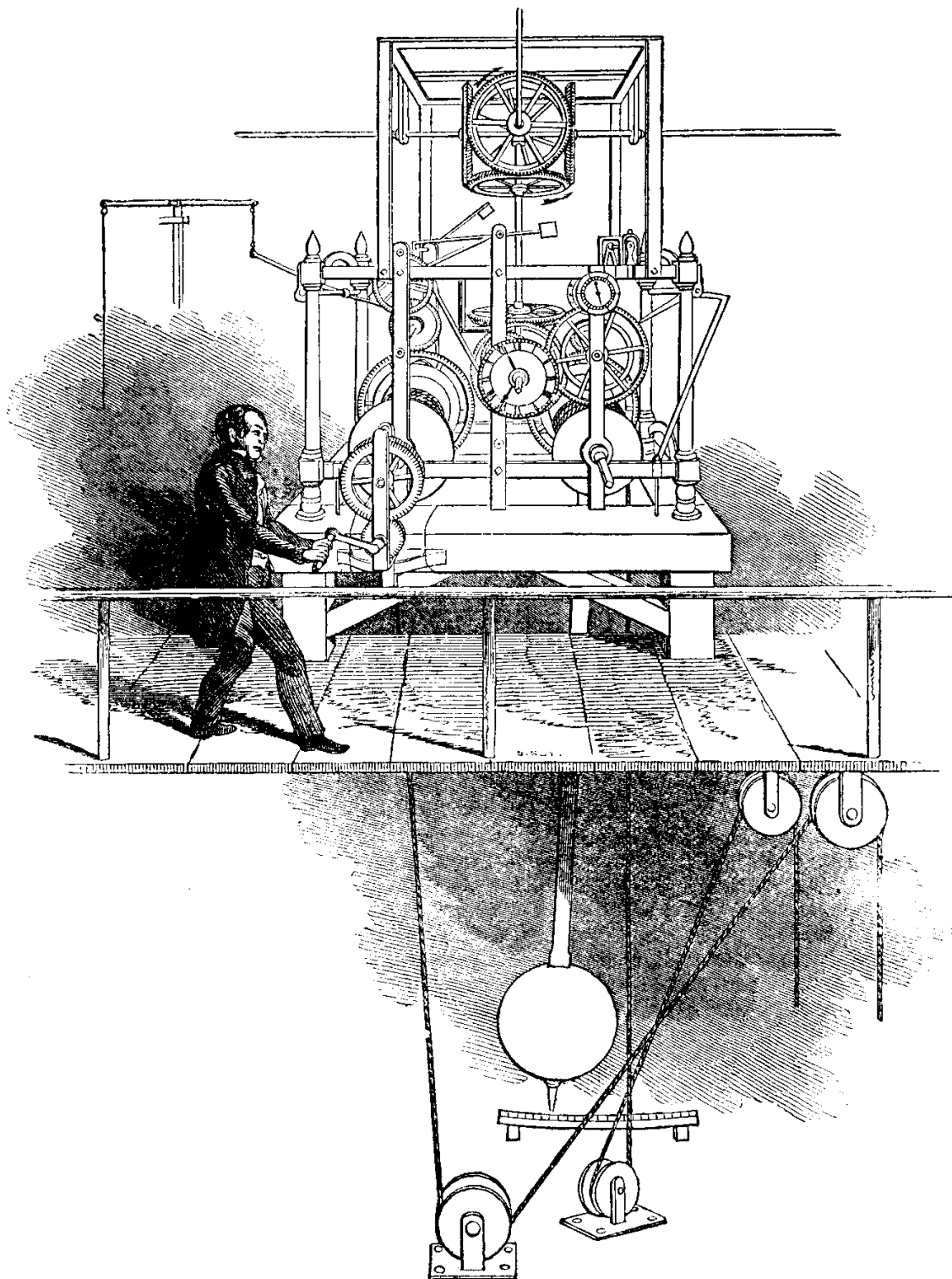


THE TURRET CLOCK KEEPER'S HANDBOOK



The Antiquarian Horological Society

The Antiquarian Horological Society (AHS) was founded in 1953. Its aims are to serve all those interested in antique clocks, watches and other time-measuring instruments. Regular lectures, meetings and visits are arranged in London, in other areas of the country by the Regional Sections, by the Specialist Groups and also by Overseas Sections.

Every effort is made to answer, through the services of an honorary Technical Enquiries Officer, requests for information which are submitted in writing. The Society has a comprehensive library which is housed alongside the Clockmakers Company Library in the Guildhall, London.

The Society publishes *Antiquarian Horology*, a quarterly journal of international repute of around 100 pages which is sent free to full members. The journal contains major articles on all facets of horology, reports on lectures and meetings, and the programme of forthcoming meetings, book reviews, and members' letters. Books and monographs by distinguished authors are also published and may be purchased by members at reduced prices.

Write to the AHS for an information pack, or search the Internet for Antiquarian Horological Society. At the time of writing, the AHS web site can be found at...

<http://ourworld.compuserve.com/homepages/ahsoc/>

The AHS Turret Clock Group

As a Specialist Group within the Antiquarian Horological Society, the Turret Clock Group functions to promote knowledge about turret clocks. Four meetings are held each year, and take a variety of formats in different venues. Lectures, visits to turret clocks and seminar-type meetings are held. The 'Summer Tour' has always been very popular, giving members the chance to visit turret clocks in churches, towers and in private estates rarely accessible to the public.

Many enquiries are answered each year, quite a number of these coming from overseas. Membership covers a wide spectrum from those just starting, to experienced experts. Some members are turret clock advisers in their local dioceses, others are historians, restorers or professionals.

Second Impression 1999

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This book has been produced to broaden knowledge about turret clocks. The spirit behind the publication is to make this information easily available, hence this unconventional copyright notice.

Organisations requiring multiple copies of this book are eligible for special rates, they are invited to contact the AHS with their requirements.

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Cover Picture: Turret Clock in St Ann's Church, Limehouse, by John Moore of Clerkenwell 1839.



THE TURRET CLOCK KEEPER'S HANDBOOK

A Practical Guide
for those who
Look after a Turret Clock

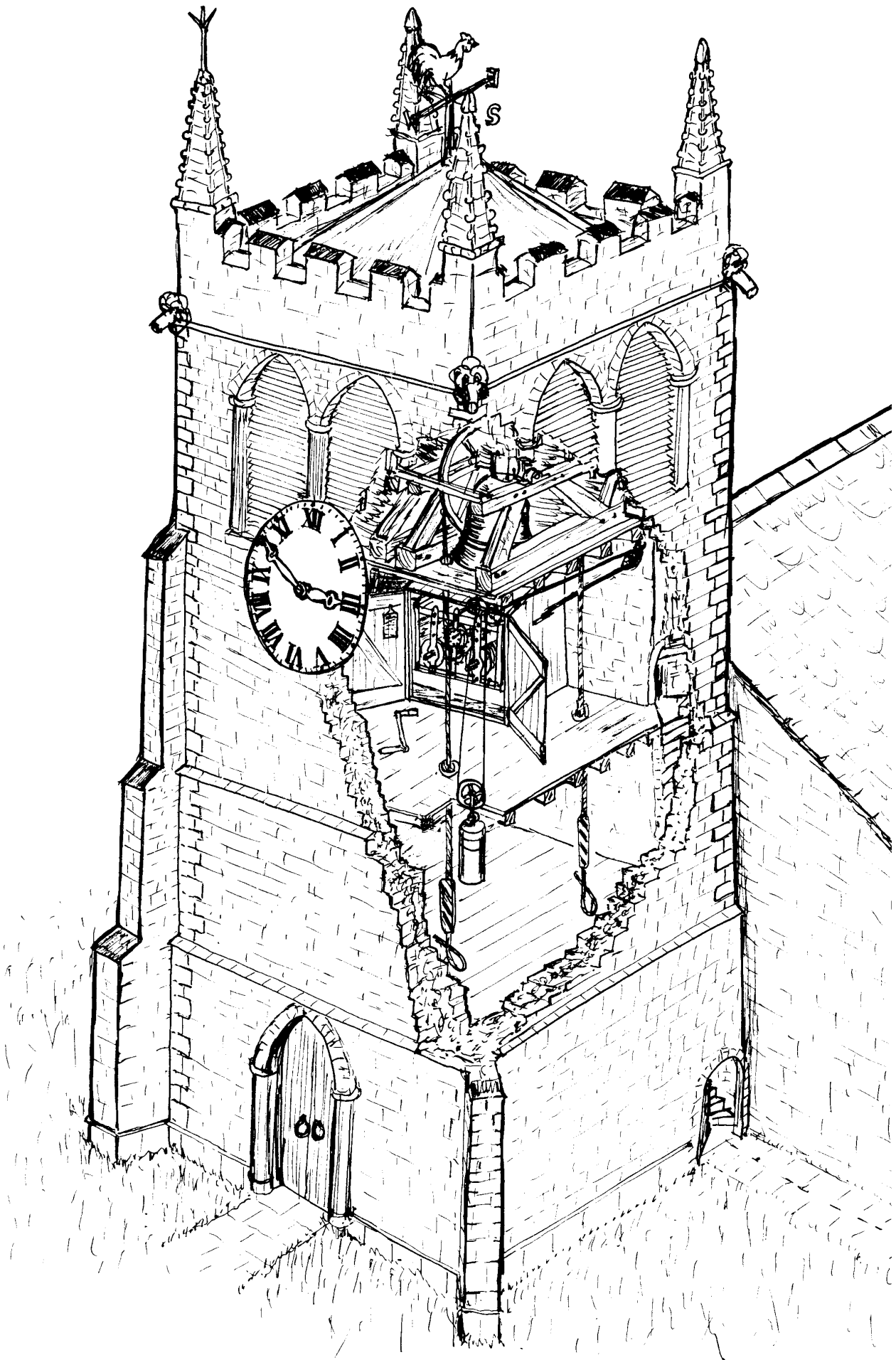
Written and Illustrated

by

Chris McKay

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1998

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Section Through a Tower
Drawn by John Ablott

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Turret clocks are so very diverse in their design and construction that it is highly unlikely that the illustrations, which are given in this booklet as a guide, will be exactly like the clock for which the keeper is responsible. However, it is hoped that they will convey the spirit of the text and help as much as possible. All pictures are based on real clocks and an indication of the period of the feature has been given where possible.

FOREWORD

Although the real practical need for turret clocks has virtually vanished due to the easy access of everyone to accurate time telling, they are universally regarded with affection and remain firmly a part of our heritage and culture. To ensure their survival is more and more urgent as so many buildings are demolished: Victorian hospitals and factories have outlived their practical life and fall prey to the bulldozer. Even the hallowed quiet of the country house stable block has been shattered as owners look to time-share apartment conversions as a means to sustain their estate; the turret clock is deposed to make space for another room.

We are fortunate that the Church of England is able to preserve turret clocks that adorn so many churches. It would be good if other organisations were able to employ the Church's blend of conserving the past with today's need, whilst considering our heritage for future generations.

I sincerely hope that this booklet will help preserve turret clocks by raising awareness and imparting useful knowledge of care and maintenance, not only with owners or keepers but also with restorers. It is through knowledge that preservation is made possible. Finally may I invite you to help broaden our historical knowledge of turret clocks by reading about the Turret Clock Database Project, recording details of your turret clocks and sending these to the AHS.

A handwritten signature in black ink, appearing to read 'M. J. H.', with a long, sweeping underline that extends to the left and then curves back towards the right.

Viscount Midleton

TURRET CLOCKS— A BRIEF HISTORY

What is a turret clock? It is a clock which is intended to make the time known publicly either by striking on a bell or bells, showing the time on an external exposed dial, or both.

