The Conservation of Wooden-Wheeled Clocks

Dr Michael Flannery

Winston Churchill Memorial Trust
2015 Fellowship
List of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>3</td>
</tr>
<tr>
<td>Abbreviations</td>
<td>3</td>
</tr>
<tr>
<td>Glossary</td>
<td>4-5</td>
</tr>
<tr>
<td>About me</td>
<td>6</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>6-7</td>
</tr>
<tr>
<td>Introduction to project</td>
<td>7</td>
</tr>
<tr>
<td>Report</td>
<td>7</td>
</tr>
<tr>
<td>Report findings</td>
<td>21</td>
</tr>
<tr>
<td>Recommendations</td>
<td>22</td>
</tr>
<tr>
<td>Conclusions</td>
<td>22</td>
</tr>
<tr>
<td>Appendices</td>
<td>24</td>
</tr>
</tbody>
</table>
Acknowledgements

I would like to acknowledge the financial support from the Winston Churchill Memorial Trust (WCMT) and the support from members of the WCMT team.

The following went out of their way to make my 2015 Fellowship a success:

UK: - Paul Buck, Jonathan Betts, David Thomson, Jayne Hall, Julie Carthy.
USA: - Peter Nunes, Tom Grimshaw, Tom Spitter, Chris Klingemier, Mary-Jane Duptakis, Tom Manning, Dan Bruno, Dr Phillip Morris, John Lester, Bruce Craven.
Sweden: - Peter Borgelin, Bo J Ronnerstam.
Switzerland: - Brigitte Vinzens, Mario Teising.
Germany: - Dr Johannes Graf, Matthias Huttlin, Professor Saluz, Herman Sacher.

I would like to thank them all for being so very generous with their time and their knowledge.

Abbreviations

American Watch and Clock Museum (AWCM)
Antiquarian Horological Society (AHS)
British Horological Institute (BHI)
British Museum (BM)
The Institute of Conservation (ICON)
Accredited Conservator Restorers (ACR)
National Association of Watch and Clock Collectors (NAWCC)
National Trust (NT)
Worshipful Company of Clockmakers (WCC)
Glossary

**Arbors** - a horological term for shafts, spindle or an axle.

**Bushes** - small bearing surfaces into which run the arbors (axles) of the gear-train in a clock. In WWC’s they may be made from wood, bone, or non-ferrous material such as brass.

**Clock** - a striking device that sounds the hours and also shows time with hands on a dial.

**Collets** - the parts fitted to a shaft on which the clock wheels are fixed.

**Plates** - the front and back supports to a clock. In WWC’s they are usually wood. In some wooden clocks there are side plates which do not support the clock mechanism but act as protection for the clock mechanism. In other examples there is also a top plate fixed to the front and back plates.

**Seat-Board** - is the horizontal frame, which sits on the case cheeks and supports the clock mechanism resting above it.

**Timepiece** - a non-striking clock.

**Treatments** - in conservation an artefact may subjected to a number of operations, some invasive others not, these are known as treatments.

**Wheels** - the general description for gears inside a clock.
Key parts of a wooden-wheeled clock movement
About me

I am clockmaker working for private clients who share a conservation approach and the National Trust where all our work is conservation led. I started my working life as an apprentice blacksmith and agricultural engineer. In 2001 I studied clock making at West Dean College and since then have been a self employed clockmaker. I set up my own workshop initially in Sussex and in the last seven years in Gloucestershire. I work on a wide range of early horological items from large public clocks to small carriage clocks.

I have PhD from Exeter University. I am a Fellow of the British Horological Institute (FBHI). An approved conservator restorer (ACR) from the Institute of Conservation (ICON). A Freeman of the Worshipful Company of Clockmakers. I have a Post Graduate Certificate in Conservation from Sussex University and I hold the City and Guilds Full Technological Certificate (FTC).

Executive Summary

My aim has been to improve my knowledge of the conservation of wooden-wheeled clocks, by looking at conservation from a number of different standpoints. By visiting a number of countries which have a tradition of making wooden-wheeled clocks, I planned to learn from other horologists, collectors, conservators and museum staff. My aim is to communicate the new knowledge gained from my Fellowship, to other UK-based horologists and conservators through horological journals and talks. I hope to understand more about these specific heritage items, and raise the status of wooden-wheeled clocks and encourage conservation.

