To celebrate its 50th anniversary in 2009, the Museum of Horology in Le Locle, Neuchâtel, has re-opened one of chronometry's most exciting chapters, namely a competition in the style of the timing trials that used to be held annually until the mid-1970s. *QP* takes a closer look

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The *Concours International de Chronométrie Le Locle*, 2009, officially began on 23 May this year. Thirteen entrants submitted a total of 16 timepieces, each of which will undergo a series of tests at various laboratories, before the final results are published on 3 December 2009.

It is telling, but perhaps not surprising, that such a competition should arise at this time. Marketing bias toward watchmaking with geographical focus beyond the Swiss borders has grown considerably in the nearly 20 years since Lange & Söhne reaffirmed their place in German horological history; the old Glashütte observatory was re-opened, and now issues certificates of timing performance to brands such as Wempe and Glashütte Original. The French observatory at Besançon has also begun testing again, issuing its first certificate of the present era to the Finnish watchmaker Kari Voutilainen. Here in the United Kingdom talks were begun between the major horological parties to investigate the re-establishment of a testing facility along the lines of the gruelling but highly respected Kew Observatory tests.

Until the changes just stated came about, the federally controlled Contrôle Officiel Suisse des Chronomètres, or Official Swiss Chronometer Testing Institute, COSC was the only body in Europe conducting independent tests, although it will only test Swiss products. Over a million timepieces a

Time on Trial

year pass through its three centres in Geneva, Biel and Le Locle. Before 1973, the Institute was in fact a loosely bound group of independent Bureaux Officiels de Contrôle de la Marche des Montres, each under the auspices of its local canton, with slightly varying standards and testing criteria. After a series of tests a watch would be either passed or failed, depending on whether its performance fell within certain parameters.

Thanks to this arrangement, millions of wrist chronometers would be certified in the 20th century. However, this is only part of the picture. In most of the towns where the old Bureaux were to be found, there were also astronomical observatories and these, too, were involved in the business of chronometer certification, although at a vastly more stringent level. The first official Observatory testing was carried out late in the 1700s after the British Longitude Act stipulated huge rewards for methods of successfully determining longitude at sea.

Later, the British Admiralty began a series of annual 'Premium Trials', starting in 1823, where instruments would be tested at Greenwich Observatory for a full year before being judged good or bad. Monetary rewards of £300, £200, and £100 would be awarded for the top three instruments each year (the top prize, depending on how one calculates things, were worth as much as £250,000 in today's money). The financial gains and the marketing advantage that winning such a trial offered the makers of successful chronometers would have been enormous.

Left: A selection of entries for the Concours International de Chronométrie Le Locle, 2009 from Chopard, Petit-Fils de L.-U.Chopard, F-P Journe and Greubel Forsey.

Right: A ship's chronometer made by Charles Frodsham, 84 Strand, London, circa 1870. Picture courtesy of Auctioneers Dr. H. Crott, Mannheim.

Very high financial incentives were eventually abandoned, but the Admiralty still retained the option to purchase, for very good prices, the best instruments from every group of tests. Until 1914, the method used at Greenwich by which to ascertain a chronometer's fineness was to apply a Trial Number to each piece, determined by the simple formula based on the instruments' weekly performance. Successful results were stratified into First and Second Class or 'A' and 'B' certificates.

European tests

Continental Observatories also tested navigational chronometers. In those early years, none but the finest and most carefully adjusted instruments employing some sort of (oilless) detent, or chronometer, escapement could hope to pass the trials. In 1923, chronometer expert Rupert Gould, commented, in his informed but typically offhand style, that, "on the Continent the word [Chronometer] is used indifferently to describe machines fitted with either the chronometer or the lever escapement".

Small wonder at the astonishment among the horological fraternity then, when, in 1914, the nascent Rolex Watch Company achieved the unthinkable by producing a tiny 'wristlet' watch (with lever escapement) that was awarded a Class A certificate at Kew. From then on, the world of chronometry would be dominated by small and delicate portable watches. Gould would have been sick.