No one knows who invented the first clock, or where, or when. However there are some things we do know; one of these is that during a night in 1198 there was a fire in the Abbey church of St. Edmundsbury. Monks put the fire out using their cowls, water from the well and water from the clock; so the Abbey had a water clock!

Mechanical clocks, as we would recognise them, first made their appearance about 1275 on the continent. We have so little information about these clocks, but one view is that they hung on a wall and had an alarm to wake a monk who would then go and ring a bell in the tower to summon his brothers. At some point the clock was made larger so that it had enough power to strike a bell in a tower... and thus the turret clock was born. One famous example of an early turret clock was at Salisbury Cathedral. Here in 1386, a man called Reginald Glover had to take care of the clock in the belfry as part of a legal contract. Some people say that the old clock on display in the cathedral today is the same clock referred to in the 1386 document, and so it is the oldest clock in the country. Such a claim is difficult to prove (or indeed to disprove!).

Turret clocks spread throughout churches, monasteries, royal palaces and all places where there was a large number of people working together. When country houses were built, turret clocks were almost always put up, usually over the stable block. Here they would have kept time for the whole estate, regulating the life of all from the youngest stable lad to the Lord of the Manor himself.

Army and Navy barracks too had turret clocks. When factories started to be set up during the early 19th century turret clocks again appeared on these buildings to summon the workers, and to dismiss them at the end of the day. In the village, like the town, the church clock regulated the affairs of people meeting together.

Turret clocks were set from a sundial, which meant that clocks in towns across the country did not tell the same time due to their different longitudes. Differences across the UK could be up to 30 minutes, but this was quite adequate for local use since no one could travel fast enough to suffer. In the 1830s when trains started to run across the country, a common railway time was agreed in the 1850s leading to Greenwich Mean Time being adopted as the National standard in 1880.

It wasn't until early in the 20th century that the church clock declined in importance. Thanks to imports of cheap pocket watches from America, many people started to use their own timepiece. Wrist watches appeared on the scene around the 1890s, and were in common use at the time of the First World War, so their greater convenience led to an even further decline in the need for public clocks.

Today time is easily available to us all. Radio broadcasts the pips and almost every appliance has its own built-in clock. Finally the amazing accuracy of quartz watches along with their low cost, really means that the turret clock is no longer really needed— it is obsolete. However, those who care for a turret clock will well know just how highly it is regarded in a local community not only for its grace in adorning a building but also for its timekeeping and its job of sounding the hours— despite all those quartz watches.

A TYPICAL TURRET CLOCK INSTALLATION

To help those who may be new to turret clocks, and to start introducing some necessary technical terms, let us visit a turret clock in a church tower.

Entering by a low door at the bottom of the tower, we see in the cramped entrance, a gloomy stone spiral staircase winding its way upwards out of our sight. The steps are worn and uneven, narrow slit windows at every turn let in much-needed light, and it's rather cool and a bit dusty. An odd cobweb or two adds to the feeling that not many people pass this way.

The first door we meet opens into a room where the bell-ringers perform. Above us we can now just make out the muffled sound of the clock ticking, a steady deep clunk, rather like the sound of a very old grandfather clock but deeper and slower. Swinging through a slot in the ceiling we can just see the bob at the end of the clock's pendulum. It is the size of a dinner plate, fairly thick, and held on to the pendulum rod by one of the biggest nuts we have ever seen.

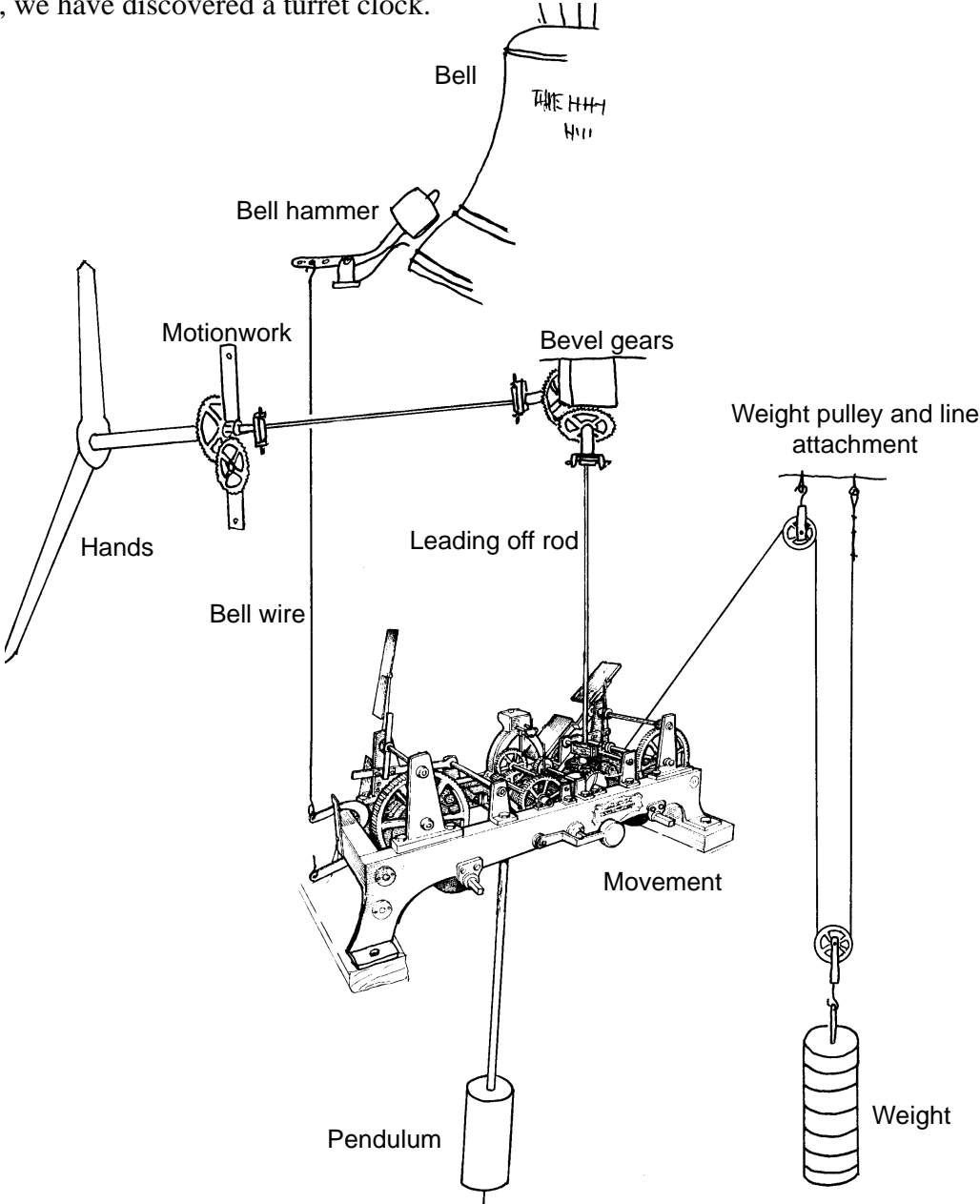
Moving on up the spiral staircase from the ringing room we come to the clock room. The tick is now much louder and emanates from inside a large wooden clock case. Opening the case door we now see the clock itself, an iron frame filled with gear wheels, from the rear of the clock hangs the pendulum which we saw swinging in the room below. The clock mechanism is properly known as the 'movement'. More about how it works later, but what we can see of the movement seems to indicate that it is very old.

Right on the front of the movement is the setting dial so the hands can be set to time without having to see the outside dial, a bit unusual since on some dials the figures run backwards - and it only has one hand. A rod runs from the clock straight upwards to a set of gears on the ceiling above and from there another rod runs across the room to the back of the outside dial. A thin wire extends from the clock case to the ceiling, going right up to the belfry where it operates the bell hammer to strike the hours. Two steel lines also come out of the clock case, pass upwards, over pulleys, and then dive off into the dark corners of the clock room. Looking closer into these corners reveals that the lines have huge cylindrical weights hanging from them, each is about three feet tall, and a foot in diameter. These provide the driving power for the clock and for the striking as well. Below each weight is a hole in the floor, and it is down these holes that the weights descend— right down to the ground floor.

Looking up to where the rod reaches to behind the external dial, we see some gears, which drive the hour and minute hands. Small weights on the end of arms stick out at odd angles to counter-balance the weight of the hands outside. From this gearing on the wall a tube to the hour

hand outside runs through a hole in the tower wall and inside it is a rod to drive the minute hand. In fact the hole is a small window, and the wall is very very thick; about four feet! A chink of sunlight from outside illuminates the back of the dial, it is green in colour, so we know that this dial is made from copper sheet.

Proceeding further up the staircase, we open another door and we are now in the belfry itself. Looking in we see the bells, dull green as seen in the sunlight streaming in through the louvres—the open slats which allow the sound to escape whilst keeping the rain out. Belfries can be very dangerous places, so we do not go inside, but just pause to look in. Suddenly a bell starts to sound, the clock is striking the hour. A few pigeons perched outside the tower are startled and take off, their wings making a frantic clapping noise. The note of the bell is very loud and deep, and since we are so close, it seems to be quite harsh. As the last stroke has sounded the bell goes on humming and humming, softer and softer until after a minute it has died away completely. Our visit is complete, we have discovered a turret clock.



A Turret Clock Installation

HOW A TURRET CLOCK WORKS

A turret clock can have one, two, or three trains of gears; the whole set of gears is contained in a frame of iron. The first is called the going train and this drives the hands to tell the time. The striking train strikes the hour and the chiming train sounds the quarter hours. Each train is driven by a weight on the end of a steel line which is wound up round a wooden or metal barrel. On the barrel is a square on to which the winding handle fits. Since some clock weights can be more than half a ton, winding a turret clock can be very hard work.

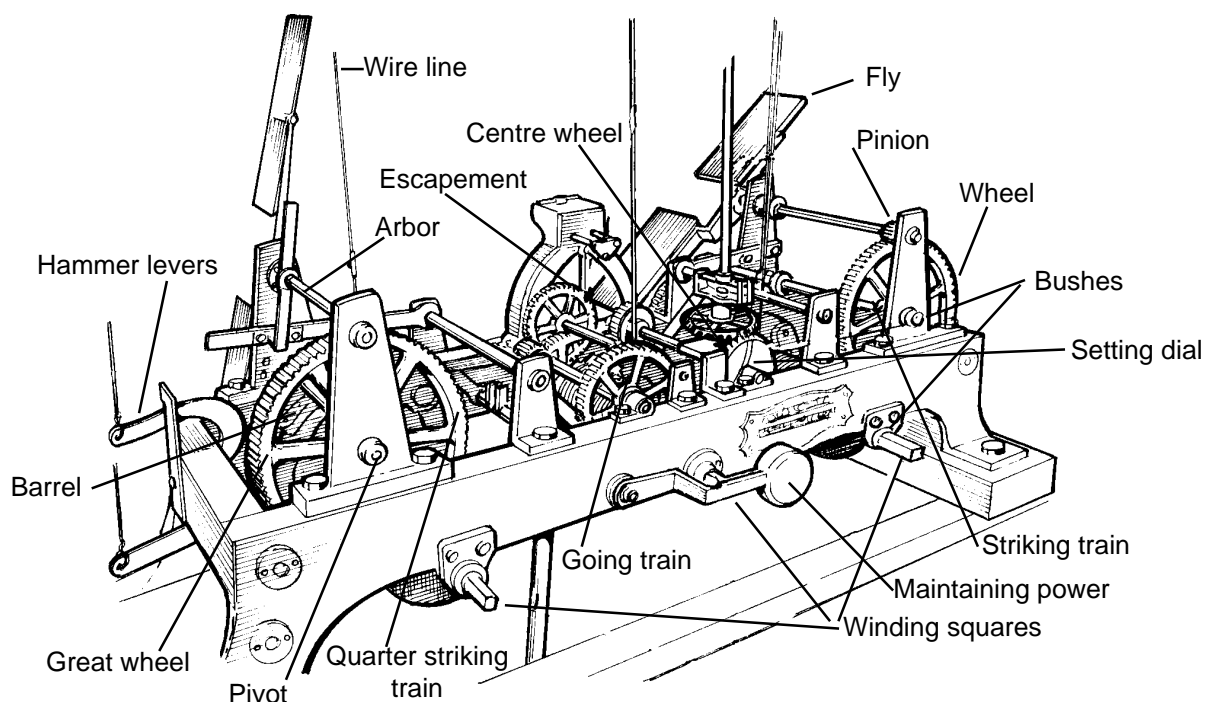
Starting with the going train, the barrel has on it a large wheel called the great wheel, this drives a train of gears which could number two, three or four, depending on the design of the clock or how long it runs for. Each wheel is mounted on an arbor, the term for an axle, the pivots rotate in brass bushes, and the small gears are known as pinions. In most going trains there is one wheel called the centre wheel which rotates once per hour. The last wheel in the going train, and the smallest, is called the escapement wheel or the escape wheel for short. This wheel rotates a lot faster than the others, usually about once or twice a minute, and is linked to the pendulum through the escapement, a device which allows one tooth of the wheel to escape for every swing of the pendulum. Without the escapement the trains of gears would run unchecked. So, as the pendulum beats time it controls the speed at which the escape wheel rotates, and hence through the train of gears with the appropriate numbers of teeth, it allows the centre wheel to turn once in an hour.