I set out to explore how wooden-wheeled clocks are conserved in different countries. I discovered that in Germany and Switzerland there is a very strong, well-organised and effective horological conservation philosophy, evident in the horological workshops of the major museums. I observed some differences, perhaps more nuanced forms, of conservation practice and differing treatments at each museum, what I saw convinced me that wooden-wheeled clocks are highly valued as significant heritage items and are afforded protection and conservation.

In the USA the concepts of heritage and conservation of American wooden-wheeled clocks was not so universally appreciated but there were notable exceptions, and a small but growing appreciation that wooden-wheeled clocks are heritage items and need protection. In Sweden, where there was a
tradition of wooden-wheeled clocks, there seems to be little appetite at the moment for the recognition that they are heritage items, and thus a general absence of conservation for wooden-wheeled clocks. It is clear that the concept of conservation and stewardship of these artefacts is currently very varied.

**Introduction to the Project**

As a National Trust Clock conservator I am responsible for the care of the clocks at Snowshill Manor in Gloucestershire. There are a significant number of rare clocks in the collection which have movements made predominantly from wood, including both the plates and the wheels. I tried to find out more about early wooden-wheeled clocks but discovered very little published material exists. In my initial research I came into contact with researchers and repairers in the USA where there more wooden-wheeled clocks. As we appear to know very little about these clocks in the UK, I felt it was important to learn more from other countries about how to conserve these clocks.

The aim of my project was to answer the following questions in relation to early wooden-wheeled clocks:

1. What is good conservation?
2. What are the barriers to good conservation?
3. How does conservation practice differ across Europe and the USA?
4. What can the UK learn to ensure best practice in conserving these artefacts?

**Report**

My method was to visit collectors, repairers, conservators and museums, to see for myself conservation in practice and to informally interview each person. I was able to contact Horologists in the USA through the National Association of Watch and Clock Collectors. This organisation, of which I am a member, has an excellent on line forum and through this I made contact with some of the people who helped me during my Fellowship. Contacting Horologists in Europe was made a lot easier by the assistance from the British Horological Institute, who on my behalf emailed European members asking for assistance, this email request was very fruitful in reaching people who were able to give me good practical advice and also introduced me to Museum staff.
Where do questions of collection and their developments fit into a research project on conservation? When attempting to carry out any historical research, based on cultural artefacts, public museums and private collections, are an obvious place to start. We expect Museums and public collection to hold artefacts that are of a reference, on which future planning could be based.

Most modern museums can trace their roots back to a collection, or a group of collections. Eventually the management of these collections transferred from the collectors, to a separate management system, other than the collectors. For example, the clock and watch collection of the National Association of Watch and Clock Collectors in Ohio was gradually built up in the latter part of the 20th century from a number of separate collections and individual bequests, eventually becoming the pre-eminent collection of clocks and watches in the USA. This collection is now not managed by collectors but by a professional management body, who oversee the management of what is now a museum. The gestation from clock collection made by individual collectors to a museum has taken a relatively short time - less than 100 years. In museum terms this is a short time.

I was fortunate to meet with several horological collectors on my Fellowship and I was struck by their dedication to their collections. Collectors of all sorts of things; animals, plants furniture and clocks, often rely on others to search out interesting items for their collections. For example, the collection at Snowshill Manor a National Trust property in Gloucestershire UK was built up over quite a few years in the early and middle of the twentieth century by Mr Charles Paget Wade. It is unlikely that Mr Wade spent time personally searching out items for his collection, he relied on a network of what nowadays are called ‘runners’. The job of a runner is to search out interesting artefacts, knowing what appeals to the collector. If there was a collector who let it be known that they were interested in a specific artefact, the pressure is put on a runner to supply that artefact, if the artefact is a single object for example a cup or a bowl there is less opportunity for deception. If the artefact is a clock in a case, there are many opportunities for deception. A clock is an example of a group of separate items brought together in one place. In its simplest form, a clock consists of three major parts; a movement, a dial and a case. This is an over-simplification, taking an American wooden-wheeled shelf-clock as an example – see below
In addition to the movement case and dial there is a glazed and painted tablet, a set of weights and a printed manufacturers instruction sheet usually glued onto the inside of the case.

Each of the separate contributing artefacts can be changed e.g. the back of one case could be fitted to the case of another or a particularly interesting painted tablet set in a door can be added to the frame of another case. The movement could be enhanced by various means and the whole lot put together and sold to a collector. A collector may well be unsuspecting that any deception has been practiced on them, and as far as they were aware the clock is genuine and original. Genuine and original are two very difficult words in collections and museums, the interpretation of both words is an area of discussion fraught with difficulty. At some stage the collection containing that clock eventually became part of a museum collection, and at that point it is very difficult for anyone to challenge the authenticity of an artefact as it now carries the 'seal' of a Museum. For conservators and researchers this is a real emerging problem, we are reliant on the accuracy and integrity of reference collections.

