



Constellation Movements: Calibres 551 -751

The first Omega Constellation mid-500 series Certified Chronometer to appear in retail establishments was the calibre 551 in early 1960. Based on the calibre 550 series developed in 1958, it is said to be part of a family of the finest production watches ever made. In this article we will explore some of the reasons why that claim is made with such frequency and conviction.

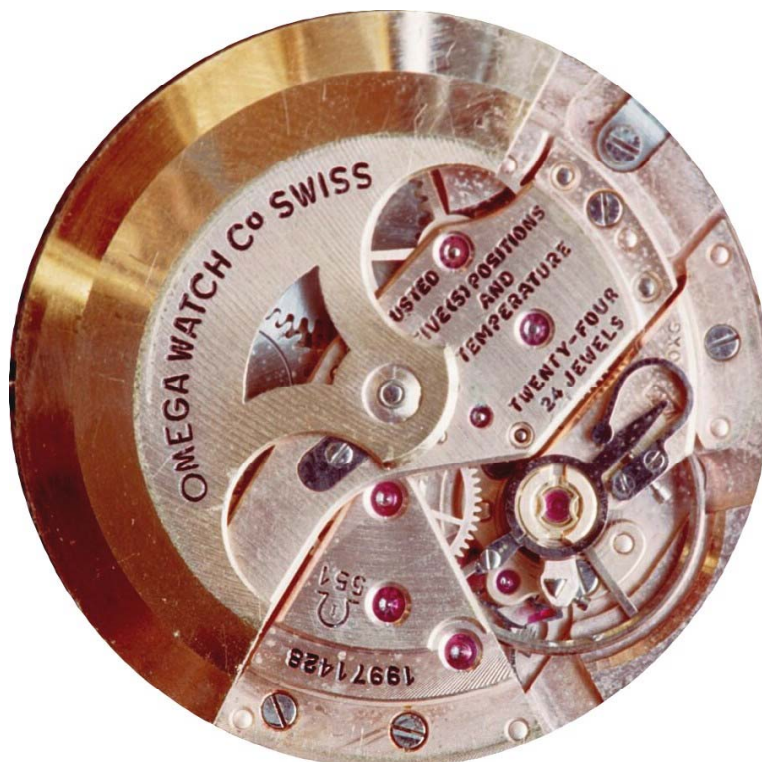
The iconic status of this series demands depth of coverage, and depth is something of which current publications are exasperatingly short, particularly for collectors who want to know as much as possible about the models they collect. Hence this article will be the longest of the series about Omega movements.

Most of the commentary that relates to the engineering and finish of the series will use calibre 551 as the exemplar for all models based on calibre 550 including calibre 751.

Thanks

As always, I am thankful to numerous correspondents for providing snippets of information to include in the article. I would like to add a special thanks to Paul Naylor and Jim Hodek for their specialist knowledge and generosity in sharing it.

As my skills in photography are somewhat under-developed, I have exploited the skills of others, in particular those of Tim Mackrain, Jim Hodek and Mark Headrick and his site at <http://www.abbeyclock.com/index.html>.



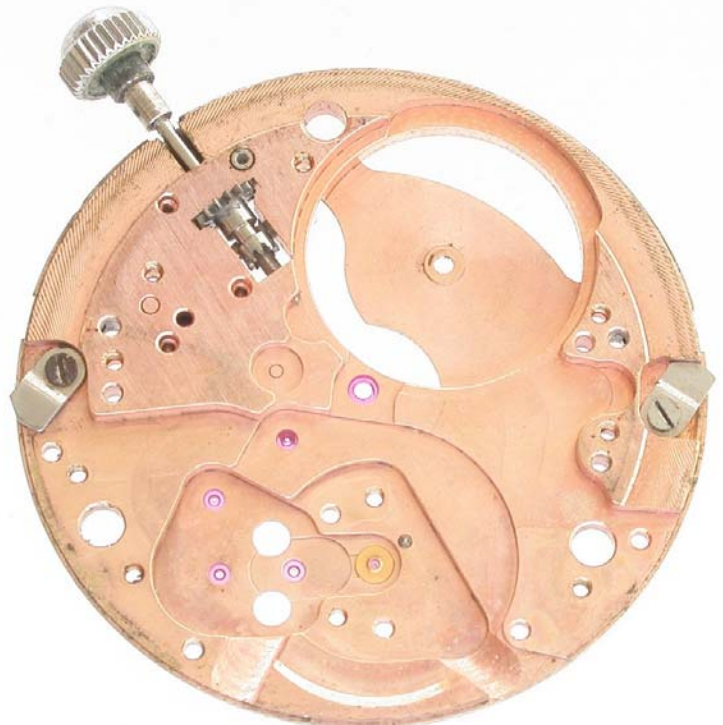
The Halcyon Days and the Evolution of the Mid-500 Series

In the 1950s and 1960s, Omega was a progressive and dynamic force in Swiss Watch manufacturing and made significant contributions to quality improvement through the design of new manufacturing technologies. The mid-500 series benefited immensely from this eruption of ingenuity, which included such innovations as the Omegametric, a revolutionary system for measuring the torque of balance-springs. Later becoming an important tool for all precision manufactures, it was invented in 1962 by Pierre-Luc Gagnebin.

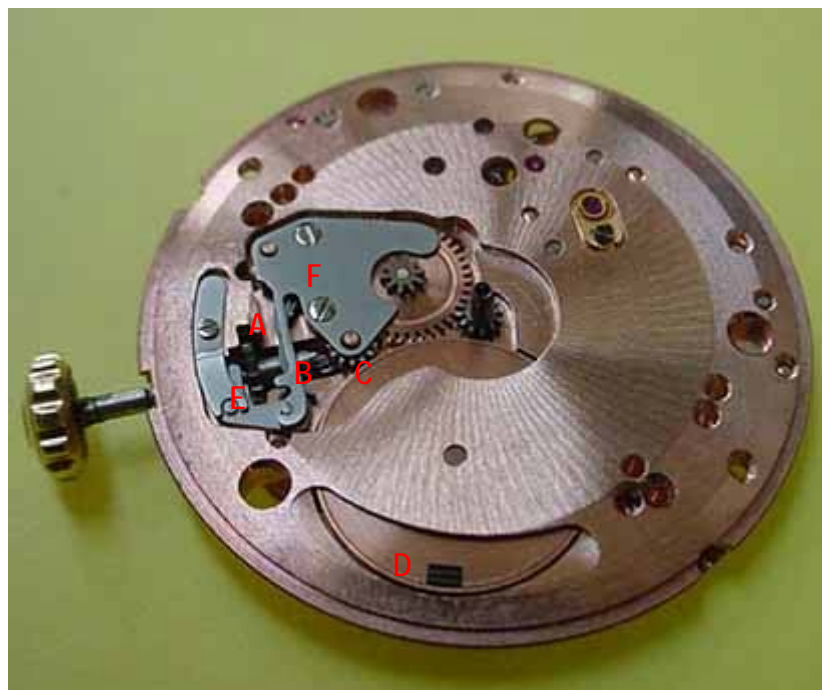
Marc Colombe created the mid-500 series under the direction of the ageing Henri Gerber who, throughout his long association with the Omega Company, had worked assiduously in continuously improving Omega's production processes. Along with improved manufacturing came a range of innovations and patents, such as the mobile balance spring stud carrier that facilitated simple adjustments of beat. Invented by Jacques Ziegler in 1959, it still appears in many high-end watches today. These developments underpin the Omega philosophy of employing technology and innovation to improve the performance and volume of its product. The mid-500 series was in many ways a successful fusion of tradition and modernity and the search for an ideal accommodation between quality and quantity, which, today, are often at opposite ends of the scale.

In 1902, Omega was one of the earliest Swiss manufactures to use the divided assembly line, thus allowing quality watches to be mass-produced. Fifty years on in the 1950s, the company underwent a massive growth program that involved takeovers, the development of new production cycles, major construction programs and the expansion of its research and development agenda. A great deal of ingenuity and capital was invested in investigating new horological approaches to old design problems on the one hand, and, on the other, of further automating many of non-critical but labour-intensive functions of the manufacturing process.

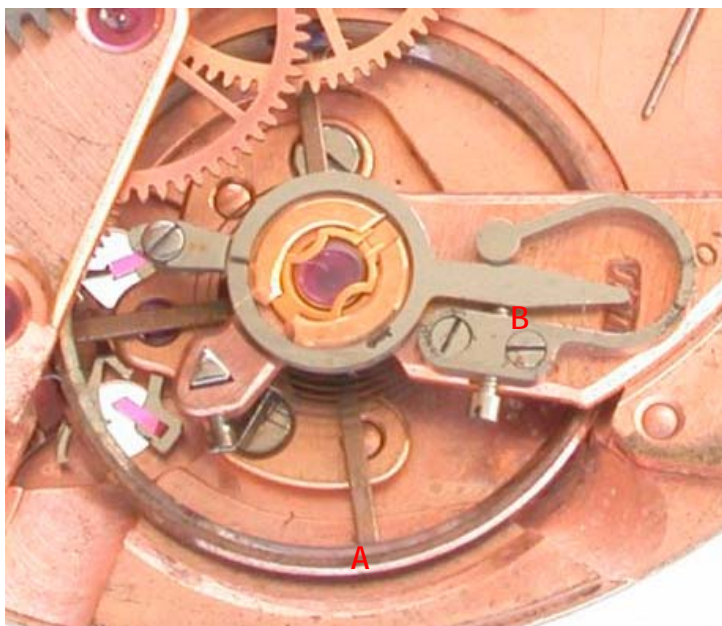
Omega clearly demonstrated its cutting edge manufacturing methods in 1960 when 20 thousand Constellations - completed in one continuous production run - achieved chronometer certification with honorary citations for their accuracy.



Main plate of a calibre 551



The front plate of cal 551 showing the keyless works: visible are A the winding pinion, B clutch, C intermediate wheel, D mainspring barrel, E setting lever and F set bridge



Four armed sand-blasted, nicely chamfered and copper plated 'Glucydur' balance wheel **A** of the calibre 551. Adjustments of the balance spring were made by the micrometer 'swan neck' regulator **B**



Calibre 551 Nivarox balance spring made from an iron, nickel, beryllium, titanium and silicon alloy. Notice the highly polished tempered alloy pivot.

It was history repeating itself in 1965 when a straight production run of 100 thousand chronometres obtained certification with merit after meeting performance criteria that were double those of movements that met non-merit criteria. These performances were the result of refined manufacturing tolerances that were hitherto unknown in the large-scale production of timepieces.

But, the process of creating an Omega was also high touch in as far as the reliance on human intervention to complete the quality cycle through skilled assembly, hand finishing and expert regulation and adjustment of movements by Omega's team of 'regleurs'.

Notwithstanding the hype associated with this family of calibres, the consensus amongst informed collectors and horologists is that it has proved over time to be one of, if not *the* most robust movement series in the history of the Omega Company and of production watchmaking in general.

A record quantity of 5.8 million of the mid-500 series of calibres was produced from 1958 to 1969. In the 1960s, Omega Constellations had Rolex on the run, and this is seen no more clearly than in the number of chronometer movements that were certified by Bureaux Officiels de Controle de la Marche des Montres. In 1962, for example, more than half of all certified chronometers manufactured in Switzerland bore the Omega name. Nearly all were powered by mid-500 series calibres.