A pendulum swings with a regular number of beats per minute, the number depending only on the length of the pendulum. A pendulum about 39 inches long makes one swing in one second, but a pendulum about 14 feet long takes two seconds to make a single swing. In turret clocks most pendulums are somewhere between these two lengths. To reduce variations in timekeeping due to changes in length, caused by changes in temperature, some clocks have compensation pendulums. These are constructed using several different types of metal so that the pendulum remains the same length at different temperatures. Pendulums which have rods made of wood perform very well in different temperatures, but ones just of steel are not so good.

Let's take another look at the escapement since this important mechanism performs two tasks. Apart from releasing the escape wheel every swing of the pendulum and thus giving time to the clock, the escapement also gives the pendulum a little impulse every beat to keep it swinging. If it were not for this, the pendulum would not keep swinging and the clock would stop. The pallets are two little pads of steel which span the escape wheel and are connected to the pendulum by an arm called the crutch. The escape wheel pushes one pad until it escapes, the other pad then arrests the motion of an escape wheel tooth making the familiar 'tick'. Next the pendulum swings back, the second pallet releases a tooth and the first pallet again arrests the motion of the scape wheel making a 'tock' sound.

How does the clock drive the outside dials? Well, we have to return to the centre wheel which turns once per hour; it is this which drives the hands on the dials through a series of iron rods and bevel gears known as leading off work. Where the direction of the rod has to turn a corner, or where two or more dials are installed on a tower, bevel gears are used to change direction of motion.

Each dial is driven by a leading-off rod which turns once per hour. Behind each dial is a cluster of gears known as the motion work, this takes the one turn per hour of the minute hand and drives the hour hand round once in twelve hours.

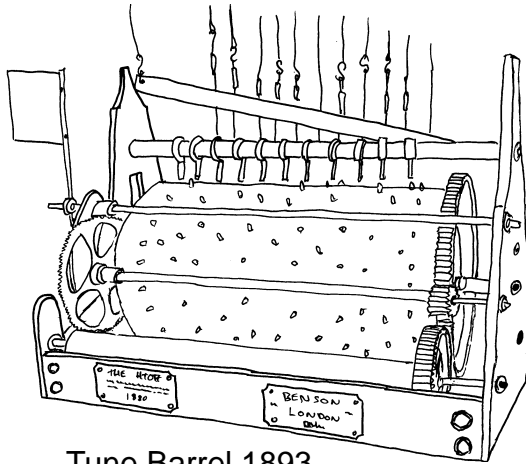


A Three Train Turret Clock Movement circa 1890
(Artwork from the late David Nettlell)

Most turret clocks strike the hour on a bell, it is the striking train which operates the bell hammer. A lever in the striking train is pulled down and released once for each stroke of the bell, this lever pulls a wire which runs to the belfry above the clock. Here it lifts a heavy hammer which then falls on the outside of the bell. A check spring keeps the hammer just off the bell so that once the hammer has struck, the bell can sound fully. If the bell is not directly above the clock, bell cranks are used to transfer the pull of the wire to the correct place. A few turret clocks have jacks who strike the hours, these are decorative figures whose arms are moved to sound the bells.

Both the going and striking trains are very similar. The striking train is also powered by a weight, but it is usually heavier than the one for the going train as it has to do more work. There is no escapement in the striking train, but a two-bladed fly revolves rapidly, its blades beating the air to control the speed of striking. In order to strike the correct number of blows one of two devices is used, a count-wheel or a rack. A count-wheel has notches at different intervals round its edge which are spaced so that the striking train will first run for one blow and stop. Then, when set off at the next hour, it will run for two blows and stop; and so on up to twelve o' clock. With rack striking, the rack, which looks like a section out of a gear wheel, is raised by one tooth every blow of the bell, until when it is fully raised, the striking stops. To control the correct number of blows the rack is allowed to drop the right amount by a specially-shaped cam called a snail. Have a look at one and you will see why it is called a snail!

Some clocks have a third weight and train of gears enabling the clock to sound every quarter of an hour; this is called the quarter or chiming train. As this has even more work to do, its driving weight is the largest of the three clock weights. Popular chimes are those used in Big Ben or ting-tangs can be sounded on two bells which is called quarter striking. The quarter train is almost identical to a striking train, here the main difference is the number of bell hammers it operates.



Tune Barrel 1893

Another device sometimes connected to a turret clock was a tune barrel. ‘Carillon’ is a term often used to describe these devices, but strictly speaking a carillon is a set of 23 or more bells on which tunes can be played: so we will use the correct term of tune barrel. The tune barrel played tunes on the tower bells, hymn tunes were popular, as were national tunes and God Save the Queen—or King, as the case was at that time. Tune barrels are separate from the clock, look rather like a clock mechanism, but have a large drum with pins in which operate the bell hammers. The whole

mechanism is rather like a huge musical box and is usually set off by the clock at certain times of the day. Sometimes the tunes change automatically, either for the different times of the day or for the different days of the week.

TAKING CARE OF A TURRET CLOCK

Safety

Safety is an important issue today and rightly so. A clock tower can be quite a dangerous place, and those responsible for the building must make sure that access to the clock is safe. Equally so, it falls to those who wind a clock to highlight any safety issues that could affect them or others. As a guide, the following list shows common areas where safety can be compromised.

- Wooden ladders with worn / unsafe rungs
- Stone staircases with worn steps
- Vertical ladders not secured to wall and not enclosed with safety rings
- Rotten or wormed floors
- Poor lighting
- Old electrical installations
- Holes in floor (e.g. for weights to pass through)
- Platforms with no rails
- Clock weights which people can walk under
- Unsecured trapdoors
- Pigeon droppings which can cause respiratory problems
- Unguarded chains on automatic winders
- Danger from falling weight if a line broke
- Danger from falling pendulum if suspension spring broke

When working alone in a church tower it is a good plan to let someone know where you are so they can check if you don't return. People have been inadvertently locked into churches and accidents can occur. When working up ladders or doing work where an element of risk is involved, working with another person is a very wise precaution. A mobile phone is a useful aid.

Bells can be extremely dangerous when they are in the 'up' position; this is when the bell is supported mouth up. Just a small push and the bell comes off the balance and swings down crushing anything in its path. Those unfamiliar with bells should not enter a belfry when the bells are 'up', neither should any bell rope be touched. Bell ringers will normally leave a warning notice saying "WARNING! The bells are up".

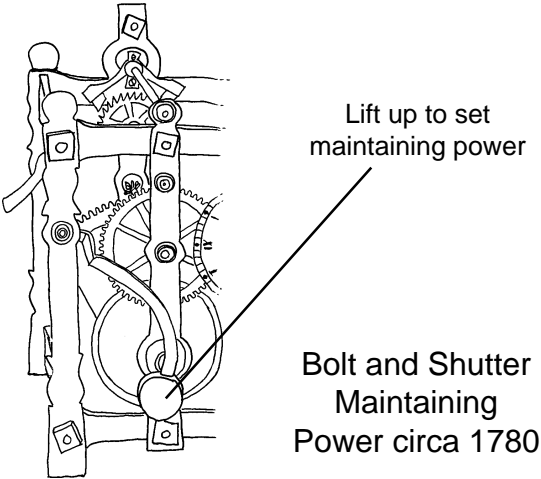
Winding

Wind the clock as required; this is likely to be daily, weekly, or sometimes two or three times a week, depending on the clock and how far the weights can fall. Most turret clocks have a winding handle which fits onto the winding square. Do make sure this is a good fit, because if it slips off injury could be caused to the person winding as well as damage to the clock.

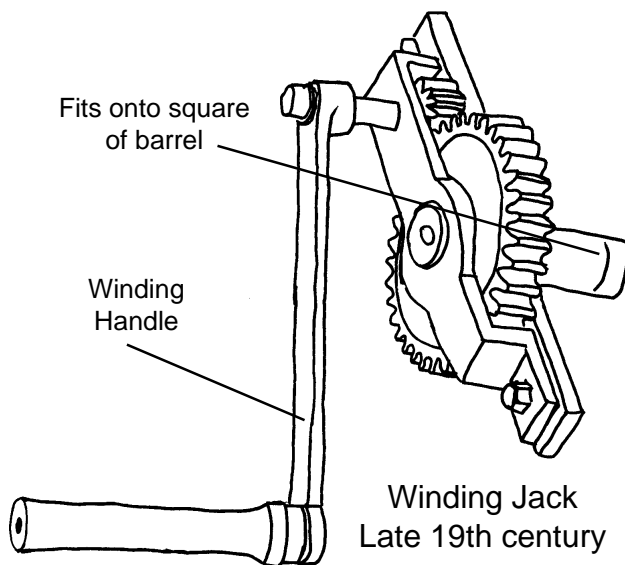
Normally each train, going, striking and chiming if fitted, should be fully wound. It is best NOT to wind the chiming and hour striking trains when the clock has warned (is about to strike or chime). This is within the five minutes before quarter striking, and within the ten minutes before the hour strikes.

Wind until the weights are fully up; often a mark on the line is used as an indicator (white correction fluid is useful for this purpose and can be quickly repainted when it wears off). Always control the winding handle, allowing it to go backwards gently when winding is finished, thus lowering the click onto the ratchet to avoid any shocks and possible breakage. Do not begin winding too quickly, but start at a steady pace which can be maintained. It is vital that a weight is not wound too high. If it is then there is the danger of straining the line anchorage, forcing the line to come off a pulley, or at the worst, breaking the line and having the weight come crashing down. A weight of a quarter of a ton descending 30 feet will do considerable damage to anything in its way.

A maintaining power is a device which keeps the clock ticking whilst being wound, usually this is a lever which has to be pushed over to uncover the winding square. This type is known as bolt and shutter maintaining power. It is important to use it if fitted since it not only makes sure that the clock does not lose time during winding, but it also prevents damage to the teeth of the escape wheel.



There is a type of maintaining power, called Harrison's, which uses energy stored in a spring to keep the clock running. If you turn the winding handle backwards a little you can feel the spring tension up. Another type uses a system of epicyclic gears which are usually hidden inside the barrel; with these clocks the winding handle sometimes turns one way and the barrel turns in the opposite direction.