There are other reasons why collections in museums and other places are potentially not accurate.
The period between the collection being given to an organisation to manage, and that organisation’s movement towards a professional management system, can be quite a long time, perhaps decades during which the clocks in the collection can be unwittingly contaminated. Most collections in their infancy rely on the good offices of volunteers to maintain the collection.

It is here that the divide between the academically trained curatorial and management staff, may well be in conflict with the practically minded volunteer who maintains, with huge dedication the collection. The volunteer will be the practical expert, keeping the clocks running and the trustees will perhaps find that their main focus might be fund raising, not maintaining the integrity of the collection.

If the volunteers are not sufficiently informed or supervised, then there is a chance that the integrity of the collection can be downgraded, not through neglect or anything malevolent. Pressure might be felt to enhance a 'visitor experience' by having clocks running. Without adequate conservation practice, keeping clocks running might mean that a clock is eventually damaged. The volunteer may well feel under pressure to replace damaged or worn out original parts to maintain the clocks operation. What is of concern is that possibly few written records will be kept of the work that has been done to the clock.

Most, not all, but most of the collectors I met with, did not keep any written records of their collections. Nearly all could recall where they had bought the clock, how much they had paid for it, and something of the history of the clock, but this information was rarely written down. When the collector dies this information will be lost. These are primary records which we should encourage collectors to practice.

After some careful consideration I decided to take a constructional approach to considering the conservation of wooden-wheeled clocks. To this end I spent some considerable time in seeking out people who were able to give some indications on how the wooden-wheeled clocks were made.

This was possible in the USA and UK but was more problematic in Scandinavia. Being a member of the National Association Watch and Clock Collectors (NAWCC) in the USA gave me a very good introduction to what was currently happening in the USA. In the UK the British Horological Institute (BHI) and the Antiquarian Horological Society (AHS) are the premier sources of information.

In Sweden and Norway there are less formal networks in place.
In the USA, there has for some time, been an increasing body of research on wooden-wheeled clocks. However, before an item is considered as an artefact worth conserving, it has to achieve some status within a commonly understood, but not formally codified, cultural framework. During my Fellowship in all the countries I visited, I met very many people who would be considered to be culturally aware. Many in the USA were well aware of early American furniture, paintings, and fabrics, but were unaware of their American horological heritage.

I found the same to be true in Sweden, where, a clock-collector had established a small collection of Swedish wooden-wheeled clocks, but could not convince more than a handful of people that they were worth preserving. He could find no appetite for a national collection because, he believes that wood-wheeled clocks did not have the cache of high value items.
The Stockholm National Museum has a very small collection of Swedish wooden clocks but most are in storage and not on public display.

In Switzerland, private and state collectors had made extensive collections of wooden-wheeled clocks which are now in national museums in particular the Uhren Sammlung Kellenberger in the town of Winterthur. In Germany the Detaches Uhrenmuseum in Furtwangen has an impressive collection of wooden-wheeled clocks on display and in the reserve collection.
In UK there were very few (perhaps less than double figures) of surviving wooden-wheeled clocks made during the whole of the 'golden period' of British clock-making between 1700 and 1790. Apart from John Harrison and a very few other makers, wooden-wheeled clocks were not made in any appreciable volume. There is a very small temporary exhibition of wooden clocks in the British Museum but none of the clocks on display were made in the UK.

Conservation of wooden-wheeled clocks is challenging, as wooden clocks movements and their associated dials and cases contain a huge variety of differing materials. These usually include:

- Front, back, top and bottom plates, gears and some levers are usually hardwood e.g. oak, cherry, but a variety of woods can be found in a single clock.
- The dial and dial surround is often made of softwood e.g. pine.
- The dial is usually painted or a printed paper, pigments printing ink and paper or card
- Various glues will have been used.
- Ferrous and non-ferrous metals are used in some levers, the majority of arbors and often the escape gear wheel and pallets.
- Winding ropes made from natural materials or nowadays found to be modern plastics.
- Weights may be comprised of metal, stone, lead, cast iron or scrap iron filings inside cans.

