

to all the slaves. A paper tape machine in circuit recorded the performance of individual clocks.

A demonstration was mounted in London in 1911, the service to be supplied by a company called Greenwich Time Ltd. Hope-Jones had already pointed out the faults of the system, as had competitors in Germany, chiefly that the clocks were always wrong except at the hour. The Great War halted development and expansion, and the company was later taken over by a rival which replaced the clocks with its own newer design.

James Nye hopes to present the history of this attempt to provide synchronised, widely distributed time in a detailed article for this journal, and this is eagerly awaited.

#### *Meeting on 20 September 2012*

The transit of Venus across the face of the sun in June of this year was marked by a lecture given by Matthew Read, Clocks Programme Tutor at West Dean College, about the clocks used on expeditions to view and measure the two transits in each of the eighteenth and nineteenth centuries. In the seventeenth century Jeremiah Horrocks had predicted the transit of 1639 from his work on Kepler's tables of planetary positions, but he could not have had the use of clocks of great accuracy. By the next century the possibility of using the transit to measure the distance of the earth from the sun had been appreciated, and many expeditions were organised to all parts of the globe so as to maximize the quantity of results. These voyages were difficult and dangerous, and yielded much data needing complicated processing.

Several Shelton regulators were used, and research into their identities is still being done by Rory McEvoy after having been started by Derek Howse. Slides of one, which was still in use in the twentieth century, and two others by Ellicott, all at Greenwich, were shown, and the principles of two types of temperature compensation used by Ellicott were explained.

The most famous expedition is probably Captain Cook's voyage to Tahiti in 1769 with the intention of timing the transit to the nearest second. However, the results were ruined by the Black Drop effect that occurs at ingress and egress, and makes accurate timing impossible. James Bradley went to The Lizard, probably with a Shelton clock still at Greenwich, and its beautiful movement, with stop work to prevent over-winding, gridiron pendulum and alterations by J R Arnold was illustrated. Another Shelton,

probably later than 1769, was shown, having Harrison's maintaining power rather than the bolt and shutter of the other clock. It also had Shelton's stamp under the back cock.

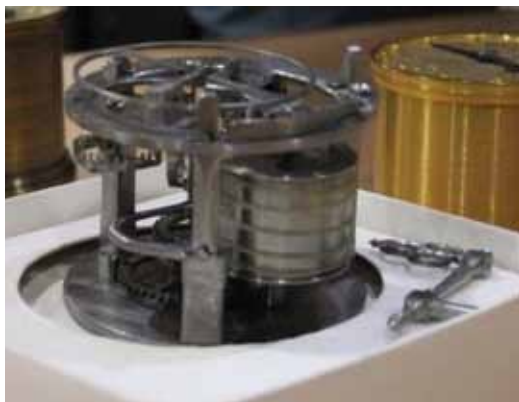
In the nineteenth century, telegraph cables allowed instant communication with some of the observing stations, which under G B Airey's influence had become numerous. The 1874 transit produced a huge amount of data to be calculated, onerous for the human computers of the time, and Airey was glad that he had retired before the 1882 event, so that he was not involved with it. Regulators were especially made by Dent from French ebauches, finished in London to the highest standard, and a George Graham clock fitted with a new pendulum by Thomas Buckney was one of several much older clocks still fit for service. Pictures of the observation stations with firm foundations for the instruments, but nevertheless made as cheaply as possible, were shown and contrasted with American stations consisting of many huts for multiple observers. Finally a Regulator by E Howard of Boston was shown, having a mercury pendulum and a gravity escapement.

S B de Save



## AHS Study Tour to Germany 17-24 September 2012

On Monday 17 September members gradually came together at Heathrow to await our flight to Germany. The anticipation was rewarded by one of the most varied and enjoyable study tours we have ever had; and the weather was kind to us too. From Munich airport we travelled southwest through the beautiful Bavarian countryside to our hotel (Seeblick) in Bernried on the edge of lake Starnberger See for four nights. After a most enjoyable dinner we retired to a private room where we were joined by three members of the Deutsche Gesellschaft für Chronometrie who had kindly brought along items for us to view and discuss. Watch movements, an early and unusual lever escapement with full Liverpool jewels, a very nice Sully escapement, a Chinese duplex, an English verge movement (working ) circa 1760 bought from a flea market for 10 euros (£8!). Also a superb working copy of an early fusee iron



Working copy of early 16th-century fusee iron movement. Photo Mike Wilson.

movement circa 1500-1510 in the Germanisches Nationalmuseum (illustrated). An interesting and different form of a fusee groove cutting tool plus a tool for cutting the crown wheel of verge watches. All this and we hadn't even left the hotel yet!