Large chiming or striking trains sometimes have a winding jack, this contains a set of reduction gears which make the clock easier to wind. Often the jack has to be put onto the winding square, and the winding handle then goes onto the jack. The frame of the winding jack butts against a stop, usually a wooden part of the supporting frame, to prevent it from turning. A variation of this is where the reduction gear is built into the clock, usually a pinion has to be engaged before winding and then disengaged after winding.

Automatic Winders

Some turret clocks are fitted with automatic winders which do away with the task of manual winding. They operate by an electric motor which winds up a small weight at regular intervals. In the event of a power cut, there is usually enough drop on the weight to keep the clock running for several hours. Some types use low voltage motors powered by a battery, these have a greater reserve and can wind the clock for a day or so without mains power.

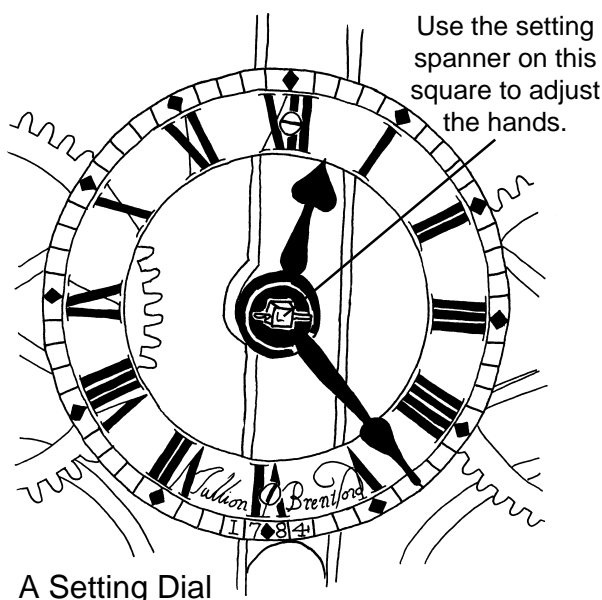
Clocks with automatic winders still need regular care and attention. A visit, monthly at least, is necessary to check time keeping and set to time if necessary.

All automatic winders should be fitted with a safety override switch. In the event of a fault where the winder fails to stop correctly, the override switch comes into action and turns the winder off completely to await maintenance. The override switch should not be reset until the cause of the fault has been identified and corrected.

Setting to time

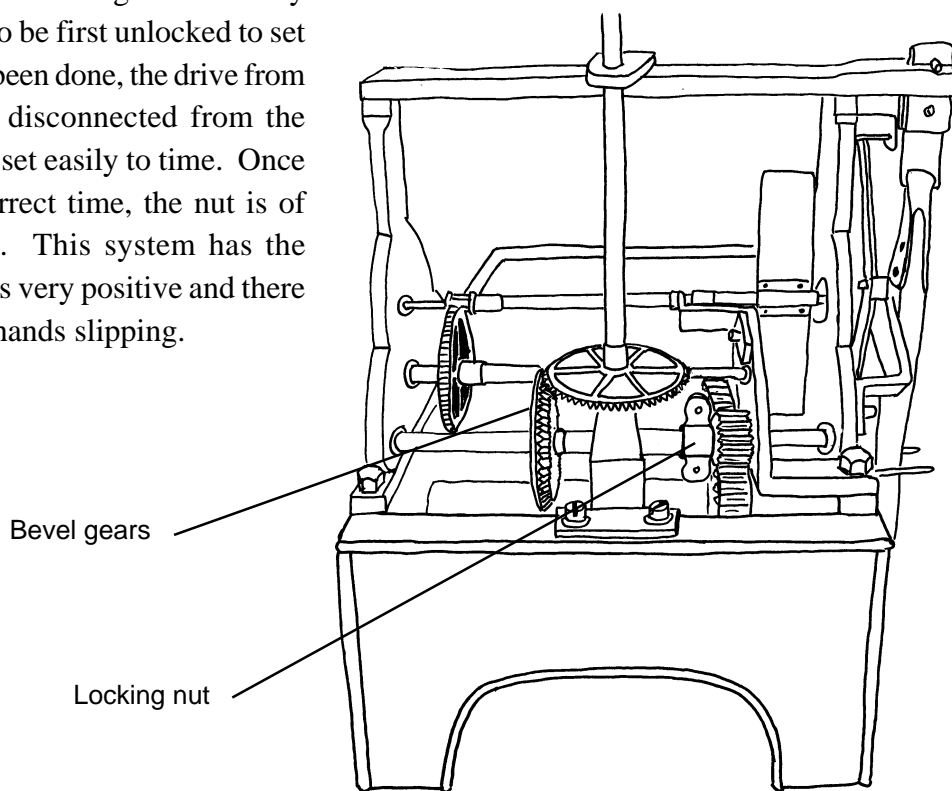
Most turret clocks have an internal setting dial which shows the time as indicated on the outside dials. They normally have one hand to show the minutes, or sometimes a second hand to show hours. Quite often the numerals run anti-clockwise.

There are several different systems of setting the hands; commonly used is a small key or spanner which fits onto a square on the setting dial, and when turned this moves the outside hands. Always use the spanner if there is one, because if you try to use the hand you are likely to bend or break it. A friction clutch allows the hands to turn, this is quite suitable for small dials, but where several dials, or large dials are used a different mechanism is employed.

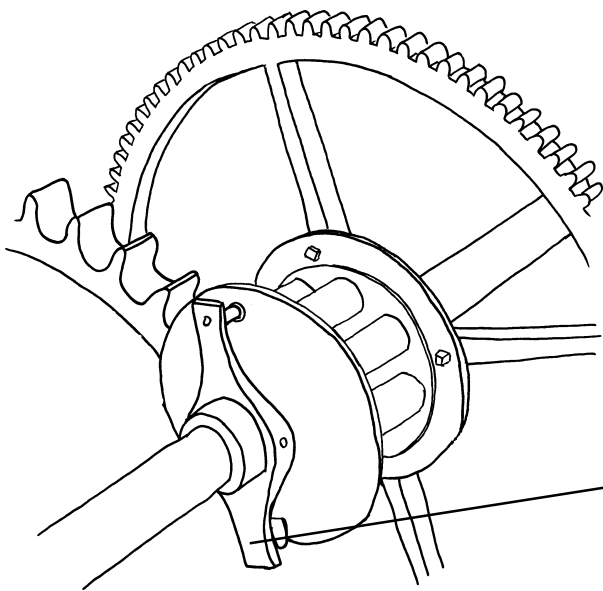


A Setting Dial

Those clocks which drive large dials usually employ a nut which has to be first unlocked to set the hands. Once this has been done, the drive from the clock is completely disconnected from the hands which can then be set easily to time. Once the dials indicate the correct time, the nut is of course locked up again. This system has the advantage that the drive is very positive and there can be no chance of the hands slipping.



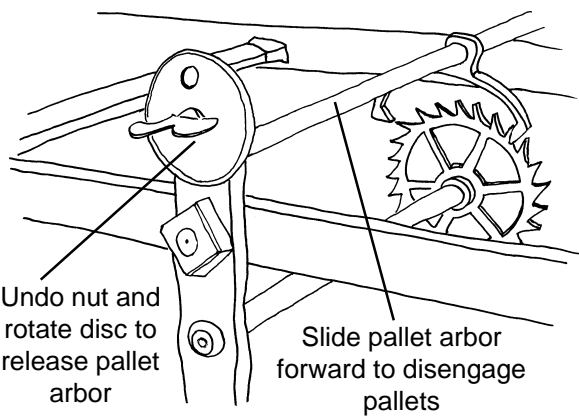
End View of a Flatbed Movement. 1880



An alternative to the nut is a dog-clutch where depressing a catch releases the hands to allow them to be set to time.

Press here to release hands

Dog Clutch Hand Setting 1826



Disengaging Pallets Hand Setting circa 1700

Some 18th century clocks are set to time by sliding the pallets out of engagement with the escape wheel and letting the clock run forward. This must be done with great care since the escape wheel can easily be damaged. First stop the pendulum, but don't just make a grab at it as there is a lot of energy in the swinging weight; rather give it a number of small pushes to oppose its swing. Next push the catch which keeps the pallets in engagement to one side, hold the escape wheel arbor, and slide the pallets out of engagement. Allow the clock to run slowly forward by letting the escape wheel arbor run through your fingers.

When you have reached the correct time (on no account let go, or let the wheel turn so fast you cannot control it), grip the arbor firmly to stop the wheel turning and slide the pallets back into engagement. Make sure the catch that retains the pallets is back into place. Finally, restart the pendulum by gently giving it a series of small pushes.

When setting a clock to time always turn the hands forwards and if you have to advance the hands past the hour let the clock strike fully. Should the clock have quarter striking, allow the chiming to finish after you set the hands past each quarter.

Setting to British Summer Time and Greenwich Mean Time

To set the clock to British Summer Time advance the hands by one hour letting the clock strike at the hour and quarters.

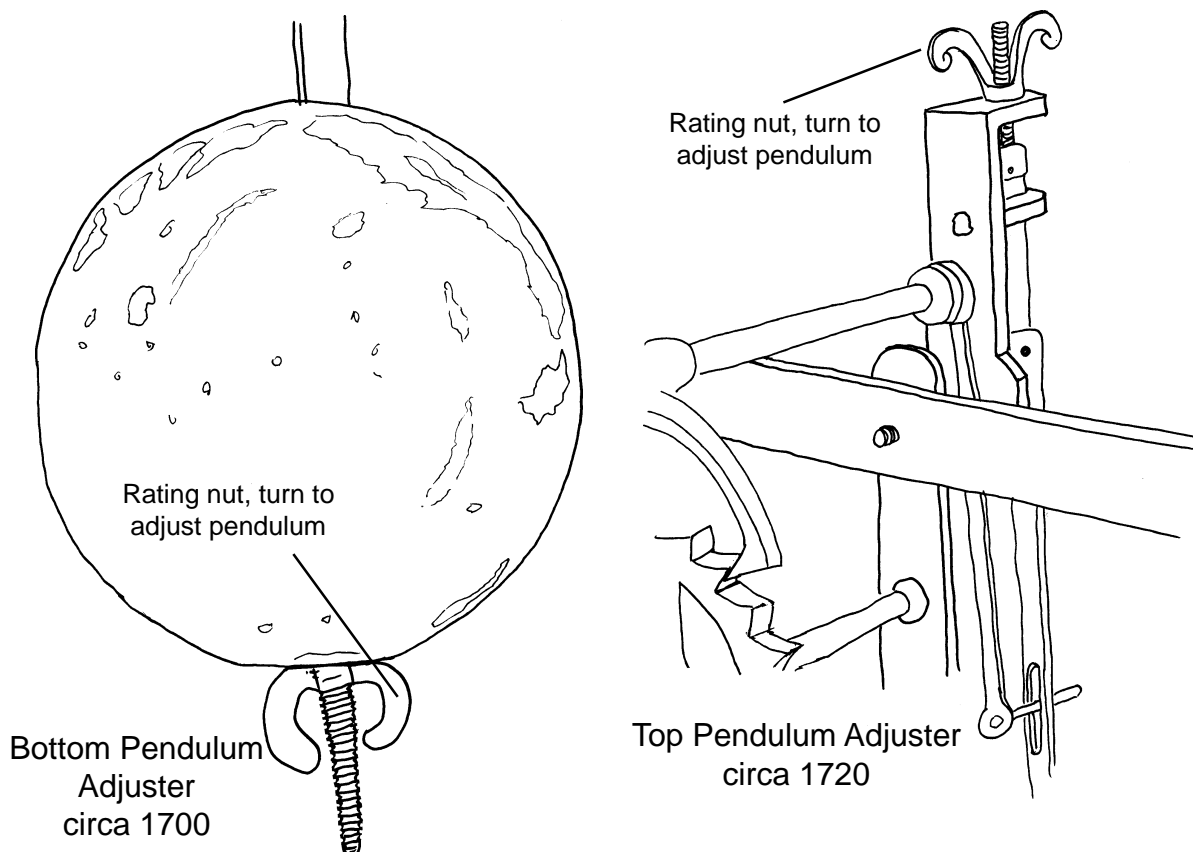
To set the clock to Greenwich Mean Time it is best to stop the clock for one hour by stopping the pendulum. Alternatively you can advance the clock by 11 hours letting the clock strike at the hours and quarters.