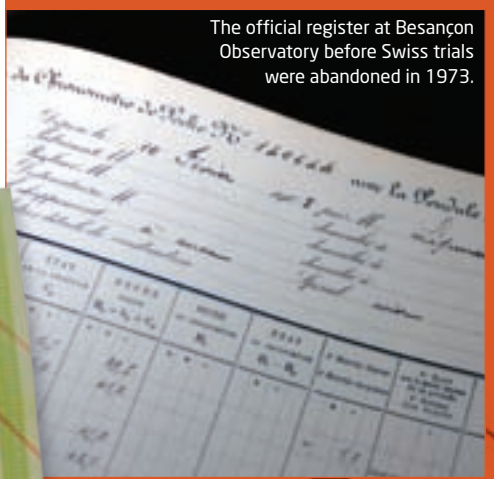
The Geneva observatory organised the first world's first annual competitive trials from 1869 to 1873, where the highest-graded chronometer would hold the annual record. Instead of makers merely submitting instruments for functional reasons, they were now pitted directly against each other for the international acclaim that would certainly follow the winners. The trials were slowly transmuting from being a measure of technical fineness to a public demonstration of the skills of the instruments' makers, with the sales of millions of watches hot at their heels.

Almost every year, someone would break a new record for the number of marks attained. Omega had reason to be proud when, in 1936, their 19-ligne Caliber 47.7 broke the previous record in its class at Kew for the highest number of marks, 97.8 out of 100, a figure that has never since been bettered, while by the mid-1960s two-thirds of the Bureaux chronometer certificates were being issued to Omega. The strength of the marketing correlation between a manufacturer winning Observatory records while also submitting more ordinary watches for Bureau testing is quite clear. The blurred distinction between the two types of test was obviously good for sales.

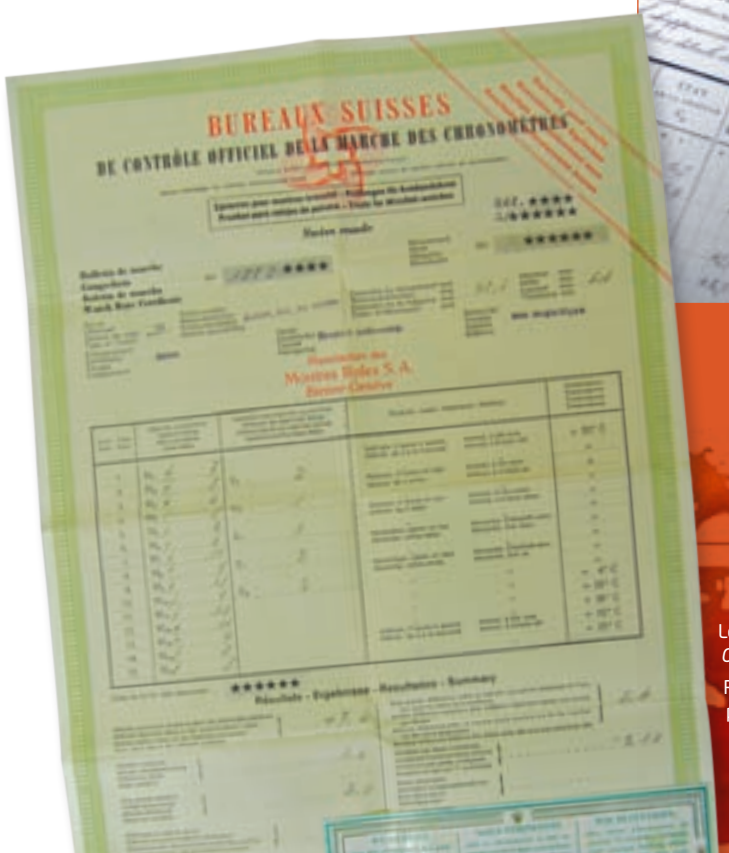
Of the 26 million or so watches exported by Switzerland in 2008, roughly 4.3 million were mechanical, while over a quarter of these were certified chronometers. The added value

Besançon Observatory. Image: Cliché J Mongreville ©Inventaire général, ADAGP, 2002.