The essential differences between mid-500 series Constellations and the equally famous Rolex Calibre 1570 were in the balance wheel, hairspring and rotor jewels. The Rolex had a white alloy hairspring with a Breguet overcoil, whereas Omega used a flat hairspring made from Beryllium alloy that allowed for adjustments by a micrometer "swan-neck" regulator. The Rolex 1570 rotor bearings were jewelled and the balance wheel featured timing screws. The Omega rotor bearings were made from a bronze alloy.

In critical functional finish there was little if any difference between these two famous calibres, although from a cosmetic perspective many believe the calibre 551 has a subtler and more refined finish than the somewhat over-damascened and colourful Rolex. Omega never gilded the lily in respect to the aesthetics of a movement and the mid-500 series had an elegance and sophistication to its finish that shames its graceless and kitschy successors.

The Base Calibre and Calibre 551

The base calibre for calibre 551 and indeed the model upon which all mid-500 series calibres were built was calibre 550. The 550 was a direct replacement for the 490 generation. Anton Kreuzer, Heinz Hampel and others have said that the early 500 calibres were taken out of service sooner than anticipated because of click wear in the winding system. However, if wear had proved to be a major problem in the short life of the series, a more plausible view would be that Omega would have produced a "fix" as soon as possible rather than compromise its reputation for quality by allowing further production runs of a problem-plagued winding system.

It is also difficult to place the assertions of Kreuzer and Hampel into the context and time frames involved in launching a new calibre series. Omega did not introduce new calibres without clear commercial and design objectives. Prototype design and testing, tooling, training, adequate production lead times and logistics for large scale manufacture of a new calibre would need to be in place before a major decision was effected to retire a calibre and introduce a replacement.

A credible alternative to Kreuzer/Hampel view is that the retirement of the early 500 series was a planned and orderly affair in line with the Omega tradition of both reflecting, and, at times, leading, market and technical developments. The trend towards ultra-thin movements would have been well known to Omega's technical and marketing doyens. The fact that the early 500 calibres were 5.5 mm thick and a bit chunky would, arguably, have provided more incentive to phase in the new slim-line 4.5 mm mid-500 series than the simpler matter of fixing a winding system in an otherwise excellent early 500 calibre.

The power reserve of the mid-500 series was improved to 50 hours with a seven-revolution spring. The old two-arm 'glucydur' balance of the early 500s series was replaced with a four-arm, nicely chamfered glucydur 'smooth' balance.

The Omega 551 did not need balance screws for timing since it was fitted with a micrometer regulator, reflecting another trend of the time in high-value watches. The removal of the other screws for poising and temperature was made possible because of the improved quality of manufacturing of balances at the time and the use of temperature-insensitive alloys like glucydur. This beryllium-iron-copper alloy is very hard and is valued for its non-magnetic and anti-corrosive qualities. It has excellent thermo-elastic properties (almost zero) that in tandem with the balance spring allows for a very steady and accurate output during rises or falls in temperature.

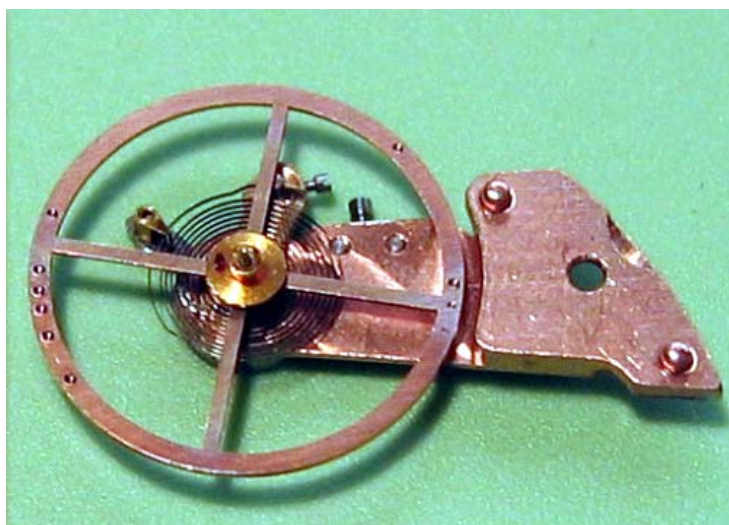
What is a Chronometer ?

A chronometer is a "super" watch, specially made, individually adjusted. It has passed stringent official tests for accuracy. For fifteen days and nights — it has been tested in five different positions, at temperatures ranging from freezing cold to tropical heat.

All Swiss chronometers receive Official Rating Certificates showing exactly how they performed in these tests.

Particularly good chronometers are awarded a distinctive notation : "especially good results" printed on this certificate. This notation, like a fine pedigree, is your guarantee of an outstandingly good chronometer.

Before you buy a watch, look to see whether it is a chronometer. Before you buy a chronometer, look to see whether it is officially certified for "especially good results". Every Omega Constellation is !



Underside of a calibre 564 balance showing pockmarks where small cores of metal have been removed to poise the balance. Photo: courtesy Jim Hodek

Poising (ensuring equilibrium of the balance) was achieved in the factory by removing small amounts of metal from the underside of the rim of the balance. Experience with these balances had shown that their extreme hardness and stability under various conditions meant they could be poised in the factory with the sure knowledge that they would remain poised over years of use and abuse. By the late 1960s more than 85% of Swiss watches being made featured a smooth balance that was factory-poised.


In the early 1960s, watchmaker's opinions counted for a lot because of the closer relationships they enjoyed with customers and the fact that many authorised dealerships were run by watchmakers who sold a number of competing brands. It's been recorded that redundant balance screws remained in quality movements with micrometer regulators simply to reassure those watchmakers who had come to expect screwed balances on higher-end watches. But, remember also, the Constellation's main competitor - the calibre 1570 Rolex - had a free sprung balance, and adjustments were made to its fully functional regulating screws by a microstellar adjustment tool.

As mentioned, regulating screws are employed to correct a number of problems that relate to natural conditions and are also used to adjust the balance poise. Such processes are labour-intensive and expensive - made the more so in Rolex's case - because many watchmakers believed that even with the correct tools the balance wheel should be removed from a Rolex watch to carry out the adjustments so as to avoid accidental pivot damage. If those very same watchmakers lamented the absence of balance screws, it was a simple matter of pointing out both the proven longevity of balance poise in the factory-poised Omegas and the economies of regulating an Omega compared with the time and expense to the customer of regulating a Rolex.

In addition to that mentioned already, the decision by Omega to embrace the trend of eliminating balance screws altogether and place its faith in the easy serviceability of the swan neck regulator may well have been an attempt to introduce greater product differentiation between itself and Rolex. But, there were risks associated with the introduction of regulators and nay-sayers had to be neutralised.

In the early 1960s, Omega worked hard to influence hearts and minds in favour of its approach to precision watchmaking. Concerted efforts to win observatory trials were part of a strategy to demonstrate that movements with regulators were every bit as good as movements with free sprung balances and timing screws. Every major triumph that Omega achieved at observatory trials was communicated to its world-wide network of authorised dealers to ensure the Omega story of quality and precision was well supported.

The same boldness and belief in technology as both a marketing opportunity and a means to improve serviceability can be seen in the introduction of the co-axial escapement. The Daniels design eliminates sliding friction in the escapement in favour of radial friction, which, arguably, has extended service intervals to ten years. Interestingly, in the Co-axial escapement Omega has returned to a free-sprung balance and the use of regulating screws. Two opposing screws adjust the effective diameter of the balance, and the necessity for additional screws to adjust poising of the balance has been eliminated in the factory by the use of laser incisions to the underside of the rim.



Why is Omega famous for its high-precision ?


Kew Teddington. Since 1933 Omega has held the only precision record officially recognized by this famous English observatory.

Neuchâtel. In 1948, at the international competitions held to commemorate the centenary of Neuchâtel, Omega outclassed all other competitors in the wrist watch category.

Geneva. Since 1943 the world's most highly prized watches have competed in Geneva's annual contest for wrist watch accuracy. Out of eight consecutive contests, six have been won by Omega ... your guarantee of consistent perfection.

World-wide Service

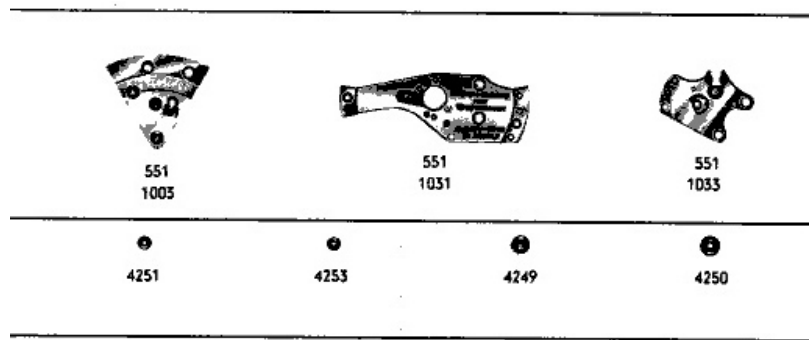
All over the free world, the finest jewelers and watchmakers sell and service Omega. Wherever you travel ... wherever you may be, you'll find authorized Omega dealers fully equipped to give you any service you may require.



OMEGA

World Renowned Symbol of Accuracy

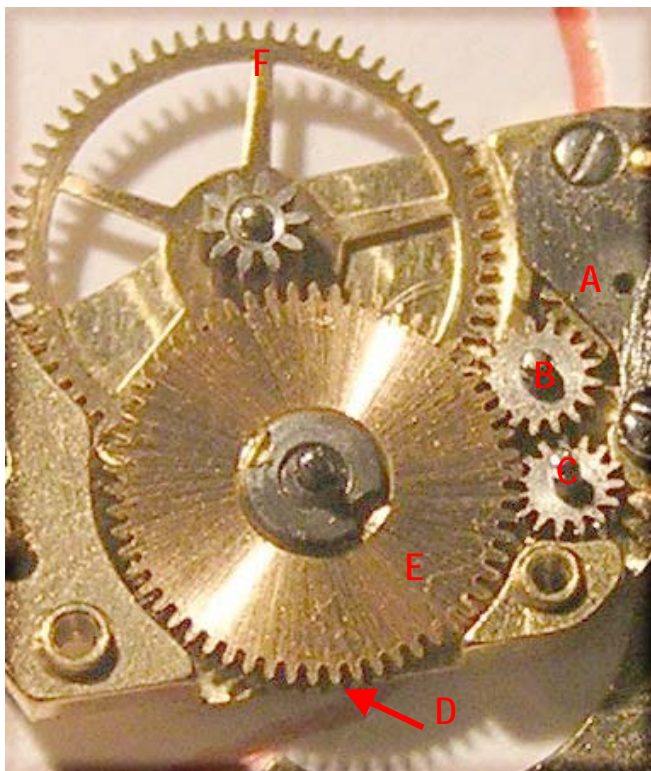
The calibre 550 housed 17 jewels. In the chronometer calibre 551 a total of 24 jewels was established as the standard. Six of the seven extra jewels were fitted to the upper and lower wheels in the automatic winding system with the seventh fitted to the upper ratchet wheel driving gear.