To Start the Clock Should it Have Stopped

Once the weights have been wound up, give the pendulum a small sideways push and keep pushing every swing until the clock starts to tick.

Regulation

Do not expect an old turret clock to keep time as accurately as a modern quartz watch. A well-maintained 18th century clock can still keep time to a minute or so a week, a Victorian clock with a pendulum compensated for temperature changes may be within 15 seconds a week or better.



To get the clock to keep good time the pendulum may need to be adjusted. There is usually a large nut underneath the pendulum which can be screwed up or down to raise or lower the pendulum bob. Some clocks have a wing nut on top of the pendulum suspension bracket, which enables the suspension spring to be pulled up or down through a slot thus shortening or lengthening the pendulum.

To make the clock gain, raise the pendulum bob.

Turn the nut underneath the pendulum clockwise as viewed from underneath.

or

Turn the nut on top of the pendulum clockwise as viewed from the top.

To make the clock lose, lower the pendulum bob.

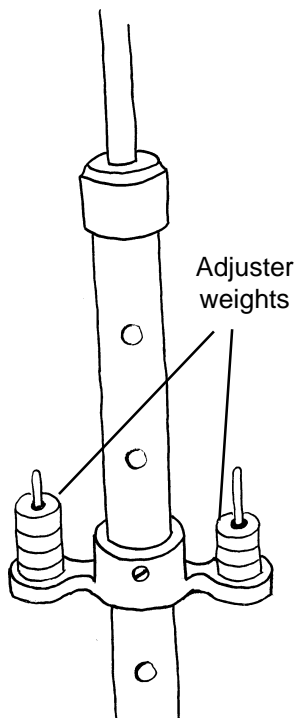
Turn the nut underneath the pendulum anti-clockwise as viewed from underneath.

or

Turn the nut on top of the pendulum anti-clockwise as viewed from the top.

Expect a change in time keeping of around half a minute a day to a few minutes for one turn of the regulating nut.

If the nut is underneath the pendulum first stop the pendulum. Do this carefully as some pendulums are very heavy (1 Cwt or more). Once the pendulum has stopped make the adjustment holding the bob so that you do not twist the whole pendulum and damage the suspension spring (the thin steel strip from which the pendulum hangs). On very heavy bobs it is worthwhile wedging a wooden block under the bob whilst making an adjustment; this stops the bob moving and saves your hand in the unlikely event of the suspension spring giving way. If the pendulum has not been adjusted for years the nut may have rusted and need releasing. A penetrating oil or dismantling fluid often helps to release seized up parts.



Rate Adjuster on a
Compensation Pendulum
circa 1875

Some clocks, usually late 19th century clocks which have compensation pendulums, use small weights for fine regulation. These work by effectively raising the centre of gravity of the pendulum. Regulation weights are often in the form of large washers and slip on to one or two vertical rods close to the top of the pendulum. Sometimes people put a number of odd items on the top of a pendulum bob to help bring it to time.

To make the clock gain add regulation weights.

To make the clock lose remove regulation weights.

Expect a change in time keeping of a second or so a day for removing or adding one washer-type weight.

Correcting the striking or chiming

The striking may possibly get out of step with the time on the dial or the quarter striking may be out of sequence; this could be due to letting the clock run down and stop, inadvertently tripping the striking, or not allowing the clock to strike fully when advancing the hands.

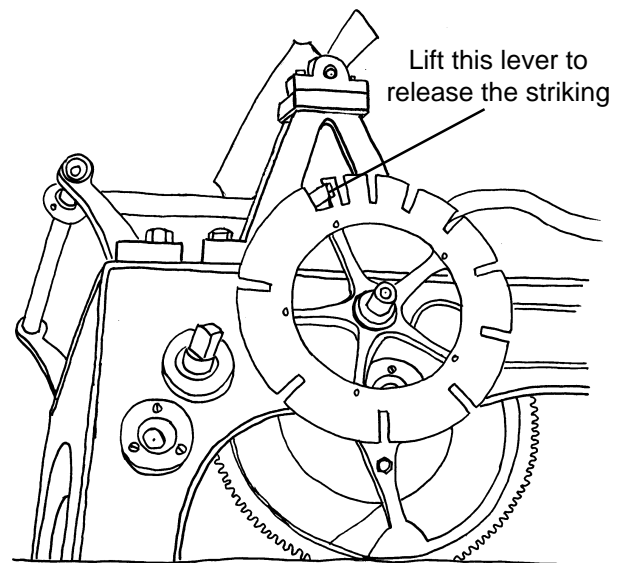
The clock may be corrected by setting off the striking or chiming. Most clocks have a count wheel to control the striking, this means the clock strikes 1, then 2, then 3 and so on. A count wheel has slots in its edge, often they are marked 1, 2, 3 etc., and the spacing between the slots gets progressively longer. When striking has finished the correct number of blows a lever then drops into these slots which in turn stops the striking by locking the fly. Lateral pins set into a wheel, instead of slots are also found.

Check the time on the outside dial, then lift the locking lever and let it drop. The clock will then strike. Repeat this process until the striking is back in step with the hands.

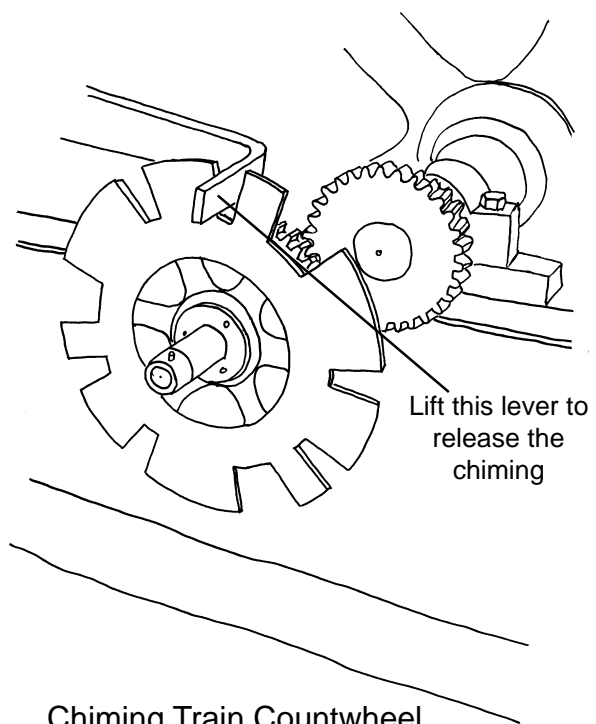
Note: The striking cannot be released if the clock has 'warned'. Warning is the clock's action just before it strikes. About ten minutes before the hour the going train partially releases the striking train, this is accompanied by a loud click. Exactly on the hour the striking train is released and the hour is struck.

Correcting quarter striking is much the same as correcting hour striking except that the locking plate normally only has four slots, one for each quarter. Sometimes the chiming locking plate will go round once every two, three or four hours, so it will have a multiple of four slots. For a chiming clock, correct the quarters first and then the hour striking since the quarters usually release the hour striking. Just to make things a little confusing, on both striking and chiming count wheels the first slot often runs into the second, so in these cases the striking countwheel only has 11 slots and the chiming 3.

Note: Like the striking train, the chiming cannot be released if the clock has warned. In a chiming train, warning occurs about five minutes before each quarter.



Striking Train Countwheel



Chiming Train Countwheel

Night Silencing

Where the striking and chiming of a clock through the night is considered antisocial, night silencing can be installed. Some old clocks in hospitals had this incorporated in their design. Today a modern night silencer can be added, this is an electric device which pulls the hammer clear of the bell so it will not sound; the times of the silent period are controlled by an electronic time switch.

Bell Hammers

Many turret clocks are in churches where there are rings of bells. Before the bells are rung, the clock hammers have to be 'pulled off'. A wire from the clock comes into the ringing chamber and this is pulled down and secured to a hook. The action is to pull the clock hammers well clear of the bells and their wheels, so that when the clock strikes the clock hammers will not hit and damage the swinging bells.

Electrical Clocks

From the early 1930s some dials were driven by synchronous electric motors. If there is a power failure then the clock will not tell the right time. Today automatic restart units are available which will keep the clock stopped for exactly 12 hours after the power failure, then they automatically restart the clock so it is back telling the right time. In another system, a power maintenance unit will provide mains voltage at the correct frequency from a battery-powered unit until the mains supply is restored.

What to do if the Clock has Stopped

A clock may stop for a variety of reasons the common causes are: the weights have run down, there is a problem with the hands, or possibly the striking may have jammed.

First make sure that all the clock weights have been wound. If you can see a weight has reached the ground then that may be the problem. If the weights are out of sight just a wind few turns on each train to check what is going on. Start the pendulum by giving it a series of gentle pushes until the clock starts to tick. If the tick is firm and strong then the clock is running, if it is weak and hesitant then something is wrong and further investigation is needed.

Try advancing the hands, if trying to move them gives more resistance than normal then it indicates some problem with the dials and hands, leading off work or motion work. Suspect something like a pigeon nest in the motion work. If it is impossible to move the hands forwards, try moving them backwards by 5 minutes or so and see what happens then. Some clocks will jam up if the striking or chiming weights have run down but the going train is still wound.

If these basic checks fail, or if the clock is in the habit of often giving problems then it is time to call in an expert to help you.

TURRET CLOCK MAINTENANCE

Turret clocks have to perform in a hostile environment as often towers are cold, damp, dusty and windy. Basic maintenance is essential to keep the clock in good condition and performing well.

The purpose of this section is to enable those responsible for the care of a turret clock, to plan the maintenance of that clock. It is not intended as a do-it-yourself guide since many of the operations need to be done by a person experienced in turret clock work. Errors in maintenance could lead to damage to the clock, bells, bell wheels, the building structure, injury to the person winding the clock or to persons in the vicinity. The points presented here are to make the turret clock keeper aware of the aspects involved. As each turret clock installation is different, turret clock keepers are strongly advised to take professional advice concerning the maintenance of their clock.

An eight day quarter striking turret clock with 4 dials needs lubrication in over 100 different places. Clocks have been damaged by people who have oiled or greased wheel teeth; dust and grit sticks to the oil to make an efficient grinding paste which rapidly wears pinions.

Protection is better than a cure, so a good wooden case (which can be locked) round the clock will protect it from dirt. Likewise, it is a great advantage to have a protective box over the motion work behind each dial and another around the bevel gears in the leading off work.

The best scheme is that a turret clock should have an annual service from an experienced person, who would perform the following tasks:—

Make a safety check on...

- Weight lines
- Weight line attachments
- Pulleys
- Flys
- Striking and chiming fly clicks
- All barrel clicks
- Suspension spring
- Bell hammer adjustments
- Bell hammer pull offs
- Dial fixing

Wipe off excess oil and dirt from...

- Clock movement
- Leading-off work
- Motion work
- Bell hammers and cranks

Lubricate the...

Clock movement

Leading-off work

Motion work

Bell hammers and cranks

Wire lines

Make minor adjustments as necessary

Report on any work that needs doing

Safety Checks

Weight lines

Lines made of galvanised steel must be checked carefully. They must be replaced if they are shiny and worn smooth, rusty on the surface or inside, or have sharp prickles on the surface. The standing end of the line is often a place where rust can start and escape notice. Occasionally hemp or fibre ropes are used; these should be checked for fraying; a powdery deposit inside the rope indicates that it needs replacing.