This image and below right: Chronometer testing at Besançon.



The official register at Besançon Observatory before Swiss trials were abandoned in 1973.



Left: A 1963 *Bureau Officiel* certificate.

Right: An original page from the registry at Kew.

How will the Concours 2009 results be calculated?

The basis of the competition is the ISO 3159 chronometer standard. A standard COSC chronometer certificate is shown below. The raw data is shown on one side, consisting of a set of daily rate readings in column 4, which are simply a measure of the watch rate (gaining or losing) compared with a standard. The rates are grouped into periods of two days each, corresponding to the five positional tests as seen in column 3 – three vertical positions and one each for dial up and dial down. Positional tests are conducted at 23ºC. The difference between successive rates is recorded as Variations in column 5.

The data summary contains a column labelled *Exigences minimals* listing the limits within or below the readings from the watch must fall in order to qualify as a chronometer.

$\bar{M}$ is the average of the rates over fifteen days. The ten-second *Exigence* here might seem rather generous, but in fact it only serves to define the average rate within a realistic range, as the next note illustrates.

$\bar{V}$ is the average variation of the rates. This, and V_{max} (below) are the more important of the first three figures. If the variation is small and consistent, then one's confidence in the timepiece's consistency is assured, while a negligible maximum variation is a further confidence factor, implying that the watch won't kick out any aberrant surprises. This is why $\bar{M}$ is less important. If, for example one's watch had a massive average daily rate, say 23 minutes and 12 seconds, but it held that rate dead reliably, then the watch would, in fact, be a very superior instrument, in spite of the initial bad impression it might first give.

V_{max} is the maximum rate variation from column 5.

D is the maximum difference between any vertical and horizontal positional tests. This is a perennial horological problem, and a low figure here is an absolute must for any watch adjusted by even a beginner with pretensions to watchmaking mastery.

P is the greatest difference between the average rate ($\bar{M}$) and and any one actual rate.

C is the temperature co-efficient, or change of rate per degree centigrade. Less an issue for the watchmaker today since most escapements are supplied by a single supplier, Nivarox-FAR, whose enormous investments in escapement metallurgy have more-or-less eliminated temperature effect as a problem in their higher grades of product.

R is the rate resumption, a figure calculated by subtracting the average of day one and two's rates from the final day's rate.

Each watch submitted to the Concours will have been tested three times, each to the same ISO standard, first at COSC, then at Besançon Observatory, and then again at COSC after a couple diversions to be tested for resistance to vibration and magnetic fields.

Each of the ISO timekeeping results will be mathematically converted to a numerical score by the following formula:

$$N = 1000 - [(500 \times |C|) - (100/3 \times |D|) - (100 \times V_{ave}) - (10 \times D) - (20 \times V_{max}) - (10 \times |R|) - (12.5 \times |M_{ave}|)$$

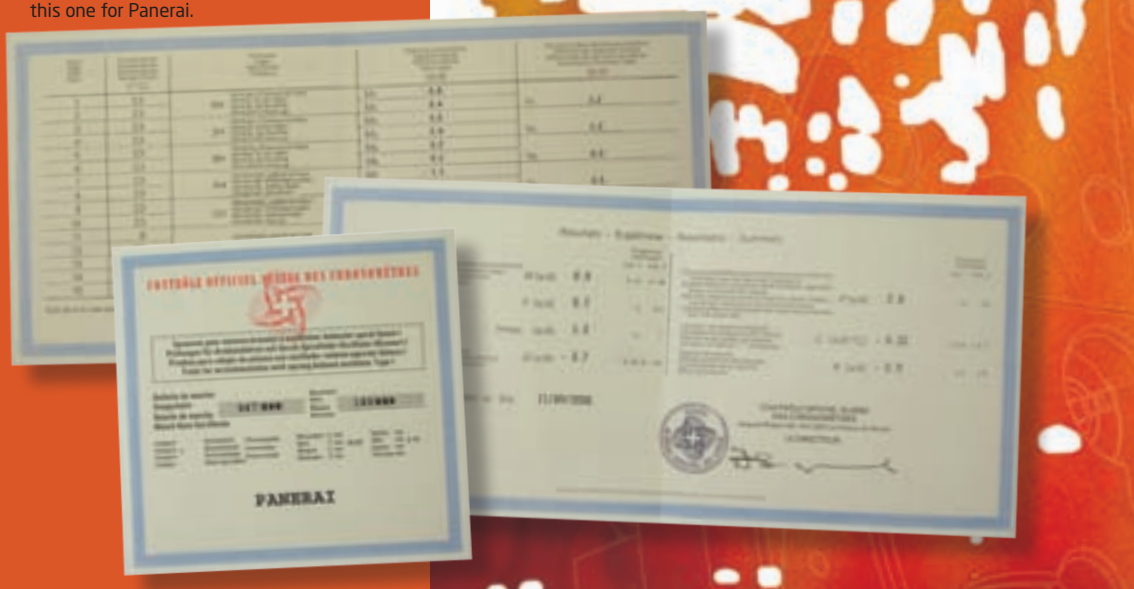
(Figures between vertical bars are *absolute values*, disregarding the mathematical minus sign that would otherwise creep in if the watch gave slightly losing rate readings.)