The clock cases are also potentially challenging to conserve, due to the various materials used in construction. These could include:

- The case body is usually made of soft wood.
- Applied paint, varnish or other pigment.
- Glass in the hood and putty to fasten glass.
- Brass, or brass plated iron finials and brass or iron hinges.
- Iron work in the key locks or catches.
- Decoration of inlaid ivory or bone or other woods.
- Different glues to hold the case together.

A further challenge to conservation is that a clock is a kinetic artefact and is expected to run. To understand wooden-wheeled clock conservation, I felt that it was right to seek out those whose experience of repair work would give me a strong indication of how the clocks were initially made and a
good understanding of modern repair techniques. American wooden-wheeled clocks can be categorised into two time frames; ‘Pre Porter Contract’ and ‘Post Porter Contract’. Pre Porter Contract clocks were made in the early 18th century as ‘one offs’ the earliest being perhaps c1720 or later 1750 onwards in very small batches of perhaps three to five. The early one offs were unsophisticated in construction, large in size and usually ran for 30 hours. It is easy to view a kinetic artefact made nearly three hundred years ago with very basic tools, from a modern perspective, as crude. Such timepieces were made without the benefit of modern machinery, lighting, or a modern workshop. That the clocks worked at all, is a tribute to the technological skills of their makers. These one-off clocks are rare, and highly valued by a small band of dedicated collectors.

In 1806 the Connecticut clockmaker Eli Terry (1772-1852) was approached by the Porters, a pair of general merchants, to make 4000 wooden clocks which the Porters wished to sell through a network of Pedlars. Terry spent four years perfecting methods by which wooden clocks could be made in large numbers, by semi-skilled operators, rather than apprentice-trained clockmakers. He used water powered machines to cut gears and to perform other operations. He made great use of jigs, patterns and fixtures to make the construction of the clocks easier. What was historically important was that he made the clocks in a limited number of designs, with interchangeable internal parts. The interchangeability made it easy to replace broken components. This was not possible for English clocks of the same time, because the wheels were individually made for each individual mechanism.

Eli Terry through mechanisation of manufacture and simplifying production, reduced the price of his clocks and made them affordable to a small but growing American audience. This is culturally significant as there is a strong argument to suggest that before this time, the brass clocks made in America owed their roots to Europe and in particular Britain and Ireland. The components of the brass clocks were often made in Britain and then assembled in America. American brass clocks are valued more highly than wooden-wheeled clocks which were originally designed to be affordable and are still today not afforded the same respect as those made of brass.

A culturally significant artefact is usually considered to be worthy of conservation, however, for an artefact to be considered to be significant, it must be either high value, scarce, desirable, of good provenance or have some other undefined quality. For example, in the UK the brass clocks made in the workshops of Thomas Tompion (1639-1713) are highly prized as perhaps only a few hundred were
made. Their scarcity and very high quality makes them highly valuable, they have a high cultural recognition.

Only one wooden-wheeled and brass clock made by T White from Witney, Oxfordshire survives today it was made around 1748. This very rare clock has received little recognition, possibly because although it is rare it is not commercially valuable. It is in the care of the National Trust at Snowshill. A side view photograph of the internal mechanism of this clock is on the front cover of this report.
An accurate definition of conservation especially of a horological nature is not straightforward. It perhaps easier to define what is not conservation. Treating the artefact with little or no respect in the way that it is repaired, showing little regard to originality, taking little care how the clock is cleaned and what is used to clean and lubricate it, all illustrates a lack of any conservation philosophy.

Here is an example of ‘over-restoration’ rather than conservation. Many of the original parts have been replaced with new pattern parts. The clock is running but it is not original though some might call it ‘genuine.’
Conservation is treating the clock with respect and having a recognition of stewardship towards a culturally significant item. The wooden-wheeled clocks made at the beginning of the 19th century have done well to survive nearly two hundred years. By their very nature they are prone to insect damage, wet and dry rot, as well as the normal damage that can be visited on a kinetic device, not to mention the interface with keen amateur horologists, children and animals.

The clocks will have outlived many owners - and perhaps we need to recognise that ownership of clocks is more of a stewardship role, to conserve them for future generations. This is where conservation and a conservative approach becomes practical. We cannot control what happened to a clock over the past 200 years, but we can control the environment and working condition of a clock now, so that it survives as intact as possible for future generations.

One idea is to use the patterns and drawings that have been made of early clocks to make new wooden-wheeled clocks. These modern made but traditional clocks could be run in place of the older original clocks, We have the skills to make wooden-wheeled clocks traditionally. There is also a growing interest making modern clocks in wood.