Weight line attachment points

Must be checked for being secure as beams suffer from rot and beetle attack. This is particularly difficult if an iron eye has been screwed into a beam. If in doubt replace with a 'U' bolt round the beam, or an eye bolt all the way through the beam.

Pulleys

Must be checked for worn pins. This requires the lowering of weights which is a specialist's job. Only needs doing occasionally, say every five years.

Flys

Clicks must be checked for wear and security. Where tapered pins are used to secure the fly, these are best replaced with tapered pins with spilt ends that can be splayed apart so that there can be no possibility of the pin coming out and the fly coming off.

Barrel clicks

Must be checked for wear and security.

Suspension spring

Must be checked for cracks and rust

Bell hammers and check springs

Must be checked for security and correct hammer clearance from bell.

Bell hammer pull offs

Must be checked to ensure they operate correctly, the hammers clearing the bells and their wheels. Also make sure that the pull off securing hook in the wall is secure.

Dial security

The dial's fixings must be checked visually with binoculars. To check a dial properly is a steeplejack's job, but a visual examination can reveal potential problems.

Cleaning

During a maintenance visit cleaning can only involve removal of any excess oil, grease and dirt. It would not cover major work requiring the dismantling of the clock or other parts which would be required in a full overhaul or restoration. Cleaning (wiping down) is best done with rags but dirt in wheel teeth and pinion leaves can be brushed out with a stiff paintbrush.

Lubrication

Where oil is needed use turret clock oil (available from watch and clock suppliers) or failing that, a straight SAE 30 oil. Engine oils are unsuitable as they are designed for operation at high temperature and pressure and they have many special additives and detergents. Cycle oil and sewing machine oil are too light. Where grease is specified, use an all-weather grease (available from lubrication specialists) or a car grease.

Clock movement

Every rotating pivot is oiled, two drops for small pivots four drops for large ones. Also pivots on levers are oiled. Oiling the escapement is best done by putting several drops of oil on each of the pallet pads and letting the oil distribute over the tips of the wheel teeth. The escape wheel is the only wheel which is oiled in a turret clock as there is a sliding action between the wheel teeth and the pallets.

Everywhere a sliding action takes place between two parts, grease need to be applied. Such places include cams and hammer lifting pins. Sometimes a lever which lets off the striking will lift another lever; where the two rub a small amount of grease is needed. A smear of oil or grease on the suspension spring serves to keep rust away.

There are parts on the clock which need lubricating but are not as obvious as the pivots on the front of the clock. There are of course all the pivots on the back of the clock as well as places which are hidden from view like the barrel clicks, centres of the great wheels, clicks on the flies, and the flies.

DO NOTs

DO NOT oil or grease wheel teeth

DO NOT oil or grease pinion leaves

DO NOT oil the crutch pins (the part which contacts the pendulum) on a gravity escapement, but these may be wiped with an oily rag to prevent rust.

Leading-off work and motion work

Rotating parts on the motion work and bevel gears all need oiling. Since these parts are usually much more exposed to the weather they need greater care to ensure the clock works properly. Sometimes long leading-off rods are supported by rollers or hangers; these too will need lubrication.

Bell hammers and cranks

All bell cranks and hammers pivots need oiling. The hammer check spring should be greased where it supports the bell hammer.

Wire lines

The life of wire lines can be extended by lubrication. Special wire rope lubricants are available which are between an oil and a grease, they not only lubricate but also repel moisture. Make sure the whole length of the line is lubricated including the standing end and that out of sight inside weight chutes.

Record Sheet

It would be useful if a log sheet were kept with the clock in its case. This could be used to record the winder's name address and phone number, any maintenance performed and problems encountered. Another function would be to record the clock's rate and what adjustment was made to the pendulum. In this way the keeper would soon get to know exactly what effect on the timekeeping one turn on the rating nut would have.

REPAIRS AND OVERHAULS

When a clock has been giving a lot of problems, or is worn, a restoration is needed. This would probably entail the removal of the clock. The sort of work needed is likely to be re-bushing of worn holes, repair or replacement of a escape wheel, fitting of new weight lines and of course, cleaning. Make sure that any building work needed is carried out whilst the clock is out and the clock room cleaned in readiness for the clock's return.

Dials too may need painting and restoration; in a large overhaul, work on dials and motion work may account for half the bill. Dials are the part seen by the public and for that reason they should be restored with sensitivity in their appropriate style and materials. Never use gold paint, it fades so quickly; real 23 carat gold leaf is the best way to gild a dial, done properly it lasts for 20 years or more.

In the Church of England, modifications and alterations to any part of a church is controlled by the Diocese. A faculty is a legal document from the diocese giving the parish permission to do major work in a church. It is the responsibility of the parish to obtain the correct paperwork. A faculty will be needed for work like removing a clock or adding automatic winders. On-site maintenance and cleaning requires no faculty. Many dioceses in the Church of England have a 'clocks adviser' who is able to guide parishes on what work needs doing and comment on quotations received. Contact the Diocesan office which will put enquirers in touch with the clocks adviser.

The Council for the Care of Churches (CCC) gives guidance to parishes on all aspects of church furnishings. Sometimes the CCC is able to help with grants for clock restoration in needy cases. A book 'Guidelines for their Maintenance and Repair and for the Installation of Automatic Winders' is published by the CCC, see the bibliography for details.

The Council for the Care of Churches
Fielden House
Little College Street
LONDON SW1P 3SH
(Publications and grants for restoration)

Other conservation-minded organisations have their own special arrangements for caring for turret clocks. The National Trust for example, will use their own staff to wind a turret clock, but will only use nominated clock conservators for maintenance work.

Restoration and Conservation Policy

Any person who undertakes work on a turret clock should subscribe to the spirit of the following policy in order to preserve the clock for future generations.

- No parts should be removed from the clock (e.g. to enable automatic winders to be fitted.)
- The clock should be preserved in its historic form as much as possible. This includes past alterations such as conversion from foliot to anchor and old paint coverings.
- Repairs should be sympathetic and fit in with the character of the clock.
- Additions, such as automatic winders, must always be effected so they can be removed without trace. No parts should be cut or drilled: attachments should only be made by clamping to the framework.

Repairs and restorations are always a compromise with conservation and it can be difficult to decide exactly what to do. To replace a badly damaged escape wheel on a 17th century clock may be justifiably necessary to keep the clock running. However, to conserve the original wheel, an expert can replace a damaged tooth or fit a brass band round the wheel into which the new teeth are cut. To replace every iron wheel in a 15th century clock, if they were badly worn, would be criminal as so much ancient history would be lost.

Who Should Service or Repair your Clock?

A competent person should carry out any service or repair work. The best qualification is someone who is experienced in turret clock work and who has a catalogue of successful work with satisfied customers who could give references. There is no formal horological qualification available for those who work on turret clocks. Those qualifications which do exist major on conventional clocks and watches.

Needless to say a proper written quotation should be obtained along with a description of what work will be carried out, what the guarantee covers and what it does not. Also an understanding about who provides insurance cover, and at what level, would be necessary. Before choosing a contractor it is advisable to get at least two quotations, not only for competitive reasons, but also to get another opinion on what work may be needed.

On completion of the work, the restorer should provide a full written report of what was done; this will in future years provide valuable information.

‘Turret Clock Services’ is an 11 page book listing some 35 persons and companies providing all types of services for turret clocks from restoration to manufacture. It is an excellent list for turret clock keepers contemplating the maintenance, overhaul, restoration, or conversion to automatic winding of their clocks. Available from...

Michael Applebee
The Mill
SUTTON-on-the-HILL
Derbyshire
DE6 5JA.
Price £3.75 post free.

Reference books like this can never be complete, so not everyone able to deal with turret clocks will necessarily be listed.

The British Horological Institute (BHI) maintains a list of their members who are qualified to BHI standards and who are obliged to follow the BHI code of practice. On request, the BHI will provide names of restorers in your area; make sure to ask for someone experienced in turret clock work.

British Horological Institute
Upton Hall
Upton
NEWARK
Nottinghamshire NG23 5TE

TURRET CLOCK RECORDING

The Turret Clock Group of the Antiquarian Horological Society has started a project to record and document as many turret clocks as possible in the UK. A recording form is included in the centre pages of the booklet and you may make copies of this form as required.

Do not be put off by the form’s apparent complexity, at the very least try to record the items in the boxes outlined with a bold line. Please help by recording any turret clocks you see. In the fullness of time, records will be available on computer disk and in hard copy for researchers to study. An incomplete record is better than no record at all.

Describing a Turret Clock

Turret clocks may be simply described by the number of trains, the type of frame and the escapement. Thus the clock at Westminster is a three train flatbed with gravity escapement.

TURRET CLOCK TERMINOLOGY

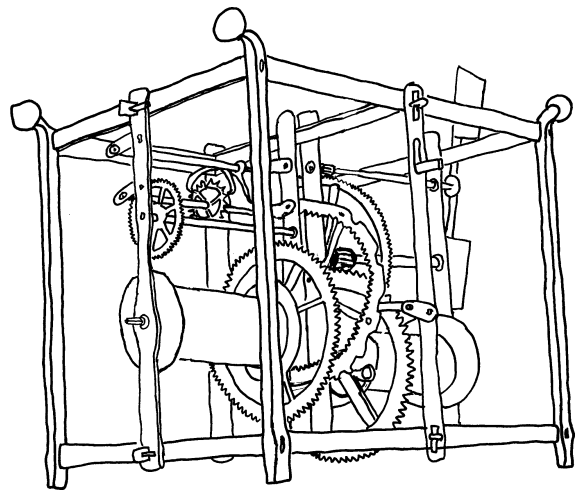
This section is primarily intended as an aid to identifying the various parts of a turret clock not covered in the preceding text and to assist with filling in the Turret Clock Database Recording Form. It also gives a little history, particularly general dates as to when certain features on turret clocks were introduced. The dates are a guide only; anomalous styles do occur e.g. when a 19th century maker copies a 17th century clock.

Frames

Naming the frame and the escapement of a turret clock is a good way of classifying a movement. Commonly met frame types are detailed here but other more unusual and less common types are encountered from time to time.

End to End Birdcage

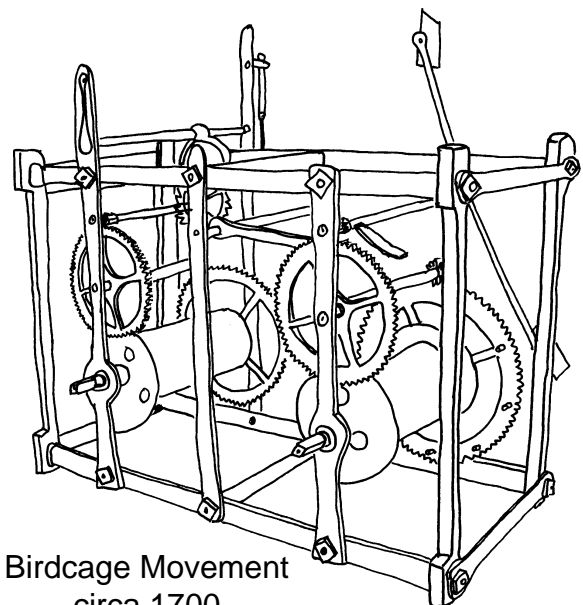
The end to end birdcage frame is the earliest type. Here the trains are placed in line or end to end. Almost always the material is wrought iron, but occasionally wood is used. Its open frame gives rise to the term birdcage. Wedges or riveting hold the frame together, bars which carry the bearings are removable and held in by wedges. We know that clocks were in use in the 13th century and almost certainly this frame construction was used. It lasted up until the 1670s when the pendulum was introduced and the frame design changed putting the trains side by side. Most clocks of this type have been converted from foliot to pendulum.