### Tuesday

Drive to Munich city centre to visit the Deutsches Museum (Science and Technology) for a guided tour of the clocks by Mrs Birgit Kremer, a practicing horologist. The clocks were mainly French ormolu and Empire style, some very grand. After lunch we visited Residenz Museum and Treasury, a very good variety of early tabernacle clocks and very ornate table clocks. Other areas had superb collections of silver, gold, bronze and scientific instruments.

Our last visit of the day was to see the Glockenspiel. This is situated in the new town hall (German: Neues Rathaus) built between 1867 and 1908 in a Gothic Revival architecture style. We were fortunate to be taken to the operation room where some members had to press a sequence of buttons to operate the music and figures. It plays at 11am, 12pm and 5pm and is one of the main tourist attractions.

### Wednesday

Visit to Augsburg. Our first visit of the day was the Schaezler Palace to see the magnificent Roentgen musical longcase clock – case by Roentgen, movement by Achenbach and Schmidt Neuwied. Last quarter 18C, it stands 2.4 metres high. Technical advice and renovation by Ian Fowler.

Next stop just a short walk to the Maximilian museum to see a variety of clocks and watches. Pocket watches and a superb coach watch, an



Table clock dia 9.5 cm with domed top covered in fine silver filigree in the Friedberg Museum. Photo Martin Ridout.

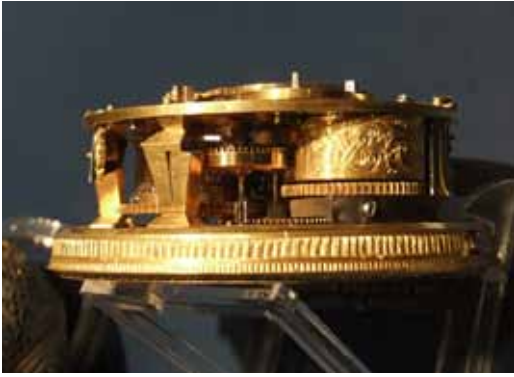
early iron clock with complications, early table clocks, wall clocks with repoussé dials and front pendulums, some very nice turret clocks – some electrically driven, most mechanical – and various forms of remontoir, even some with Riefler pendulums. There was one very large turret clock circa 1721, over 6ft long and 6ft high, this one was unusual in that all the pinion shafts were supported and ran in sets of two frictionless guide wheels.

Time for lunch and talk over the morning's events.

From Augsburg we then drove to Friedberg to the museum in the castle of Wittelsbach.

We were welcomed by the town Mayor and the museum's director, Dr Alice Arnold-Becker, a very knowledgeable young lady (by the time you read this many of you will have heard her at the Dingwall-Beloe lecture).

An interesting history of Friedberg horology in that in the 16th century the Bavarian dukes who lived there encouraged an influx of talented craftsmen, and in the process exploited the strict guild regulations that applied in neighbouring Augsburg. By the end of the 19th century, 400 watchmakers had registered in Friedberg and supplied all of Europe. Fortunately a lot of the watchmakers' houses have been preserved and the history of who lived in them is known.



Clock watch movement in the Friedberg museum. Photo Mike Wilson.



Table clock in the Friedberg museum, closed and opened. Photos Martin Ridout.



Half-quarter repeating watch in the Friedberg museum. Photo Martin Ridout.

There is a fascinating collection of clocks, watches<sup>1</sup> and very rare porcelain all superbly displayed. A multifunction iron clock late 16C, a very rare small round table clock with a domed top covered in very fine silver filigree (illustrated). A very good selection of 17 and 18C watches and coach watches. The pair cased coach watches were all open so as to view all aspects of the mechanism. They varied from timepiece and alarm to calendar and moon phases to hour striking and even half-quarter repeating, striking every 7½ minutes (illustrated).

A good variety of pocket watches, pre-balance spring to early minute repeaters, some with very nice repoussé cases and many many more.

It is often said that young girls and women did the fretting out of balance cocks. Well, in this museum there is a large oil painting of a woman circa 1750 showing her with fret saw working on a balance cock!

We returned to the reception to find tables laid out for drinks and home made cakes which we were instructed to eat before we left. It doesn't come any better than this.

Unfortunately the Museum/Castle is closing for two and a half years for a full refurbishment, I am sure it will be well worth waiting for.