Excerpt from an Omega parts manual displaying parts that differed from calibre 550

An interesting aspect of the development of a new production calibre is the extent to which designers and engineers drew from the experiences of the past, not only in lessons learned, but also in terms of parts inventories. Few production calibres were ever built from the ground up and the mid-500 calibres are no exception. As any canny watchmaker will tell you, quite a number of the calibre 551 parts, for example some wheels, pinions, setting lever and spring, hairspring stud and other parts, were drawn from earlier Omega calibres, particularly the 470.

Most of the calibre 550 parts are interchangeable with calibre 551 except for the lower rotor bridge and the two 'signature' parts of a Constellation movement: namely the train wheel bridge that carries the calibre and serial numbers and the upper rotor bridge that features the stamped jewel count and the 'Adjusted to five (5) positions and temperatures' script. Many of the parts of other non-chronometer mid-500 series calibres are also interchangeable with calibres 551, 561 and 564, and this may ensure a ready supply of non-signature parts well into the future. The parts that may become scarcer are the rotor and drive wheel bridges.



The Winding System

Significant improvements to the self-winding system were made as a result of difficulties experienced with winding mechanisms of the early 500s. Problems with click wear were eliminated and the winding system was sensitive to the slightest movement.

The engineering of the bi-directional winding system centred on a double reverser wheel, shown as **D** and **E** in the opposite picture. The reverser wheels featured two small satellite wheels placed in between **D** and **E**. A large and a smaller wheel (**B** and **C**) were placed so as for wheel **B** to drive the lower reverser wheel **D** as well as the smaller wheel **C**. (Note that removal of the lower rotor bridge plate to view the winding configuration has led to the parts not intermeshing) Wheel **C** drives the upper reverser wheel **E**. A pinion mounted to the axel (arbour) and positioned underneath **D** and **E** drives **F**.

The important thing to remember is that the above configuration only created motion in one direction. The combined reverser wheels **D** and **E** drive the central axel, and thus **F**, when they are rotating in an anti-clockwise direction (dial up position). When they turn in a clockwise direction they do not drive the central axel. So, at any time, only one of the wheels is actively driving the winding mechanism.

The Omega winding system is not all that different from the Eterna design that ultimately became the most widely used bi-directional system in the world. Omega combined the two reverser wheels into one and introduced wheels **B** and **C**, whereas in the Eterna system the rotor drives directly the upper part of the reversers.

Longines, in the 43X series of movements, also used a combined reverser wheel assembly similar to Omega.

A feature of the Eterna system was the use of ball-bearings on the rotor, arguably solving the main issue of the Omega winding system, which was that of wear over time to the bronze alloy rotor bearing. It has been the subject of much speculation as to why Omega did not jewel the rotor or use a system similar to the Eterna model. To some, this is perhaps one of the most irritating aspects of the mid-500 series today, particularly as the rotor design does not allow for replacement of the bearing assembly alone.

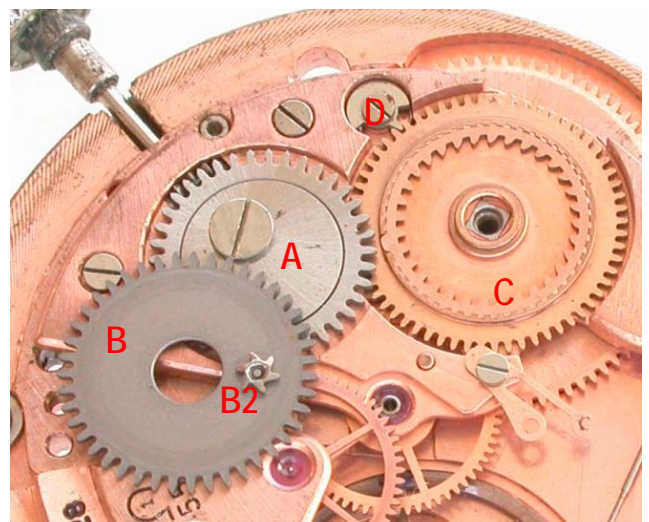
Nevertheless, rotor bearings were a minor consideration at the time because of the relative ease by which the rotor could be removed from the movement and the minimal cost of replacing the assembly. When parts were plentiful, the cost of a rotor, or rotor bridge and assembly was relatively cheap.

One particular problem that can develop with automatics using reverser wheels is wear and/or lubrication gum-up of the reversers. If the reversers fail to release in their idle rotational direction then you may well be presented with a serious problem. The Omega winding reversers are not unaffected by this issue. On occasions you will see Constellation reversers completely worn out inside because of a lack of, or improper, maintenance. The part to repair the problem is still available, but is not cheap at around US\$50.00.

It's clear, however, that all rotor-mounting methods have trade-offs. A jewelled mounting is often proclaimed to be the ideal standard, but is subject to cracking if the watch is shocked. Ball-bearing mountings can also have shock problems reduced winding efficiency and noise, and there are other design issues with the radius of the rotor driving gear. The key to longevity of any winding system is regular cleaning and lubrication to ensure it works smoothly over an extended period of time. Omega Constellation rotor assemblies will last a very long time if so serviced.



Dual reverser wheel system of the Longines 430/1/2/3 series.
Photo: courtesy Jim Hodek



The two part ratchet wheel used on Omega mid-500 series calibres. The crown wheel **A** drives the upper ratchet wheel **B** (Shown here upside down with satellite wheel **B2** visible) **B2** drives the lower ratchet wheel **C** (but not the reverse). The click **D** ensures the lower ratchet wheel only turns in one direction. The lower ratchet wheel winds the mainspring and is also driven by the automatic winding mechanism.



Calibre 551 escape wheel and pallet lever showing the jewelled entry and exit pallets

The Escapement

The calibre 551 featured a straight-line lever escapement, mirroring a preference of the Swiss watch industry for the escape wheel, pallets and balance to be positioned in a straight line. To digress for the benefit of those who enjoy a little horological history, a Chinese monk, I-Hsing, constructed the first recorded escapement in AD 725. Called the 'celestial balance', it was designed to release a regulated flow of water into a vertical tank. The French engineer Villard de Honnecourt described the first escapement for a mechanical device in AD 1250, but it wasn't used to regulate the release of stored energy in a clock. Rather, it was part of a novel machine that progressively followed the sun as it moved across the sky.

The pallet lever plays a crucial part in any watch because it is responsible for accurately discharging the power from the gear train. The calibre 551 pallet lever is made of the highest quality tempered alloy that resists fluctuations in temperature. It is finished in a smooth utilitarian fashion, which under the Omega manufacturing ethos is quite befitting of a part that is not wholly visible. It is a simple and straightforward design, is flat polished to a 'black' finish and has nicely machined round edges. Most importantly, the pivot has excellent polish and the pallet jewels are finely set and aligned. The escape wheel is also of a very hard tempered alloy.

Most major escapement systems have efficiency levels below that of 50% and the Omega calibre 551 was no exception. Couple the loss of power in the escapement with the considerable loss in the gear train and you can begin to understand how much compensatory power must reside in the mainspring.

While the calibre 551 mainspring was thinner because it supported a slow-beat movement, it necessarily had to pack a larger punch of power to offset the significant losses of energy in the drive train and escapement. A poor quality watch will quickly burn itself out coping with such forces and this is one of the reasons why the mid-500 series is held in such high esteem. The series has now been in service for more than 40 years and it's indeed rare for a well looked-after calibre 551 to have had much more than the rotor assembly and the third wheel replaced (The third wheel pivots, in particular, appear to have felt torque stresses more than other parts of the mid-500 series). In fact, a regularly cleaned and oiled calibre 551 I inherited from my father still retains all of its original parts and keeps excellent time!

Centre Seconds

To say that the mid-500 series calibres are quirky is extreme, however the series did have personality traits that, when combined, distinguished it from other production watches. While not as idiosyncratic as Rolex calibres of the time, the series is distinctive in its own right. Mention has already been made of the dual reversers and satellite wheels fulfilling the click function in the automatic winding system, the fitting of a swan neck regulator and electroplated copper finish on the parts. Besides cosmetic individuality, such as case styles and pie pan dials, Omega also took its own path in the design of the sweep seconds function.



Series showing the pallet assembly, drive train through to the balance wheel, disassembled balance wheel, close-up of regulator with incabloc shock proofing system and disassembled mainspring

The company so favoured the indirect centre seconds option that it almost became a trademark. Even the last in-house 1000 series automatic movements featured indirect centre seconds. Omega saw a number of advantages in isolating the seconds gear from the power train - one being that both centre seconds and sub seconds options were available with little modification to the movement. Indirect centre seconds also facilitated the placement of the balance wheel close to the rim of the plate, offering better visibility and access. The picture below of a mid-500 series movement shows how the centre seconds function was configured.



The sweep seconds pinion **A** (just visible) passes through the centre wheel **B**. The third wheel **C** drives the pinion **A**. Resting on the pinion **A** is the sweep seconds friction spring **D** that stabilises the sweep second hand motion preventing the jerky action that can occur owing to play between the teeth of the third wheel and those of the sweep second pinion. Notice the visibility and access of the balance wheel. Photo: courtesy Jim Hodek

The indirect centre seconds function was fully integrated and part of the initial design of the mid-500 series. Because the third wheel runs above the centre wheel it can drive the sweep seconds pinion without the need for a transmission wheel. You encounter transmission wheels on many movements of the period. In essence, the transmission wheel is a simple modification to what is basically a subsidiary seconds movement: an upgrade to meet the fashion preferences of the time for a centre sweep seconds hand. The Omega calibre 280 is but one of many examples of this mutation of an original sub-seconds design.

Finish and Quality

The robustness and durability of the mid-500 series was evident in its ability to keep excellent time during the early part of its history, but 40 years later the quality inherent in a well cared-for calibre 551 is reflected more by its dogged resistance to the forces of friction. This broaches matters of both the superiority of materials used and the manner in which critical surface areas of the movement were finished, not to mention the original engineering and design of the calibre.

The quality of materials and degree of functional finish of the parts of a movement determine both how long the parts last and how effectively they perform. Every part of a movement serves a purpose and every

moving part comes into contact with other moving parts. If the constituent materials of the parts are of high quality, it is the finish of the points of contact between the moving parts that will influence ultimately the degree of wear and tear. When parts wear away they produce tiny fragments of material that may fall on other parts and thus a cycle of continuous degeneration begins. In low-value movements with either or both substandard alloys and poor functional finish the parts must be kept well lubricated, and as soon as the lubrication fails excessive wear sets in, dramatically reducing the life of the watch.

Functional finish, the art of ensuring the efficient interlocking of the parts and applying highly polished finishes to minimise friction, is one of the principle benchmarks of a high-value movement and this is where the mid-500 series of calibres earns it spurs.



Snailing on crown and ratchet wheels. Notice damascening of the plate, producing a play of light that looks similar to mother of pearl

Omega parts were made of a hard and tough beryllium-bronze alloy. It was - as Rob Berkavicius and Paul Delury discovered after having the material analysed in a metals laboratory in Adelaide, South Australia - a copper-based alloy with around 2.25% beryllium, a combination that responds extremely well to hard tempering. This tempering method produced an exceptionally durable material with excellent wearing qualities. Paul and Rob's investigations also revealed that the rose finish of the movement was pure copper electroplated on to the surface of the parts.

Prior to the electroplating process, the base metal parts underwent a comprehensive albeit mainly machine finishing regime. No amount of external coating will obscure bad finishing of base metal parts and considerable time was devoted in the production process to ensure both the functional and cosmetic aspects of finish met Omega standards.