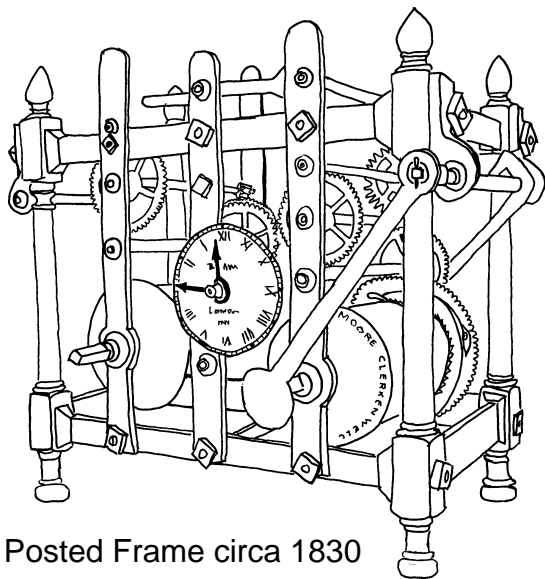
End-to-End Birdcage Movement
probably 17th Century

Side by Side Birdcage

Birdcage is the name given to the frame made of a cage of wrought-iron. Often the frame is held together by riveting or by screwed nuts. Individual bars that support the trains of gears can be removed, normally these are secured with nuts. The trains are placed side by side. This type came into use around 1670 and was used until cast iron superseded wrought iron at the end of the 18th century.



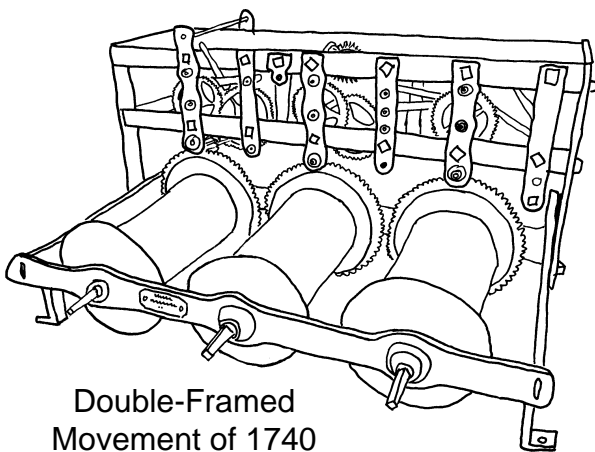
Birdcage Movement
circa 1700



Posted Frame circa 1830

Posted Frame

With the expanding availability of cast iron the posted frame became popular from around 1790, it lasted until the 1850s. Here all the frame and train bars were made of cast iron, usually the corner posts are either round or square in section. Generally the parts bolt together, on smaller clocks the whole of the end frame is cast as one unit.



Double-Framed
Movement of 1740

Double-Framed

Sometimes incorrectly called a chair frame or arm-chair, the double-framed construction comprises a short frame for the trains and long frame for barrels. In this way maximum strength is obtained whilst providing a long barrel which meant that many turns of line could be achieved giving a long going period. The period in which this frame was used is from 1730 to around 1840 and was popular with makers in Yorkshire, Derbyshire and Lancashire.

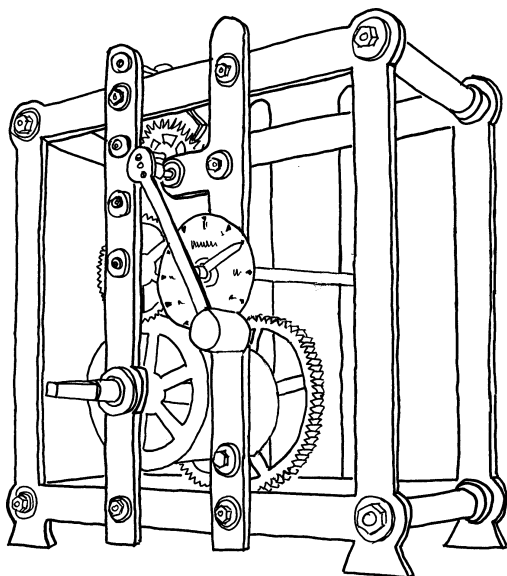


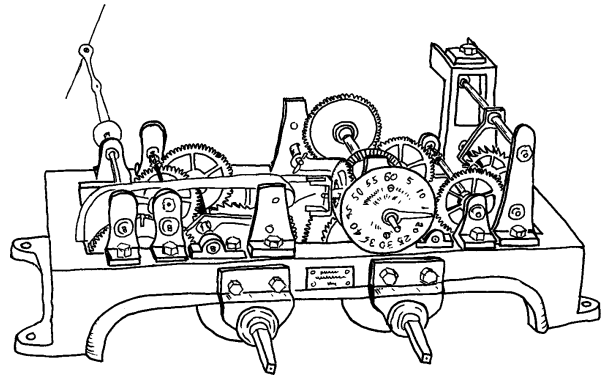
Plate and Spacer Movement of 1860

Plate and Spacer

Here was a variety which was easy to make. The plate and spacer frame comprised two cast-iron plates, one front, one back. These were held apart by four pillars. Train bars were removable in the normal way. Becoming popular around 1800, the design faded out after 1850, but continued to be used on small single-train clocks.

Flatbed

Becoming popular around 1850, the flatbed brought a major change to British turret clockmaking. A flat bed of cast iron was used as a base and wheel bearings were then bolted onto this bed. Ideally it was possible to remove any wheel without disturbing another, but in reality this was seldom achieved. The Great Clock at the Palace of Westminster is an early flat bed movement.



Flabed Movement 1874

A Frame

Small timepieces of the 19th century often have a frame shaped like a letter 'A'; hence the term A frame. The picture of the clock with the Huygens automatic winder at the top of page 33 has an A frame.

Frame Materials

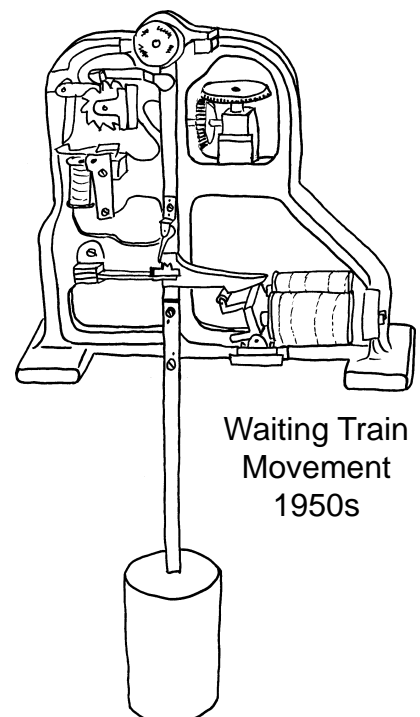
Wrought Iron was used in early clocks and it can be identified by its uneven thickness, laminar structure and joints where another part has been fire welded on by the blacksmith. To make parts in cast iron first a wooden pattern is made, from this a mould is made in sand which is then filled with molten iron. Cast iron parts often have an intricate shape and sometimes a line can be seen where the sand mould was split. Some blacksmith work in wrought iron is so exact it is difficult to tell from cast iron.

Occasionally frames are made of brass, almost always on very small clocks. Wood is also employed, this tended to be used in the Midlands in the last half the 17th century and first quarter of the 18th.

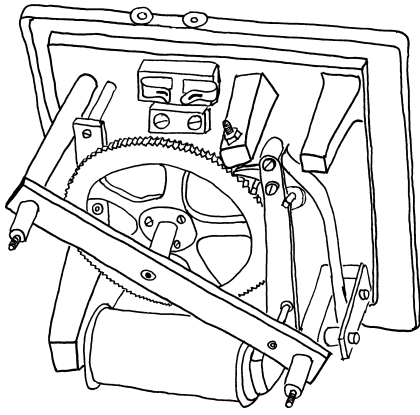
Electrical Turret Clocks

Waiting Train

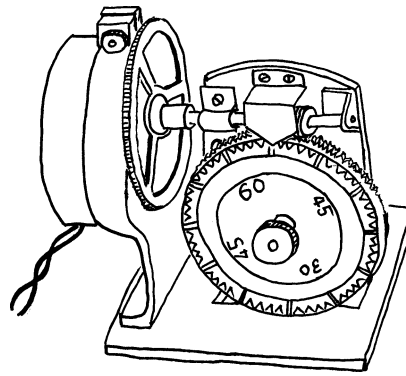
This was really the first commercially viable electrical turret clock; it was patented in 1907. A heavy pendulum works as a motor and drives the dials. Every half minute a pulse from an electrical master clock releases the pendulum movement which has been 'waiting' for a synchronising signal. The waiting train system is able to drive very large dials, some as large as 25 ft diameter



Waiting Train
Movement
1950s



Impulse Movement Circa 1930
(Cover Removed)



Synchronous Movement
Circa 1940

Impulse Movement

Master clocks were introduced in around 1900, they produce an electrical pulse to drive slave dials every half minute. Impulse movements are used to drive small turret clock dials, the mechanism being situated behind the dial.

Synchronous Motor

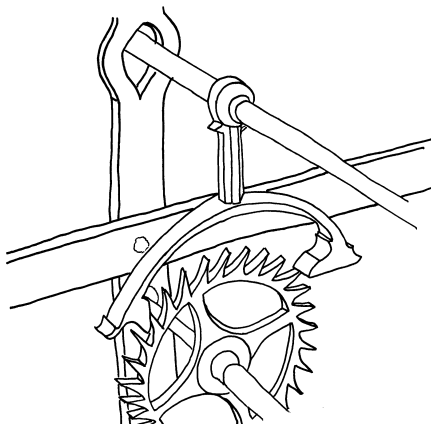
Once the National Grid was established, voltage and frequency of the supply was standardised. A synchronous motor is driven by the 50Hz mains and its timekeeping is entirely set by the frequency of the supply which by law is set to close limits. The first synchronous motor driven turret clocks were installed in the early 1930s. Backup systems are available to overcome power failure problems.

Radio Controlled

Today many modern installations use electronic systems. Dials are driven by a motor controlled by very accurate time signals carried by radio transmissions from MSF Rugby. Changes between GMT and BST are automatic.

Turret Clock Escapements

There are over 50 different types of turret clock escapement. However, only four basic types are normally encountered.



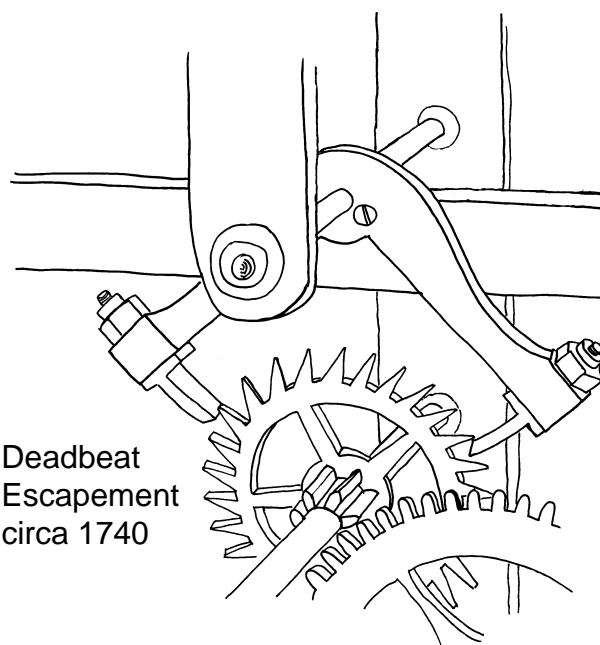
Recoil Escapement
circa 1680

Recoil

Introduced around 1670, the recoil escapement is commonly used on clocks of the 18th century. Use in the 19th century was usually confined to timepieces only. This escapement can be clearly identified by the escape wheel which, having been released, then moves backwards a little or 'recoils'. The acting faces of the pallets are commonly curved. They are reckoned by some to be poor timekeepers but are less likely to be damaged if the clock runs down and are very tolerant of wear.