The letters in the formula correspond to those listed above from the ISO3159 test. The formula would be computed three times, once for each timekeeping test, with the results, N_1, N_2, and N_3 plugged into the final formula for a total score, N_F, out of 1000:

$$N_F = (0.4 \times N_1) \times (N_2 + 0.4) + (0.2 \times N_3)$$

The results will be published anonymously, barring those of the winner, whose identity will be announced, with much fanfare, no doubt, on 3 December.

A standard COSC chronometer certificate, this one for Panerai.



arising from that magical line on the dial, "Officially Certified", is inestimable if not totally unquantifiable. The competitions did inspire great advancements in horological science – the geometry of the club-tooth lever escapement would get refined, while a profusion of new materials and manufacturing techniques arose. Acclaim was also due for the individual specialist springer, or *régleur* who fine-tuned observatory-winning instruments.

The apparent ease with which production watches can now pass the COSC test has also been the subject of much discussion lately. The superb levels of industrial sophistication demonstrated by Switzerland's main escapement maker, Nivarox-FAR, has played no small part in the homogenisation of wrist chronometer production.

Death and rebirth

As the 20th century progressed, the relevance of the Observatory trials began to be called into question. Post-war demand for navigational instruments bottomed out. And the quartz dawn had shaken all the old dearly held truths about mechanical chronometry. In a very tangible measure of the sea change experienced in those years, one elderly British member of the *Société Suisse de Chronométrie* recalls, the parking lot of that organisation went from over-flowing at meeting times in 1969 to literally half a dozen cars two years later.

In 1973 the annual trials in Switzerland were abandoned, and the general testing of navigational chronometers at the observatories was also desisted. The director of the Besançon Observatory told this correspondent that the lack of interest in mechanical horology in the face of quartz was fundamentally the only reason why the trials were stopped. Who cared if a watch could hold its rate to within a tenth of a second a day – it had none of the excitement and mystery of the new electronic oscillators in their black boxes. Besançon made its last award, to Lip Manufacture, in 1973-74.

The re-emergence of the Concours must surely be traced back to a revival of the sentiments that were allowed to fade in the 1970s. Today's collectors have little emotional attachment to the amazing technological achievements of electronic horology – quartz, atomic, and radio-controlled clocks are part of the mundane fabric of life in the 21st century. What is amazing is the concept of craftsmanship in miniature, of skilled masters patiently labouring away in their peaceful workshops wresting that last tenth of a second out of arcane instruments. New manufacturing materials, escapements and lubricants have also given today's chronometer makers a new arsenal with which to tackle mechanical precision.

The ideals of a Chronometer trial marry perfectly with the current trend toward exclusivity. In a world where over a million chronometers are made every year, wouldn't it be great to know that yours is number one?

The first certificate to be issued by Besançon since testing recommenced. Presented to the Finnish watchmaker Kari Voutilainen.