The more a movement is well maintained, the better it is to accurately evaluate functional and cosmetic finish. In having ogled through a highly magnified variety of mid-500 movements, ranging from the appallingly neglected to the lovingly maintained, I believe there is an amazing consistency of finish in these calibres.

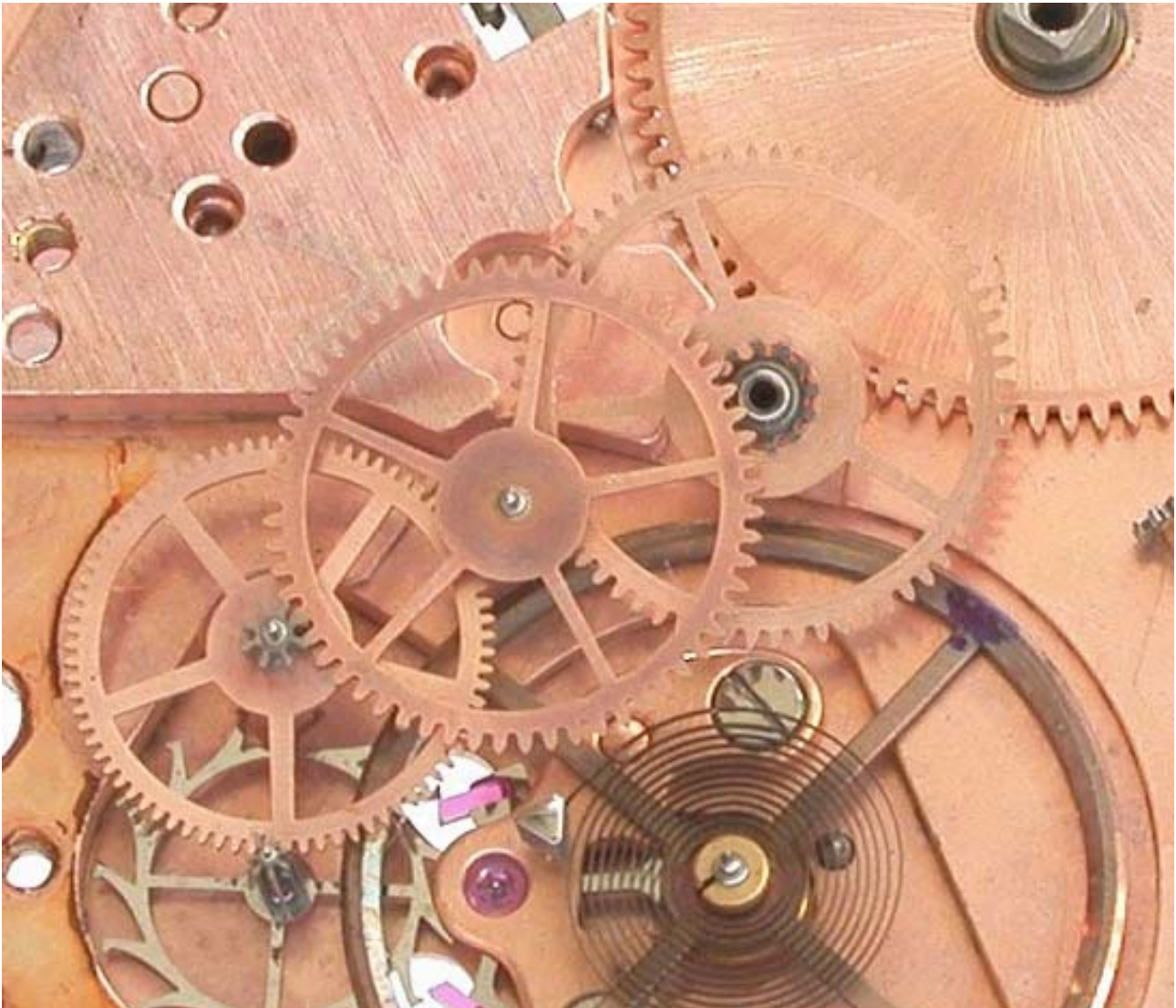
The finishing and decoration of movements played an important function in earlier, less exact times. At first, finishing was carried out both to disguise uneven surfaces and to achieve as flat a plane as possible. Today, machines can achieve what human hands could not and much of the finish on movements is redundant. The original reason for cosmetic finishing has been subsumed into a tradition, and indeed an expectation, of finishing as a means of 'beautifying' a movement. In an ideal world, the best type of finish for the 'working



Close-up of 'Arabesque' finish on parts of the plate rim creating a strobe-like effect under certain light conditions

surfaces' of a movement is a 'black' (mirror finish) polishing that produces completely level planes or surfaces - even the most outstanding damascening cannot match a black, friction-minimising polish.

In the mid-500 series, prior to copper electroplating, the flat surfaces of the movement were nicely straight-grained. The non-visible edges were machine rounded, whereas visible flat surfaces were anglaged to a high polish. Rounding and anglaging are done for both cosmetic and functional reasons. In terms of function, this type of finishing removes any remaining pieces of metal after the shaping or stamping of the parts and eliminates the problem of metal detritus interfering with the moving parts. It doesn't take much to stop a movement and one tiny fragment of metal lodged in a critical place can bring the movement to a grinding halt.



Close-up of the drive train showing machine produced wheels. The gears are expertly cut. Notice the snailing on the barrel wheel and fine grain flat surfaces with machine finished rounded edges. The pivots are highly polished. This movement has seen some neglect and keen eyes will notice rust on the plate near the escape wheel, corrosion on the pallet wheel screw and escape wheel and a dark patch on the balance.

The working surfaces contain an excellent degree of polish. The mainspring barrel cover, the barrel and the mainspring itself have smoothly polished surfaces to allow the power to disperse evenly. The teeth of the wheels are nicely formed and the wheels are grained in a circular pattern. The barrel wheel is impressively snailed, as are the non-visible reversers.

The steel surfaces are usually snailed, as in the barrel ratchet and crown wheels, or black (mirror finish) polished, as in the screw heads (in visible areas of the movement) or oilstone grey with rounded edges, as in the setting lever. All non-anglaged edges are in fact rounded to ensure that no metal fragments pollute the cased movement. The wheel bridge has an attractive three-finish effect that combines graining, finer graining on the plane that carries the serial number and a contrasting arabesque finish on the outer rim.

The two outer planes of the rotor are highly polished adding a pleasing contrast to the graining of the inner rotor. The arabesque finish continues on other parts of the plate rim and strobos in some angles of light. A damascened mother of pearl effect is created on some surfaces of the bottom plate. Other critical parts of the movement such as the cannon pinion are well finished adding to the smooth setting of the hands.

An important element contributing to the durability of a movement is the quality of the alloy used in the arbours and the quality of the polish of the pivots. The mid-500 series arbours are made of a very hard tempered alloy which meant that a succession of abrasive treatments were needed to polish the pivots to a high degree of smoothness and eliminate microscopic grooves or roughness. The pivots in the mid-500s series are excellently finished. Couple this with the low frictional qualities of hard alloy on the sapphire jewel; add a touch of oil at regular intervals and owners could be assured of many years of uninterrupted wear.

Factory Adjustments

In the 1960s, Omega was one of the most consistent entrants and indeed winners of Observatory trials in Geneva, one of the most prestigious contests for precision watches in the world. Omega's track record in major annual competitions contributed significantly to the company's international reputation for both precision and innovation. While other competitors reserved elite movements for observatory trials, Omega movements most noticeably were closely related to their regular production designs. The company was the world's largest manufacturer of Bureaux Officiels de Contrôle de la Marche des Montres (Known as BO) certified chronometers from the late 1950s to the late 1960s. Most certified movements found their way into Constellations, the flagship model of the Omega stable.

In order to obtain competitive advantage and stature as a brand, Omega decided upon and promoted vigorously the practice of only fitting in Constellations certified movements that had received a commendation for "especially good results". In contrast to the Omega initiative, Rolex and others maintained the custom of fitting the higher graded chronometer movements in their top and most expensive models. This gave Omega a distinct marketing advantage because customers were reminded that no matter whether they purchased the cheapest or most expensive Constellation they would receive the highest grade of movement.

Adjustment is one of the more esoteric and critical parts of the process of bringing a movement to completion. It is labour intensive and contributes significantly to the expense of production. While Joseph Ory, Omega's chief movement regulator, or 'regleur de précision', was tweaking Omega production-related calibres for the major competitions of the day, a group of master watchmakers undertook the task of balancing meticulously all critical components and ensuring precise tolerances between interacting parts to make certain that as a matter of course Omega Constellation movements met the criteria for "especially good results". Movements that did not meet the criteria but still attained certification were used in other chronometer models of the time, but, as mentioned earlier, Omega had become so consistent in producing large numbers of movements that exceeded basic chronometer standards that there were few lower-grade chronometres ever produced.

Adjusting a movement centres mainly on the balance wheel and hairspring. Notwithstanding significant improvements in materials and design, adjustments for gravity-related error, temperature variance and isochronic errors are tedious and time-consuming.



Joseph Ory, Omega's "Regleur de Précision" in the 1960s

The standard that Omega chose to meet was that of adjusting the watch to perform at *better* than plus or minus six seconds per day over five prescribed positions and temperatures and over a specified period of time. This meant painstaking processes such as the removal of minute 'cones' of metal from the balance to improve poising so as to enhance the rate of timekeeping over the entire slope of the torque curve of the mainspring.

FEATURED AT THE
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Ω
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Deviations in an unadjusted movement in various positions and in various temperatures could be as much, or more, than 30 seconds a day. The role of the Omega production regleurs (master watchmakers) was to observe and test for deviations and make the adjustments to meet Omega's criteria of attaining "especially good results" from the testing bureaux. Some of the procedures undertaken to improve accuracy included testing and correcting for trueness, or true-ishness, of the balance (Perfect roundness of the balance and exact pivot centring); poising to eliminate centre of gravity error; tiny manipulations of the micro regulator to keep the number of swings of the balance as constant as possible, and a variety of other procedures to ensure each piece exceeded chronometre standards.

Some of the work in adjustment was automated or at least carried out electronically as the advertisement overleaf demonstrates. When one discounts the hyperbole, what the advertisement also illustrates is that with 25% of its workforce devoted to quality control, the company recognised the absolute necessity in the 1960s of ensuring that the Omega Constellation lived up fully to claims of quality and precision made in advertising.

Slow Beat – High Dependability

The mid 500 series was a slow-beat movement with the balance wheel oscillating at 19,800 half swings an hour, although a so-called 'true' slow-beat is said to oscillate at 18,000 half swings an hour. It's a useful digression to evaluate the comparative benefits of slow beat over fast beat movements. Slow-beat movements, in general, require less energy (torque) to drive them and therefore can accommodate softer and thinner mainsprings.

Having less power under the bonnet - even after compensating for energy loss through the drive train and escapement - means a corresponding reduction in stress and strain, reducing friction levels through the train to the escapement. It also allows for less friction on the winding system. By extension, a quality watch that endures less friction is likely to require fewer visits to the workshop for repair and have far fewer worn parts in need of replacement. Further, it can be argued that a quality slow-beat movement will not wear as much as a fast beat movement if lubrication failure occurs, as it often does in the everyday world.

Combine lower friction and less potential wear - caused by irregular or incorrect servicing - with a first-rate escapement, micrometer regulation and a movement that had a high level of 'functional finish' (polishing and finishing of intermeshing parts of the movement where friction and wear occur) and you may begin to understand why the mid-500 series earned such a spectacular reputation, initially for precision and later for longevity.