1. Editor's note: A German-language catalogue of the clocks and watches and sundials (Adelheid Riolini-Unger, *Friedberger Uhren. Heimatmuseum der Stadt Friedberg*) can be ordered from the museum for 18 Euros plus p&p, see <http://www.museum-friedberg.de/> The descriptions are online on the museum's website, see <http://tinyurl.com/cy3ol4c>.



Birdcage clock in the Turret Clock Museum in Mindelheim. Photo Mike Wilson.

#### Thursday

Another fine day takes us to Mindelheim just west of Munich to visit a large private (but open to the public) collection of turret clocks. These are housed in an old but very smart church in the centre of town.

Clocks of every description, from original 16C foliot to many forms of anchor, grasshopper, gravity, single train to four train, and all working! We really didn't know which to look at first, fortunately our host took charge and pointed out the finer points of each clock. One clock which was displayed as a centre-piece was made by a monk circa 1750, in bird cage form (illustrated) but very elaborate and with various complications, the form of the wheel work is like no other. Two rooms on the ground floor contained roughly forty clocks and a further ten in the clock tower. Our host said he had a further forty-nine clocks at home!

It begs the question: why haven't we got a museum like this?

People often say they would like to have more but don't have the space to accommodate them. A museum could be the answer to save some of these wonderful clocks.

A light lunch before setting off to our next visit: Erwin Sattler, makers of very fine precision pendulum clocks for over fifty years. They are based in Gräfelfing, west of Munich city centre, in a purpose built new factory.



The Erwin Sattler works: giant regulator. Photo Mike Wilson.

As we alighted from the coach we all stood in amazement at the sight of a giant regulator built into the front of the building (illustrated). This clock, three years in the making, has a pendulum length of 7.7 meters which weighs 200 kilos and a driving weight of 180 kilos. It was a little too big to put in my suitcase.

After being welcomed by master clockmaker Marcus Glogglger we were taken through to the various production, manufacturing, assembly and testing departments.

The clocks are loosely based on Vienna regulators but to a whole new level of sophistication and accuracy. The Graham dead beat has adjustable pallets, either ruby or agate, and run in jewelled bearings. For the main train all pivots run in miniature roller bearings (no need to oil). The accuracy of the best clocks is rated at 1-2 seconds per month.

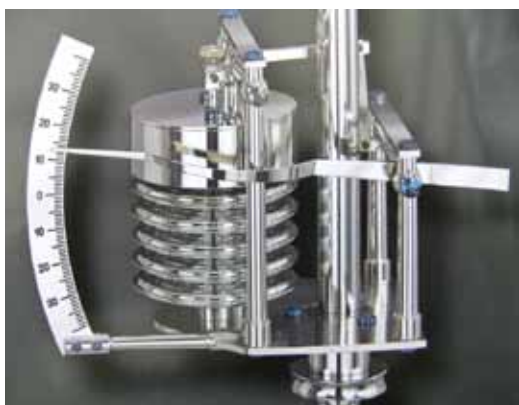
Production machines are the latest CNC with multichange tool cutters. We saw gear blanks being cut from hard brass plate, dial plates (illustrated) and back and front plates. We were offered some reject gears to take away, they were 200th of a millimeter oversize – wow!

All brass gears are gold plated, this is done to prevent oxidation over time. All steel work is bright Nickel plated, screws and hands are blued.





The Erwin Sattler works: machining a regulator dial. Photo Mike Wilson.



The Erwin Sattler works: air pressure compensation device. Photo Mike Wilson.

We also saw an air pressure compensation device with five aneroid containers and barometric display, fitted to an Invar pendulum rod (illustrated).

Erwin Sattler sells around a thousand clocks a year, many of those in kit form, they only require assembly, no finishing. Prices vary from 3,800 euros for the self-assembly to 178,000 euros for the tour de force grand complication.

We were presented with goody bags with brochures containing the history and all the different models they produce.

This was only Thursday and I think we were all getting a bit blasé over the amount of quality items already seen. However ...