I was fortunate to visit collectors and spend time talking about care and conservation, in most cases the concept of conservation as outlined Institute of Conservation (ICON) was not commonly shared by USA collectors. I found a general consensus that the clocks did not need careful conservation because there are many still in existence. I saw examples of widely differing methods of cleaning, repair and treatment.

One collector I met, cleans his clocks in proprietary cleaners before coating the wheel in a silicone solution. This has two results: firstly the clock runs very freely (and requires less weight) and secondly, the silicon impregnated gears are now irreversibly coated with a solution which cannot be removed. In the UK acceptable conservation treatments are widely expected to be reversible, in this case, the treatment could not be reversed, so we may consider the treatment to be counter to modern and acceptable conservation practice.
Other collectors used less aggressive cleaning methods. For more complex repairs, collectors tended to pass the clocks to be repaired to specialised repairers. During my Fellowship in the USA, I was fortunate to be able to visit two specialist repairers whose practice radically differed, but in the main when faced with a gear with a few broken teeth, they removed broken gears and other parts, and made new ones, discarding the original parts. In the UK this would be considered very problematic practice because the loss of originality is irreversible. In the UK good practice would be to insert new teeth in the wheel, thus preserving as much of the original wheel as possible. In the USA the repairs, though carried out to a high technical standard, failed to preserve originality of the clock, potentially introducing a new type of wood into the movement.

This shows a 3D-printed plastic strike train fly made in 2015. Below it is a similar item made in wood, also in 2015.
A poor repair, made very many years ago, to a wooden wheel in the T White clock. Despite this, the majority of the wheel has been preserved.

A modern double saw cutting machine that will cut new clock wheels in a broadly traditional way.
Most of the collections I visited in the USA as part of my Fellowship, were being administered by professional curatorial teams but the clocks in the main were still being cared for by volunteers. The volunteers rather than the curatorial staff held the technical knowledge of the clock repair, and there were clearly cases of friction in this imbalance. I have also pointed out this worrying possibility of a shortfall in originality which will not be fully realised until wooden- wheeled clocks American horology has full cultural acceptance.

A display of wooden-wheeled clock mechanisms in parts at The American Clock and Watch Museum, Bristol Connecticut USA
At the American Clock and Watch Museum in Bristol, Connecticut, there is a growing realisation that the collection needs a professional curatorial overview. Managing the change is clearly a difficult and challenging process. The National American Watch and Clock Collectors Museum in Columbia, Pennsylvania was further down the path of a professional conservation approach and had clearly experienced a very difficult transition. New recording systems and conservation approaches are in place.

The Winterthur Museum in Switzerland has a superb collection of foreign and Swiss-made clocks and a excellent collection of Swiss made wooden-wheeled clocks. The collection is maintained by a highly dedicated conservator and the whole museum collection is supported by a very well organised group of 'friends'. Conservation is practiced as a matter of course, underpinned by the knowledge of the conservator who is a 'time served' clockmaker. There is, as far as I was able to determine, a clear policy of conservation. The Clocks were treated with respect and it was clear that this was a very good example of a stewardship approach. My visit to this museum was a highlight of my Fellowship.

**Report Findings**

- There is no accepted definition of 'conservation’ within horology.
- There is a lack of clarity surrounding the evolution of collections.
- Before an item is considered worthy of conservation it must have achieved a cultural status worthy of conservation.
- Written records of conservation, or even repair, were not generally considered important.
- Museums in Switzerland and Germany were clearly focussed on conservation and willing to share experiences.

The relevance of my findings to the UK are as follows, we need:

- a public discussion of Heritage and heritage items within horology.
- to recognise more widely that horological and related items need the protection of conservation.
- to recognise that conservation needs to be collaborative.
- a discussion on the ideas of originality and genuineness.
- a discussion of the stewardship concept.
Practical Recommendations

- Accurate horological records should be instigated, maintained and reviewed.
- Records should be maintained both in a written and digital format.
- Photographs should be made of the artefacts, before and after any treatments.
- Treatments to artefacts should be conservative and be supported by adequate and informed technical information.
- Workers, whether volunteers, professional museum staff or others, who are working on clocks, and related artefacts, should not be working in isolation, ideally at a minimum they should be subject to peer review before commencing any invasive treatment on an artefact.
- Professionals need to recognise the knowledge held in depth by collectors and volunteers working in horological collections.