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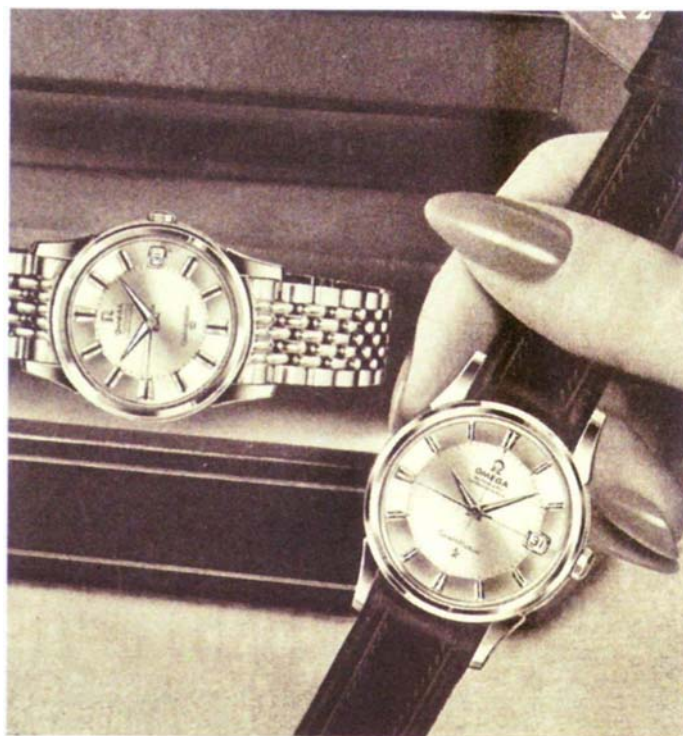
Ethos

It's worth revisiting a point made earlier about the Omega Company's manufacturing ethos. The Brandt legacy was one of creating timepieces to match a vision of aesthetic and technological excellence, and the Omega Constellation was, as has often been stated, a "high-value" watch. While the last of the family line of actively managing Brandts passed away in the late 1950's, their manufacturing *raison d'être* was very much in the forefront of the organisation's corporate memory in the 1950s and 1960s. It was a legacy that gave prominence to time-honoured values of quality, tradition and artistry: not to forget more than a measure of horological 'hauteur' that was informed by some of the more self-serving myths and legends of Swiss watchmaking.

If we take the Swiss perspective in reviewing the halcyon days of the mid-500 series, Omega, with a history of more than fifty years of mass-produced timepieces, had not embraced the Americanisation of automation that began with Fordism and over time legitimised built-in obsolescence and planned dilapidation as a primary means of fuelling the madness we now call consumerism. In Omega's case, mass production was leveraged to tighten tolerances, improve efficiency and to produce quantity, which, in turn, meant growth and profit, but not at the expense of quality and durability. In fact, Omega mechanised numerous processes knowing that the resulting exactitude would enhance quality.

In the 1960s the company was also yet to confront the jewel free, pin-lever 'disposable' watch of the 1970s, which, through successful marketing campaigns that altered price/value perceptions, went on to capture more than fifty percent of the US market by the middle of that decade. The Japanese were yet to swamp many of Omega's traditional markets with their sturdy, somewhat ugly and vastly cheaper mechanical movements in Seikos and Orions. And, while electronic watches like Bulova added competitive pressure and prompted Omega to follow suit in some models, the quartz explosion was still some years away and didn't overtake mechanical watches in numbers produced until 1978. The Swiss would say that Omega was forced by overwhelming circumstances to entertain notions of manufacturing to a price as opposed to a standard in the 1970s, and it is pleasing to see that today it *seems* to be moving closer to its origins.

And so, the mid-500 series can be seen as one of the highest forms of the evolution of the production movement *before* price got in the way. The DNA of the mid 500-series is traceable to traits and attitudes much closer to haute horlogerie than the quality-compromised, cost driven assembly lines of the 1970s. The series is a true work of art and function, produced in an era that witnessed the pinnacle of the production watch - a combination that so inspires today's horological petrol-heads.



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OMEGA

The Calibres

551

As calibre 551 has been used as an example throughout this survey of the mid-500 series, there is no need to repeat information mentioned earlier.

Calibre 551 was the only non-date calibre to power mid 500 series Omega Constellations: let no-one try to convince you otherwise. Any watch without date of this period purporting to be an Omega Constellation that has a calibre 550 or 552 movement under the dial is incorrect.

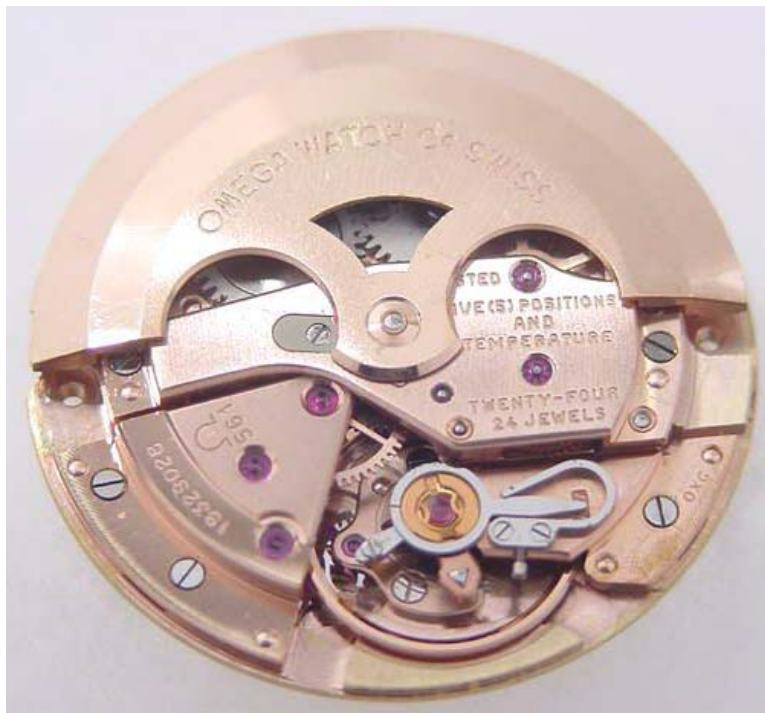
561

While modelled on the calibre 551, the base calibre for the 561 is calibre 560. New parts were added to the base calibre to build a date function into the series. A new plate was required to accommodate the date mechanism and other re-designed parts.

The calibre 561 does not feature a quickset date function, mirroring the state of technology at the time. Omega's main competitor, the Rolex calibre 1570, also did not have quickset date. The date can be set either by winding the watch forward or backwards to nine or ten o'clock and then forwards to twelve - a feature of non-quickset date models designed to facilitate more rapid calendar changing. I believe, however, that collectors should not do this too regularly, as on some occasions it can mark uncannily the time at which the calendar function fails.

The calendar mechanism works by connecting the hour wheel **A** to a wheel with twelve teeth **B**. On the same axel as **B** is a wheel **C** (not visible in picture) with eight teeth. This wheel drives the forty-eight tooth date indicator driving wheel **D** that rotates once in every 24 hours. The driving pin **E** engages the teeth of the date indicator **F** at approximately 2200 hours and completes the change at midnight.

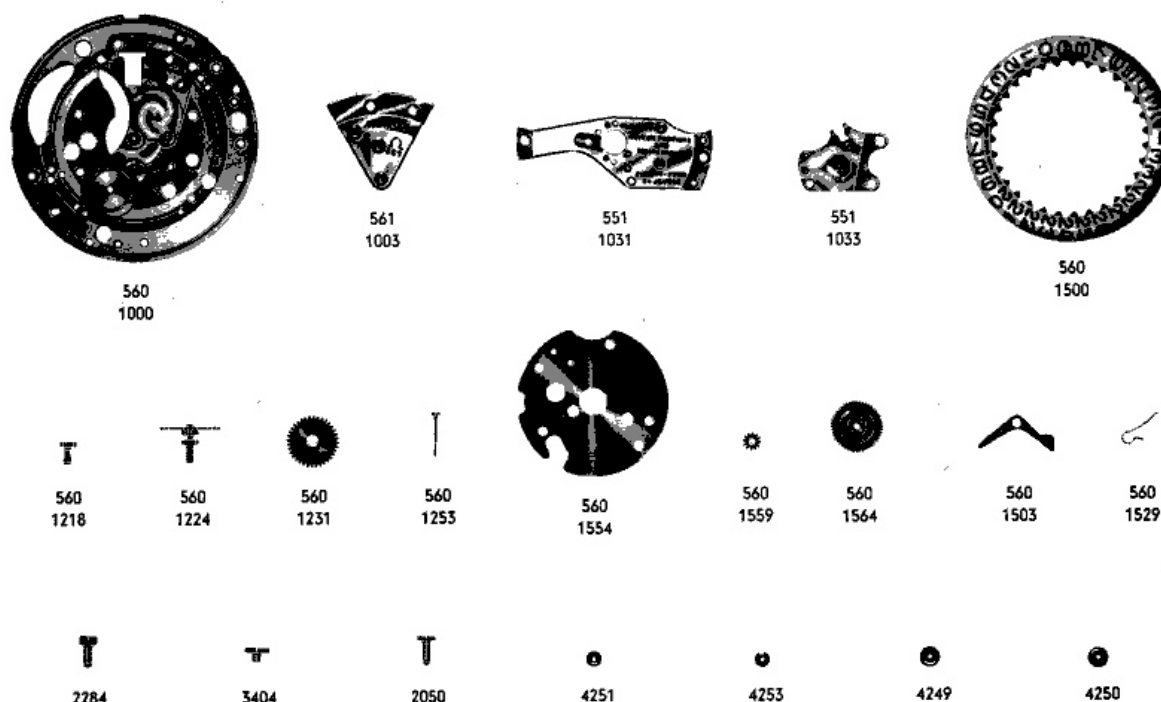
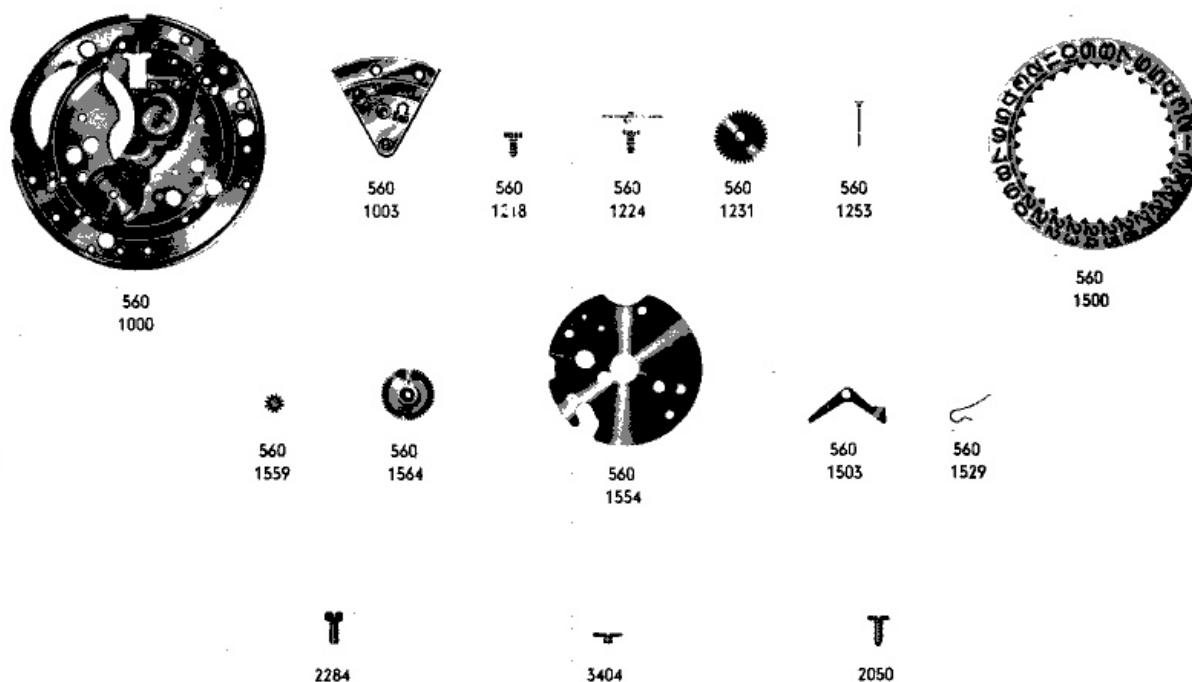
Further modifications were made to the date indicator driving wheel **D** that eliminated the double safety cam mounted on the pipe of **D**. A lighter wheel replaced the old wheel



Photographs courtesy of Tim Mackrain

and, coupled with a strongly sprung date jumper, it prevented displacement of F when the movement was severely shocked.