### Friday

Visit to the Bayerisches Nationalmuseum with our guide Mrs Birgit Kremer. Before reaching the clocks we passed through many areas with fine paintings, some pictures made of coloured



Two mystery clocks in the Bayerisches Nationalmuseum. Photo Mike Wilson.

stone and marble, richly made furniture with marquetry inlays, a very small rose turning lathe made of wood (possibly lignum vitae) presented with various turned samples. Our first item of real interest was a very large orrery some 9ft high in a glass case, so complicated it would have tested Einstein. Next to this was a large and very ornate longcase clock with various dial functions. A very fine and large silver repousse cased clock, various porcelain clocks. We were then taken to a private room where some of the reserve collection of clocks and watches had been put out for us to view: 16C iron clocks, early 17C gilt table clocks, 17C watches, a gold hunter grand complication watch by Glashütte, one of only twenty-seven made. Two unusual mystery clocks (illustrated) and many more.

Then to Nymphenburg Palace for lunch and to see the clocks there. The palace is a large and very imposing building, both inside and out. The enormous great hall covered in superb paintings on the walls and ceilings, and gilt rococo mouldings everywhere, and the clocks are not bad either. Each room had a clock in many different forms of porcelain and ormolu, all with full garnitures and all very rare.

Back to the coach for the journey north to Nuremberg for the next three nights.



Fifteenth-century iron foliot clock at the Germanisches Nationalmuseum. Photo Martin Ridout.

### Saturday

Morning at leisure to visit the old town and palace. There are still some of the medieval walls and the four towers that mark out the old town. In the centre is the cathedral with its fine Glockenspiel. A steep climb will take you up to the very well preserved palace and of course a panoramic view of the old and new parts of Nuremberg. Unfortunately all the antique shops were closed.



Rare book watch at the Germanisches Nationalmuseum. Photo Mike Wilson.



Masterpieces of iron and steel in the Germanisches Nationalmuseum. Photo Mike Wilson.

The afternoon was taken up by a visit to the superb Germanisches Nationalmuseum. Our guide for this was Oliver Nagler. This is a must see museum – not only for its contents but for the building itself. It is built around and over an old conserved monastery complete with cloisters. The central courtyard/garden now displays a large collection of bronze figures. However I digress, we came to see clocks and watches and were not disappointed. The first item was a small 15C iron foliot driven tower clock (illustrated). Then a small cylindrical iron pocket watch (brass cased) circa 1510 ascribed to Peter Henlein. A very good selection of astrolabes from 4 inch dia up to 2ft dia. In addition there is a large collection of diptych sundials, some with compasses, made from metal (brass), wood and ivory. A variety of early watches 16/17C including a rare book watch (illustrated). We looked at the masterpieces of iron and steel work, ornate vices and saws, compasses, complicated locks, all beautifully finished (illustrated).

One could spend days in this museum but as usual we ran out of time again.



The Rammensee Turret Clock Museum. Photo Martin Ridout.

### Sunday

Visit to another private collection of turret clocks in the small village of Gräfenberg, the Rammensee Turret Clock Museum. The building was once the manufacturing base for turret clocks and the present owner is a descendant of the family.

He has spent a long time collecting and restoring original and later clocks, and again all working.

16 and 17C foliots, early 17C anchor, some converted from verge. Again a lot of variations of remontoire. Some clocks had bells, one was 3½ tons! It was noisy.

One large early bird cage was unusual in that it had rollers on the anchor (it was working), on close inspection the escape wheel showed almost no signs of wear. A collection again of over forty clocks.

After a most enjoyable morning we said our goodbyes and went into the village for a very relaxed lunch, before an interesting tour through the Bavarian countryside and back to the hotel.

### Monday

Our last day – all cases packed and on the coach – but not quite finished.

This morning we had our last visit to the Karl Gebhardt Collection, which is in the same historical building as the library of the Deutsche ANTIQUARIAN HOROLOGY

Gesellschaft für Chronometrie (DGC). Our host was Dr Bernhard Huber, a past director of an international IT service provider, but although retired still very actively involved in horology as the DGC librarian.

We started on the ground floor where we saw various tools, pocket watches, early Atmos clocks and a very nice Automata clock. Then to the first floor which for me and others was the icing on what has been a very big cake. There were six very large display cases full of every type of pocket and wrist watch you could imagine. Each display case was in year order i.e. case one 1510–1800, case two 1800–1900, up to case five and six 1950–2000, showing the decline of mechanical and the birth of electronic, quartz and solar powered watches. Of course it has now gone full circle and mechanical watches are now making a huge comeback.

Dr Huber then ushered us through another door into the DGC library, the largest horological library in Europe. The next hour was spent studying books that we were unlikely to see again. Well, it is a study tour.

Before I close I would like to say on behalf of our tour members a very big thank you to Susan and Jack Knight for all the hard work in organizing what has been the best tour yet

Mike Wilson