Conclusions

During my Fellowship, I observed various conservation practices followed in Museums and by private collectors. In terms of horology and wooden-wheeled clocks, I think I have my foot very firmly on the first rung of a very long ladder. I can now see how much I do not know! However, none of this would have been possible without the expanding of knowledge experience and distance allowed by the WCMT Fellowship.

There are perhaps two bottom lines;

- My own personal growth, having had a unique experience through being awarded a Fellowship which will continue to inform my future work, research and writing.
- While I think I have achieved my initial aims, in achieving these, I have found other areas which during the research become highlighted. This phenomenon might be expected, it is very difficult to carry out a project without finding new questions which you did not know existed at the start, and to which there are not, as yet, good answers.

Horological conservation in the UK is still not universally practiced, nor to be strictly accurate, does a broad conservation philosophy have universal acceptance among the majority of UK horologists. Over the past 25 years there has been a debate among British horologists as to the importance or even the need for any clock conservation. There are a very few horologists who would consider themselves to be clock conservators. There are scarcely more than a dozen clockmakers who are ICON accredited.
conservator restorers. It is within that context that I need to set the reflection of conservation in other countries against the conservation in the UK.

From my Fellowship I think that The Deutches Uhrenmuseum, Furtwangen Germany are leading other museums in horological conservation, The museum practices a clear conservation philosophy nothing is done to the clocks that cannot be reversed. The Uhren Sammlung Kellenberger, Winterthur Museum in Switzerland has a different philosophy in terms of conservation and has opted for a practical conservation approach. Horology in the British Museum along with most UK Museums, is at the moment within a broadly conservation-led approach. In the USA the National Association of Watch and Clock Collectors Museum is gradually searching for an approach that will be viable for a collector based organisation. The American Clock and Watch Museum is at a point not so far from the NAWCC but is a smaller and not such a collector-lead organisation. The collection at the AWCM is of significant cultural and heritage importance, I do not think that this is by any means fully appreciated either by the museum itself or by a wider US recognition of its unique cultural significance.
Appendices

Museums and Libraries

American Watch and Clock Museum
100 Maple St, Bristol, Connecticut 06010, United States www.clockandwatchmuseum.org

The British Museum London Great Russell St, London WC1B 3DG www.britishmuseum.org

Deutches Urenmuseum. Furtwangen
Robert-Gerwig-Platz 1, 78120 Furtwangen im Schwarzwald, Germany www.deutsches-uhrenmuseum.de

Museum of Modern Art and Design Boston USA 465 Huntington Ave, Boston, MA 02115, United States
http://www.mfa.org/

Nordic Museum Skanskan Stockholm Djurgårdsvägen 6-16, 115 93 Stockholm, Sweden
www.nordiskmuseet.se

National Association of Watch and Clock Collectors Museum and Library (NAWCC).
514 Poplar St, Columbia, Pennsylvania 17512, United States www.nawcc.org

Old Sturbridge Village Museum PA1 Old Sturbridge Village Rd, Sturbridge, MA 01566, United States
www.osv.org

Snowshill Manor Gloucestershire The Manor Snowshill WR12 7JU The National Trust
http://www.nationaltrust.org.uk/snowshill-manor-and-garden

Uhren Sammlung Kellenberger Winterthur Museum Winterthur Switzerland 8400 Winterthur, Switzerland www.uhrensammlung.ch
Private Collections

Mr T Grimshaw USA
many other collectors and researchers who wish to remain anonymous
Pierre Muller-Mosel Switzerland

Researchers

Peter Nunes Movements cases and manufacture
Mary Jane Dukakis Sociology of American Horology
Chris Klingemier American Painted dials clock cases and woodwork technology
Tom Spittle Americana Horologica
Phillip Morris Early American Wooden clocks
Boj Ronnerstam Swedish Wooden Wheeled clocks

Conventions and Meetings attended

National Association of Watch and Clock Collectors (NAWCC) 2015 National Convention Chattanooga TN USA
The Malmo Society of Antiquarian Horology Malmo Sweden

Makers and Repair Specialists

Don Bruno. Torrington Clock Company specialist in the repair of wooden-wheeled clocks. Torrington Connecticut. USA.

Johnathan Lester. Wooden-wheeled clock repair using modern ICT, and traditional methods. South Cheshire Street Burton Ohio. USA

Peter A Nunes. Antique clock restoration and repair specialist research in wooden wheeled clocks Peacedale Rhode Island. USA