Calibre 561 was released in late 1959 and the first model to feature the new calendar Constellation was the Grand Luxe model OT 16963. The easily observed signature parts of the movement are the train bridge that bears the calibre number and the rotor bridge. You may also notice the stamping of OXG just below the rotor bridge on the rim of the movement. The location of OXG varied in different production runs and it denotes the Omega 'House Code'. House codes were stamped on most imports to America. OXG was the Omega ebauche code and, in the case of Omega, the 'manufacture' that produced the movement under its own name.



Top: Parts list showing the variations of the base calibre 560 to calibre 551. Below: Parts list for a Constellation calibre 561 showing variations and commonalities to both the 560 and 551.

Calibre 562

It is reasonable to state from the viewpoint of 'informed collecting' that the 561 was the first and premier calibre for the early calendar mid-500 series Constellations. Being the first means that, from the standpoint of collecting this series of Constellations, it is an important movement to have in one's collection. Premier, from a collecting viewpoint, can be interpreted to mean first amongst others.

The reason why it is useful in exploring issues such as the first of a model and the most desirable models to collect becomes clear when you are confronted with claims about other calibres being legitimately connected to the Constellation marque. For example, in the paper records held by Omega Museum there is a notation that some calibre 562s were adjusted to meet chronometre certification, were issued with certificates and powered early calendar Constellations. These notations may or may not be accurate, but the real question is, why would you want to have a calibre 562 when most lines of reason would point you to calibre 561 as being the definitive model of the early calendars?

While I think it's premature to say with certainty that the records are either correct or incorrect, I have never seen a calibre 562 that met fully the specifications for a Constellation – there has always been something missing – and I think it is commonsense to leave the collecting of 562s to those who have great affection for Seamasters and Devilles.

550 27.90 R.A.S.C. PC AM 17 p (27.9 x 4.5)	19800	1960	Seamaster - Dynamic - 797'000 pieces
551 27.90 R.A.S.C. PC AM bull 14 p	19800	1963	Constellation - Seamaster - chronometre - 37'000 pieces (dont 20'000 Nos consecutifs en 1960)
552 27.90 R.A.S.C. PC AM 24 p	19800	1963	Seamaster - Geneve - 316'000 pieces
560 27.90 R.A.S.C. PC CAL AM 17 p (27.9 x 5)	19800	1969	Seamaster De Ville (1960) - Geneve - Dynamic - 3'000 pieces
561 27.90 R.A.S.C. PC CAL AM bull 24 p	19800	1968	Constellation chronometre - remplace par le 564 - cal. 561+563 = 1167'000 pieces
562 27.90 R.A.S.C. PC CAL AM 24 p	19800	1968	Seamaster - Seamaster De Ville (1960) - en partie avec bull. (Constellation) - remplace par le 563
563 27.90 R.A.S.C. PC CAL CORR AM 17 p	19800	1965	premier calibre CORR - cal. 563+564+565 = 1'640'000 pieces
564 27.90 R.A.S.C. PC CAL CORR AM bull 24 p	19800	1965	premier calibre CORR - Constellation - Seamaster (par. le 2'000'000eme chronometre Omega)
565 27.90 R.A.S.C. PC CAL CORR AM 24 p	19800	1965	premier calibre CORR - Seamaster - Geneve - Dynamic (1965)
			total cal. 550 a 565 = 3'511'000 pieces
			total famille 27.9 autometriques - manuels 19'800 A h (cal. 550 + 560 + 600 + 610 + 750) = 5'831'000

Screen capture of a page in the Omega Museum document 'Nomenclature des calibres Omega' showing that some Constellations were powered by calibre 562s – underlined. Translation of 'en partie avec bull. (Constellation)' literally means that some pieces were issued with a chronometer certificate (bulletin) and were used in Constellations

As you may have concluded, the interchangeability of the early 56X calibre parts is both a godsend and a nightmare for collectors. While one should not be fussed about a competent watchmaker purloining minor parts from other early 56X calendar models to repair a genuine calibre 561, you should be less than happy to discover a Doktor Frankenwatch taking a non-chronometer movement; finding a Constellation dial; sourcing signature Constellation parts, such as rotor and drive train bridges, dauphine hands and correct crowns; removing the old drive and rotor bridges from the donor movement and popping on the signature bridges. This can be seen as both opportunistic and deceptive. Apart from exploiting novice collectors, it corrupts market supply to have yet another Frankenwatch doing the rounds.

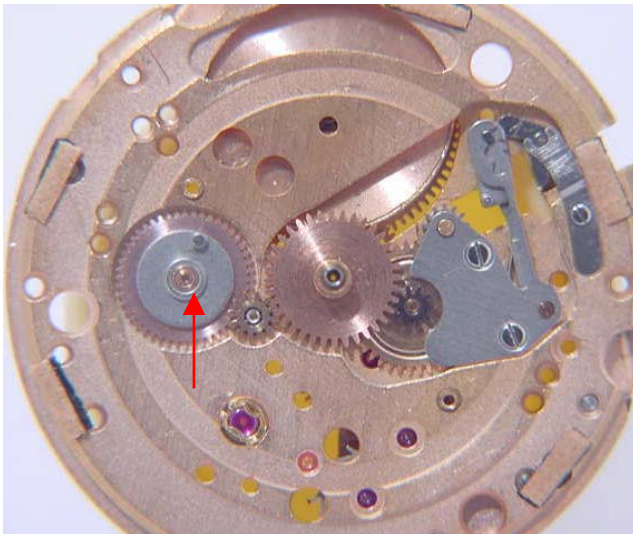
Fortunately, more than half a million true calibre 561s were produced. So, why consider a early calendar Constellation that is not to specifications, that does not have crisp case lines, that does not have correct hands, that doesn't feature a correct original dial and dial markings and does not have a correct crown? There are plenty of calibre 561s that do, and all you need is patience and somewhat deep pockets. Further, there are calibre 561s that have their original, aged and authentic papers - such as receipts, owner's manuals and chronometer certificates that have matching serial numbers. I recently purchased a solid 18k gold calibre 561, C-shaped bracelet model with authentic papers and was surprised at how little by the way of premium I had to pay.

Apologists on eBay and other discussion forums suggest that there is really not much variance in the early 56X calibres and suggest that the only difference in Constellations was that the balance and balance spring were manually regulated before gaining a chronometer certificate. They often explain that, after fifty years, numerous parts have probably been replaced and there is little contrast between a genuine 561 and an impostor. What they fail to mention in their self-serving apologies for, and snake oil defences of, all sorts of shonky listings is that only chronometer movements that received certificates declaring "especially good

results" (criteria roughly double of that of basic certification) were fitted to Omega Constellations. Further, they fail to mention that many Omega Constellation calibre 561s owned by careful and appreciative owners who regularly serviced their watches survive today without having had many, if any, parts replaced. In their ignorance, they also fail to acknowledge the fundamental tenets of collecting, that of valuing the rarity, originality and historical integrity of a watch.

The differences are much greater than the apologists suggest and, from a collecting standpoint, to own a nicely preserved calibre 561 with genuine papers is an aspiration that is both worthy and attainable. Further, if papers aren't available on a well-preserved and authentic Constellation, you can, for a fee of 60 Swiss Francs, receive from Omega a certificate that provides details of its authenticity and the original shipping destination of the watch. Such certificates support the provenance of authentic Constellations, and will preserve and, in time, enhance, the value of your investment.

564

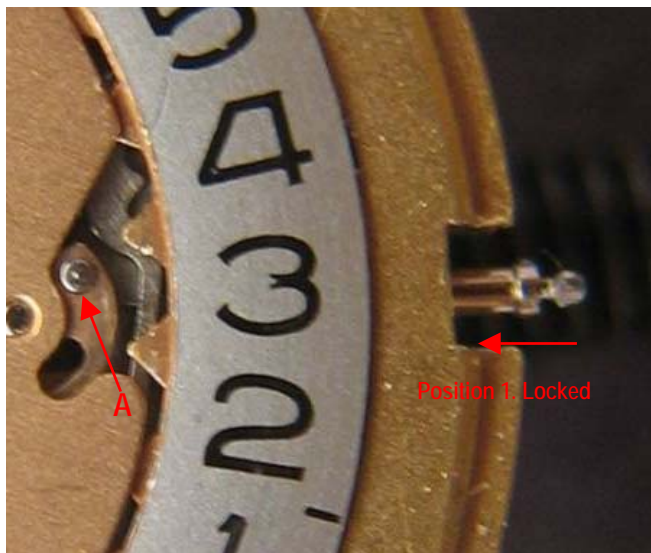


Front plate of a calibre 564. Note the upgraded date indicator driving wheel. The configuration for normal driving of the date mechanism is the same as calibre 561. Photo: courtesy Tim Mackrain.

The base calibre for the calibre 564 Constellation is the 17-jewel calibre 563. The additional 7 jewels of the calibre 564 are devoted to the winding system as they were in the 551. There are few differences between the 563 and 564 and both feature the quickset date function.

Apart from some modifications to the plate and a new date indicator guard, a handful of new parts largely for the winding assembly and quickset function were designed for the new quickset date base calibre. Most of the parts for the base calibre came from earlier models, mainly 550, 551 and 560, however some important parts were sourced from even earlier calibres, mirroring a custom at Omega of not reinventing the wheel, so to speak.

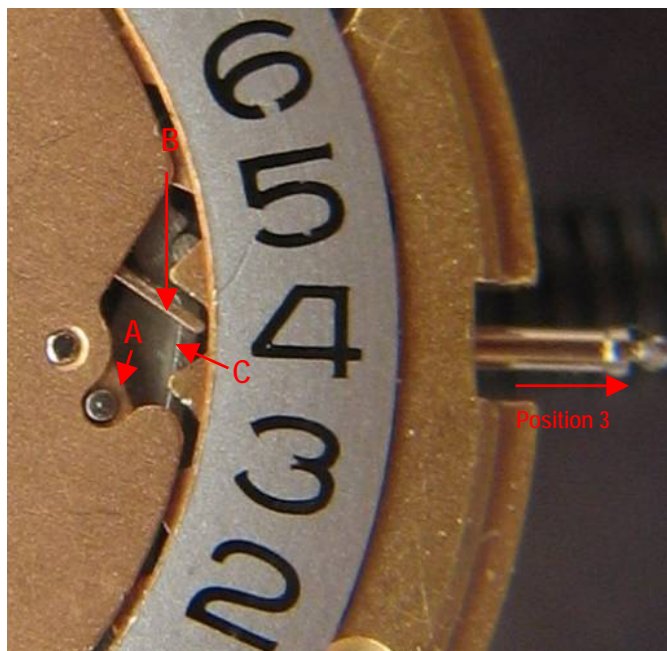
The date change function on the calibre 564 isn't rocket science. Instead of rotating the crown to advance the date, a pull-push motion allows the date to be advanced day by day. There are three positions of the crown, and as the crown is pulled out from the lock position 1 to its farthest point at position 3 it engages a spring that impels the date lever to engage the teeth of the date, advancing the date by one day. The process is repeated until the correct date appears. To set the hands, position two of the crown is selected and the crown is rotated until the correct time appears.



Quickset function with the crown in the lock position 1. Note date corrector pin position A. Photo: courtesy Jim Hodek

The quickset design is reasonably robust, but somewhat bothersome. Many believe that the date setting system in 1000 series Constellations that allows date selection by rotation of the crown is more durable and more efficient. There can be wear

problems associated with the calibre 564 quickset configuration, the breaking off of the spiral (see B overleaf) on the date corrector being the main problem in earlier 564s, however in later calibre 564s the part was redesigned to eliminate the spiral in favour of a more solid part. One is able to tell when modifications of this type occurred because of the figure 1 placed within the Omega symbol on the drive train bridge.

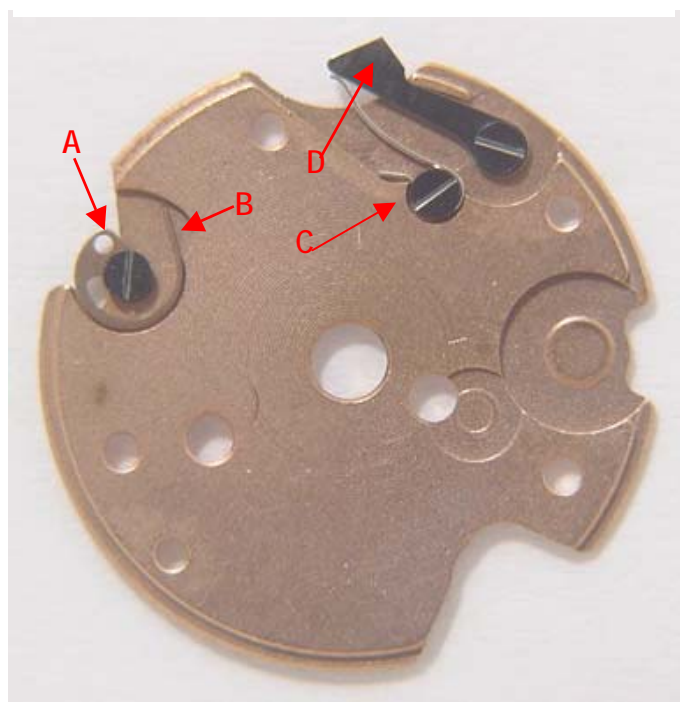


Close-up showing the crown in position 3. Notice how the pulling out of the crown has pushed the date corrector pin into a lock position at **A** and the date corrector spiral **B** has completed its function. Photo: courtesy Jim Hodek

The picture opposite shows the action of changing the calendar. The date corrector is attached to the set lever by a rod **C** that can just be seen in the picture opposite. (See the previous picture for a better view of the rod). When the crown is pulled out to **position 3** the set lever starts the date changing action by causing **A** to move towards its locking position and **B** to 'nudge' the date wheel tooth down one notch, thus advancing the date from 3 to 4.

The date jumper **D** and jumper spring **C** in the lower picture work in tandem with the correcting mechanism to ensure that the date is set exactly in position and that only one day is advanced at a time.

The second picture shows the reverse of the date indicator dial guard. This part connects the date indicator wheel to the rest of the movement and provides attachment for the date corrector (spiral part at **B** and pin at **A**) and the date jumper **D** and spring **C**.



Date indicator guard showing **A** the date corrector pin hole, **B** the date corrector spiral **B**, **C** jumper spring and **D** date jumper. Photo courtesy Tim Mackrain

Constellations powered by calibre 564 started reaching the shops in the first half of 1966: the C-Shaped and 35mm round models being the earliest cases to house the movement. Also housing calibre 564 was the new monocoque (one shell) series that featured the some of last of the pie pan dials along with more contemporary flat dials.

Some collectors nominate the calibre 564 Constellation as the true owner of the title of Best Production Movement Ever Produced, possibly placing too much weight on the quick set modification.

If we follow the modification logic, we must then consider the 751, which has exactly the same DNA as the 561 and 564 but with the added mutation of a day function. True, there were improvements on the 561, for example, the modified date indicator driving wheel, but there were also modifications of the 564 such as the remodelling of the date corrector part.

We are thus confronted with the question of which version of the calibre 564 is the definitive 'Best Ever'? But, don't debates of this kind entrap the parties involved in endless spirals of argument that lead nowhere? Is it not wiser and much more conducive to one's blood pressure to view the mid-500 series of calibres as members of the same family: as siblings born at reasonable intervals? Not to put too serious a slant on it, this can allow mid-500 series devotees to find a level of furious agreement that allows them to conserve their energies in readiness for the inevitable onslaught from the 30T crowd, which will mount an argument based on indestructibility while dancing around important questions of design, technological development and function!

Impostors and Ring-Ins

Calibre 564 chronometer certified movements also powered a small number of Seamasters, such as the example opposite, and the Seamaster movements are indistinguishable from the Constellation movements. They bear the same rotor bridge and train bridge markings and some have very similar cases to some calibre 712 models.

On occasions you may encounter a Seamaster case housing a calibre 564 with a faux Constellation dial. This is sheer madness because of the comparative rarity of some Seamaster chronometers released in particular case numbers. Arguably calibre 564 Seamaster chronometers in good condition should be of a comparable value to their Constellation cousins because relative numbers were small.



Calibre 564 Chronometre Seamaster. Photo: courtesy Jacques Phedonos

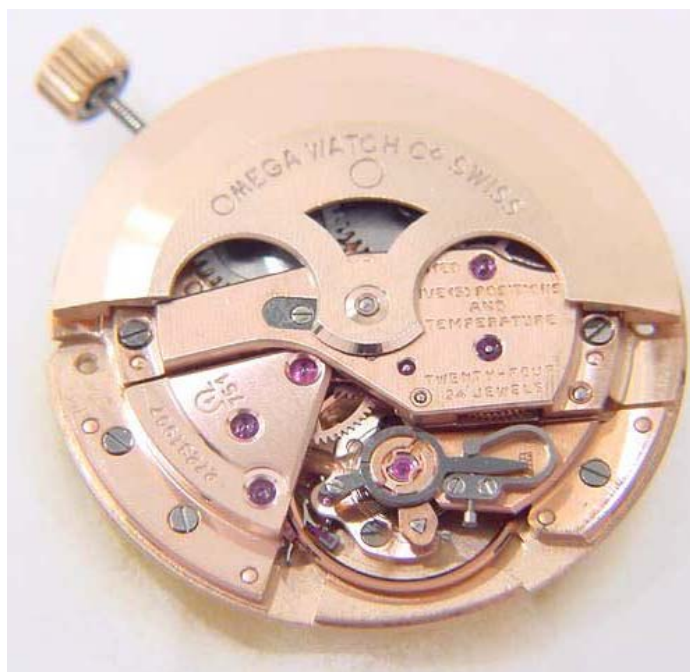
The most common Franken quickset Constellations you will encounter are those powered by a calibre 565 non-certified movement or the 17-jewel calibre 563, - with or without the rotor and train bridges swapped - that originally powered a number of Seamaster DeVilles. One way in which to tell whether a Doktor Frankenwatch has been playing 'swapsies' are colour variations between the bridges and the rest of the movement. One has to be careful in declaring a Frankenwatch too soon because some colour variations are caused by bodgy servicing methods, particularly the use of wrong or exhausted cleaning solutions that either strip the copper electroplating off the parts, tarnish them or effect variable colour changes to some parts. As far as I am able to state with certainty, the only quickset 56X calibre to be fitted into Constellations was calibre 564.

751

The long and lamentably neglected calibre 751 is, as mentioned earlier, a sibling of the earlier mid-500 series calibres. The 24-jewel calibre 751 had a commercial life of about nine years until the Swiss watch crisis began to really bite in the mid-seventies.

The base calibre for the 751 is the 17-jewel calibre 563. The rotor bridge and the lower bridge for the rotor were sourced from calibre 551. A new plate was necessary to build the day/date function and a complimentary date indicator guard was designed to fit. The 563 date indicator was flattened to fit the new configuration, but basically the date mechanism and the quickset function are identical to the last modified calibre 563/564 models.

A new day dial with star assembly was designed to attach to a day star driving wheel that was connected to the centre wheel assembly. The normal mid-500 series centre seconds design was



Calibre 751 Day/Date movement. Photo: courtesy Tim Mackrain

used and advancing the day function is very much like how we should now advance the old calibre 561 non-quickset date in as much as advancing the time 24 hours in order to change the day.

The 751 was the last of the great production movements manufactured by Omega. Apart from being the power source for Constellations from 1966 to 1975, it also filled the elegantly designed gold case, milled from a block of solid 18k gold, of the famous BA168.023 'Golden' Seamaster. Rarer than any Constellation series ever produced, only approximately 1000 examples of the Golden Seamaster were ever built.

Today, some of the more discerning collectors are recognising the value of the calibre 751 and its direct lineage to the celebrated calibre 551. The 751 is every bit as good as the earlier calibres and represents the youngest child of the famous family. Far from embodying the precociousness of the baby of the family, every thing that can be said about the earlier mid-500 calibres can be said about the 751.

The 751 was also the first calibre to power integrated bracelet models. In the mid 1960s, Omega initially resisted the demands from its dealers to produce integrated bracelet watches, but in 1969 it relented and produced the eminently collectible model ST 368.0845. Over the past twelve months there has been some movement in the price of this and other calibre 751 models as some of the aversion to this calibre evaporates in direct proportion to the significant rises in price for earlier mid-500 calibres.

Calibre 752

As with the calibre 562, there is an ongoing debate about whether calibre 752 powered some Omega Constellations. The Omega database indicates that calibre 752 powered the integrated bracelet Constellation models 166.0252 and ST 366.0857. However, the Omega Museum document, Nomenclature des calibres Omega, does not list the 752 as having been fitted into Constellations. There may be several explanations for this disparity.

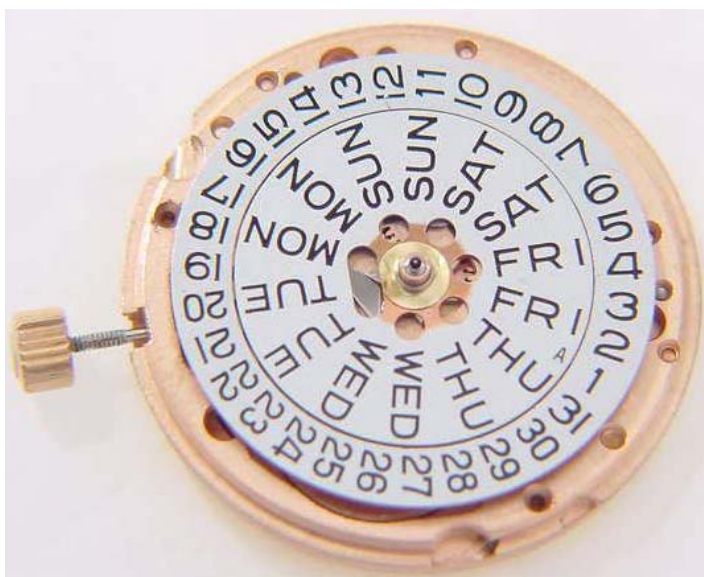
The above models were produced after 1975 when the Swiss meltdown was in full swing. They were produced during the changeover to the 1000 series calibres and they may have only been produced for the Japanese market. I have seen three examples of Constellations housing calibre 752s – all of which were originally located in Japan. While a sample of three coming from one country is not large enough to state with certainty



Date indicator and guard with day dial featuring longer date jumper and spring



Comparison date indicators. Right: indicator for 564. On the right are the 751 and 564 hour wheel assemblies. Note the pinion for the star wheel on the left and the longer finger assembly



Full assembled day/date configuration: Photo courtesy Tim Mackrain

that some 752 chronometer and non-chronometre grade movements found their way under the Constellation livery, they do present an argument for open-mindedness until the matter can be proved one way or the other.

In Finality

As mentioned initially, to my knowledge there are no publications available that attempt systematically to provide an in-depth survey of evidence that supports conventional wisdom that the mid-500 family of calibres were the best production movements Omega ever produced and, arguably, the best production movements ever produced by a Swiss watch company. What I have sought to do in this article is present some breadth and, with any luck, a bit of depth to the history and engineering of these magnificent calibres. Hopefully it adds in some way to the collective body of knowledge on the series.

The first thing that this examination has established is that Omega Constellation calibres were 'high value' movements. But were they of higher value than their contemporaries?

In reviewing the construction, design, materials, finish, precision and ongoing durability of these calibres, there is no doubt in my mind that the mid-500 series is exceptional for a production watch. There is also no doubt in my mind that, when comparing apples with apples and exploring the evolution of Omega calibres, both in terms of functionality and durability, that the mid-500 series is the best that Omega ever produced.

Whether or not they were the best production calibre ever built can only be tested over and over on the watchmaker's bench and turned over and over in the expert horologists mind. Perhaps, in the history books some of the more recent production watches will ultimately claim that title? Who knows? Certainly, they were first amongst equals when one considers their main competitors of the time. But, the fact that a broad base of collectors, watchmakers, dealers and horological sages consider them the best is good enough for me.



Calibre 752 Constellation full COSC case numbers 166.0252/ 366.0857 with genuine blue dial. Purchased in Japan in 1970

Glossary of Terms

The following terms used in this article are listed alphabetically:

ANGLAGE: The machine or hand angling of plate and bridge edges. Is both cosmetic and functional as it removes sharp edges that may sustain some damage during service, remain as detritus in the movement and potentially affect the mechanics of the movement.

ARABESQUE: The embossed parallel lines around parts of the rim of a number of Omega calibres that often creates a strobing visual effect when seen in particular angles of light. The style of decoration has now been used in the latest Omega in-house calibre with some fanfare and erroneous claims of it being a 'new' feature of Omega manufacturing.

ARBOUR: The axle or shaft on which a wheel or pinion is mounted.

BALANCE: The mechanism that controls the speed of the to and fro oscillations of the balance wheel. Consisting of a number of parts, the major of which are the balance staff, the balance wheel and the balance spring.

BALANCE SCREW: One of a number of small screws inserted horizontally in the rim of a compensated balance. Adjusting these selectively can correct the poise of the balance, the rate (timing) of the movement and may help to correct position errors

BALANCE-SPRING: An alternative name for the hairspring.

BARREL: A mainspring barrel that drives the train directly.

BEAT: The 'tick' of a watch, produced as a pallet comes into contact with the escape-wheel.

BRIDGE: A block screwed to the top plate of a movement, with a hole in it (often jewelled) to support one end of the arbour.

Bureaux Officiels de Contrôle de la Marche des Montres. Known as BOs. Independent and authorised testing laboratories that undertook the task of evaluating and awarding the chronometer appellation to large volume consignments of movements. Observatories only tested chronometers in specific competitions. In 1973, the bureaux in five watchmaking cantons (Bern, Geneva, Neuchâtel, Solothurn and Vaud) as well as the Fédération de l'industrie Horlogère Suisse were amalgamated into a new centralised testing body called COSC or Contrôle Officiel Suisse des Chronomètres.

CALIBRE: The physical make-up of a watch movement that distinguishes it from others: a description of the personality of a watch. A watch can be described as being of large, small, deep, slim etc. calibre.

CANNON PINION A pinion that is a friction-fit on the arbour of the centre wheel and has a tubular extension (the shape of which gives rise to the name) passing through the central hole in the dial, on which the minute-hand is fitted.

CENTRE WHEEL: The second wheel of the train, driven (by means of a pinion which shares its arbour) from the great wheel. The arbour forms the spindle around which the hands revolve.

CLICK: A spring-loaded pawl or tongue used in conjunction with a wheel with angled teeth (in which the click engages) so that the wheel can be turned one way only.

COCK: The shaped bracket which supports the bottom bearing of the balance-wheel and to some extent protects the wheel itself.

CROWN: The milled knob on the pendant of a stem-wound watch, turned by the fingers to wind the watch and (usually) to set the hands; for the latter purpose it is pulled out or occasionally pushed in.

DAMASCENING: A method of decorating the bottom plate or bridges, consisting of a radial or striped design that appears to shimmer as it catches the light at different angles;

ESCAPEMENT: The 'metering unit' which, working in conjunction with the balance or other controller, breaks down the motive force of the mainspring into controlled and regular steps by alternately delivering impulse to the balance and locking the train. Its main components are the escape-wheel and the pallets.

ESCAPE-WHEEL The final (usually fifth) wheel of the train, bearing especially shaped teeth that interact with the pallets.

FLAT POLISHING: The polishing operation creates a mirror surface on parts of a watch. Also called black polishing.

FREE-SPRUNG: Having no regulator attached. Such a watch or chronometer relies on the balance-screws for any adjustment that may be necessary. It is assumed that the movement will have been built and adjusted to a very high standard of accuracy from the start, so that such adjustment is only occasionally needed.

FRONT PLATE: The plate nearer to the dial.

HACKING: A watch with a small lever under the dial which thrusts a wire hook between the teeth of the escape wheel or fourth wheel thus stopping the movement.

HOROLOGY: The science of time measurement, from Greek hora 'point in time' and logos 'word, speech, process of reasoning'

INCABLOC: Shock-absorber system to help prevent damage from shocks to the balance pivots. Its spring system assures an elastic play of both jewels of the balance wheel, thus allowing compensating movements of the balance staff pivots when the watch is shocked through dropping or other trauma. Without a shock absorbent system, the constant shocks to the case could cause bending and eventually breaking of inner components.

ISOCHRONOUS: A balance is isochronous if the duration of the oscillations is the same whether the arcs are long or short. Factors that prevent this state of isochronism include the escapement, the play of the balance spring between the curb pins and faulty poising of the balance wheel and its spring.

LEVER ESCAPEMENT The standard escapement for Swiss watches from about 1890. The 'lever' is a pivoted bar to which is attached an arm carrying two pallets, which alternately engage with the teeth of the escape-wheel. The other end of the lever is forked and engages with the impulse-pin which is mounted on a steel disc (the roller) centred on the balance-staff.

LUBRICANT: Used to reduce the level of friction caused by the intermeshing of one watch part with another. Special low-density oils are used in the pivots turning inside jewels, the sliding areas between levers and the spring inside the barrel, as well as numerous other parts of a movement.

MAINSRING: The coiled spring of tempered steel which provides the power source for all watches

MOVEMENT The correct name for the 'works' of a watch.

OVERCOIL: A method of improving the isochronous characteristics of a hairspring by bending its outermost coil inwards and upwards so that it ends and is anchored well within the circumference of the spring. Breguet invented it and it is often called after him

PALLET: Mounted on the end of a pallet lever designed to engage with the escape-wheel for the purpose of either receiving impulse or performing the locking function. There are usually two pallets, one for each operation. See Lever Escapement.

PERLAGE: Also known as circular graining, perlage is a surface decoration comprising of an even pattern of partially overlapping swirls applied with a quickly rotating material that has a very fine abrasive quality.

PINION: A small wheel mounted on the same arbour as a larger one and generally used to transmit the drive between that wheel and another. Pinions are usually of steel and have six or eight 'leaves', as their teeth are called.

PIVOT: The narrow tip of an arbour, rotating in a jewel especially hollowed to receive it or a hole pierced in one of the plates. The steel used for arbours is quite brittle and pivots often break, especially at the outer end of the balance-staff.

PLATE: A panel of metal pierced with a number of holes to receive the pivots of a watch's moving parts. Most watches feature the modern layout of only one plate behind the dial.

POISE: Achieving a state of balance of the balance. Although no balance is perfectly poised and perfectly stable, the smooth Glucydur balance of the Omega mid-500 series, where the balance is posed in the factory, comes quite close and will remain so for many years in a regularly serviced watch.

PRODUCTION MOVEMENT: The term is used in this article to denote a movement in which automated processes play a large part in its production. While the Omega production process was streamlined and automated, at many junctures of the manufacture of a movement human hands intervened and either guided the machining or applied their specialist craft.

POSITION ERROR: Variation in a watch's rate when it is held or suspended in different positions. Omega mid-500 series calibres were tested and adjusted in different positions, and recorded on the rotor bridge is the notation 'Adjusted 5 positions'.

REGULATOR: A device for altering the effective length of a balance-spring by sliding the curb-pins, which lightly restrain it close to its outer end, back and forth along its length.

RATE: The degree to which a movement deviates from strict accuracy when timed over a specific period. "The watch has a good rate" is professional jargon for "The watch keeps good time", but can also mean a statement of verified fact when stated as "The watch tests with a high stability of rate".

SNAILING: Variations of a decorative spiral pattern used on the barrel wheel, barrel ratchet wheel and crown wheel of Omegas. Snailing looks like a series of slightly curved lines radiating from the wheel centre.

STRAIGHT-LINE LEVER: The 20th-century style of the lever escapement — the arbours of the balance, lever and escape-wheel all line up in a row.

SWEEP SECOND HAND: A second hand that is centrally mounted so that it sweeps the entire surface of the dial.

THIRD WHEEL: The train wheel between the centre wheel and the fourth wheel.

TRAIN: The sequence of wheels and pinions that transmits the drive from the barrel to the escape wheel. It normally consists of the great wheel, centre wheel, third wheel, fourth wheel and escape-wheel. Each of these carries a pinion to receive the drive from the preceding component.