Deadbeat

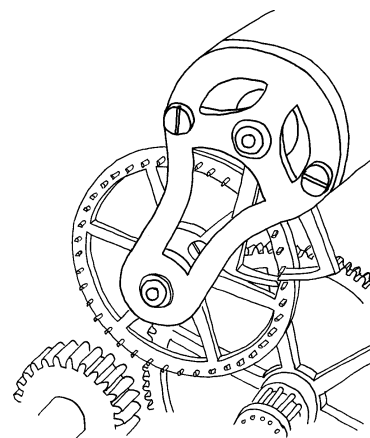
Invented in 1675, but not generally introduced until 1720, the dead beat escapement is used on high-quality 18th century movements. Its use in the 19th century was widespread. With the dead beat escapement the escape wheel advances, then stops 'dead', there is no recoil. If the clock weight runs down, there is a possibility that the teeth may be damaged when the sharp edges of the pallets butt onto the thin points of the escape wheel teeth.



Deadbeat
Escapement
circa 1740

Pinwheel

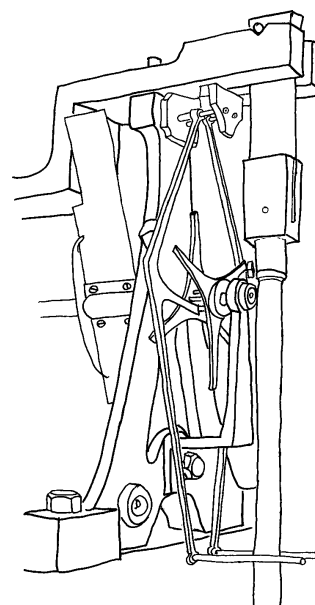
The pinwheel escapement is a variation of the deadbeat, pins on the escape wheel taking the place of teeth. Its use in English turret clocks generally dates from the 1820s onwards.



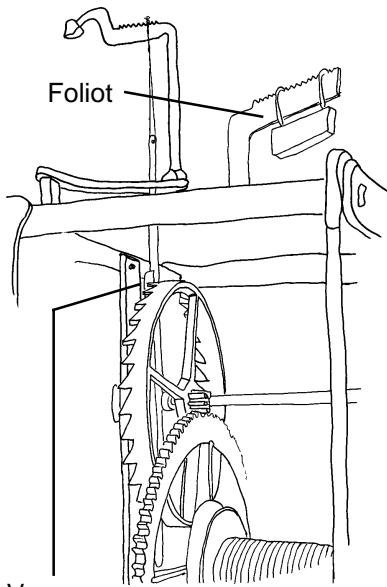
Pinwheel Escapement 1918

Double Three-legged Gravity

Invented by Lord Grimthorpe and employed in Big Ben in 1860, this escapement is used on high-quality clocks where accurate timekeeping is required. It is usually used in conjunction with a compensation pendulum. Here two arms are alternately lifted and released by the escapement. The escapement is very 'active', the scape wheel turning through one-sixth of a turn for every tick.



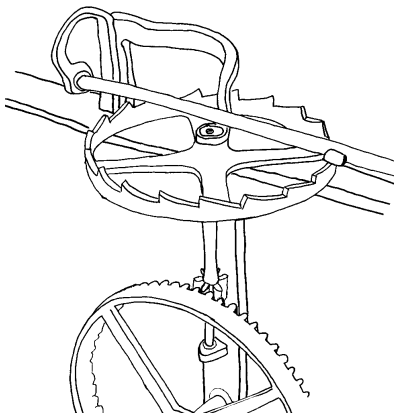
Gravity Escapement 1878



Verge
escapement Verge & Foliot
Circa 1650

Verge & Foliot

Many early clocks were fitted with a verge & foliot. The foliot was a weighted bar which first turned one way then the other driven by the verge escapement. Almost all clocks were converted from foliot to pendulum from the 1660s onwards. To discover an original existing foliot would be an important find, but a few do exist.



Verge & Short Pendulum
Circa 1690

Verge & Short Pendulum

For a short period from around 1660 to 1690 some turret clocks were fitted with a short pendulum (about 2 ft long) and a verge escapement. These soon gave way to the long pendulum with a recoil escapement.

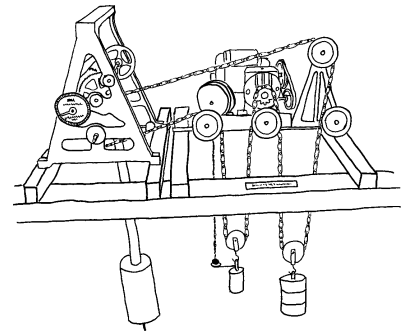
Automatic Winders

Automatic winders are used to do away with the necessity of manual winding. In each type an electric motor re-winds a small weight at regular intervals. In the event of a power cut there is normally sufficient reserve to run the clock for several hours. Almost all systems employ a sprocket wheel connected to an arbor and roller chain to transmit power from the automatic winder to the clock. By choosing the appropriate wheel the weight used can be much less than the normal driving weight for the clock, but of course it has to be wound up more frequently. Early automatic winders were mains powered but now some are battery powered, the battery being recharged from the mains. This method provides a reserve of several days whilst the mains-powered version, depending on its type and installation, may only provide a reserve of 6 hours.

The four basic types of automatic winder are:—

Huygens Endless Chain

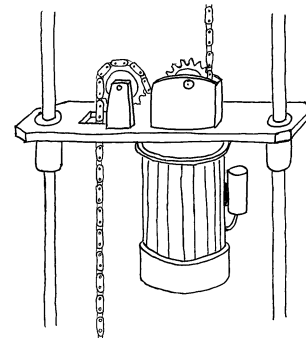
A weight hangs on endless bicycle-type chain. One side of the chain provides driving power to the clock, the other is rewound by an electric motor when the weight has descended to a certain level.



A Frame movement with Huygens Auto Winder

Monkey up the Rope

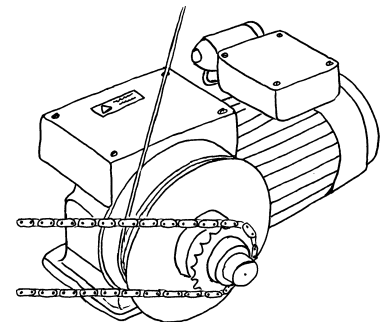
An endless loop of chain passes over a sprocket on one of the clock wheels. The motor hangs from one side of the chain and provides the going weight. The motor winds itself up the chain when it has descended to a certain level.



Monkey up the Rope Auto Winder

Differential (Epicyclic)

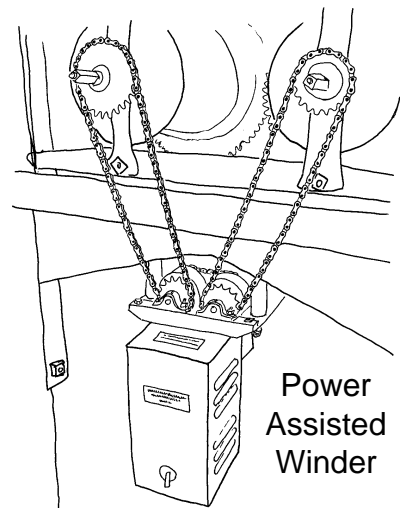
A differential gear has two inputs and one output. The output drives the clock, one input is a small weight on a line, the second input is from a motor. Periodically the motor rewinds the small weight after it has descended to a certain level.



Epicyclic Auto Winder

Power Assisted Winder

An electric motor winds up the original weights on the clock, this could be initiated automatically or under the control of an operator. Systems like this need to be well designed so that undue strain and shock is not put on the clock.



Power Assisted Winder

Condition of Clock

'Excellent' describes a clock which is exceptionally clean, well-maintained and everything works.

'Good' describes a clock which is clean and everything works

'Fair' describes a clock which is running, has no major problems, but is rather greasy or oily.

'Poor' describes a clock which is running, or able to run, but is in a very dirty condition.

'Derelict' describes a clock which cannot run, is dirty, rusty and may have had parts removed and lost.

BIBLIOGRAPHY

The following list of books are those which will give a new reader a good insight into turret clocks. Unfortunately many are out of print and may be difficult to obtain. Libraries which have a good collection of books on clocks are:—

Antiquarian Horological Society Library

The Clockmakers' Company Library

(Both of the above are housed in the Guildhall Library, Aldermanbury, London EC2P 2EJ.)

The Science Museum Library, Exhibition Road, South Kensington, London. SW7 2DD

BEESON. C.F.C.

English Church Clocks 1280-1850.

Antiquarian Horological Society 1971

Brant Wright Associates 1977

The only modern book dedicated to turret clocks. An absolute must for the enthusiast even though it stops at 1850.

COUNCIL FOR THE CARE OF CHURCHES.

Turret Clocks. Guidelines for their Maintenance and Repair and for the Installation of Automatic Winders.

The 14 page booklet covers conservation and restoration, routine maintenance, repairs, and automatic winders. It is aimed at parishes who need to have a basic understanding of the issues that involve clocks in their charge and more than meets these needs.

Available from Council for the Care of Churches, Fielden House, Little College Street, LONDON SW1 3SH. Price £2.50 plus 25p postage.

GORDON. G.F.C.

Clockmaking Past and Present. This incorporates the more important portions of "Clocks Watches and Bells," by the late Lord Grimthorpe, relating to turret clocks and gravity escapements.

Crosby Lockwood & Sons, London 1925. 1st Edition.

Trade Edition 1928. 229pp.

Technical Press Ltd, London 1949. 2nd enlarged edition.

GRIMTHORPE. Edmund, Beckett, Lord. LL.D.,K.C., F.R.A.S.

A Rudimentary Treatise on Clocks and Watches, and Bells for Public Purposes. 404pp

Crosby Lockwood & Co London 1903. 8th Edition.

Facsimile reprint of 8th Edition 1974 by EP Publishing.

McKAY. Chris.

Stands the Church Clock.

A look behind the face of public timekeeping - history plus the catalogue of the 25 items which featured in the 1989 turret clock exhibition. 24pp. Bury St. Edmunds Leisure Services. 1989.

McKAY. Chris. (Editor)

A Guide To Turret Clock Research.

Proceedings of a seminar organised by the Antiquarian Horological Society Turret Clock Group in 1991 to study research techniques. Ten papers cover subjects from looking at movements, through computers, to archives and Churchwardens' accounts. Of the ten four are case studies concerning a church clock, Herne Bay clock tower, a railway clock and clocks with an unusual pagoda-style frame. Overall, the emphasis of the book is on how to conduct research rather than on what was discovered.

NETTELL. David.

An Amateur's Guide to Automatic Winders.

Covers philosophy, types of winders, the Huygens endless chain, differential winders, monkey-up-the-rope winders, night silencing, safety, non-automatic winders, plus the practicalities of manufacturing auto winders.

1988. 49pp. Soft cover.

PICKFORD. Chris FSA (Editor)

Turret Clocks: Lists of Clocks from Makers' Catalogues and Publicity Materials.

Lists turret clock installations of famous and not so famous makers. Includes companies such as Smith, Potts, Gillett, Moore, Thwaites and Reed, and Vulliamy. AHS Turret Clock Group Monograph No 3 1995. Approx 190 pages, A4, Soft covers

A BRIEF GLOSSARY OF TERMS

AHS	Antiquarian Horological Society.
Arbor	Horological term for axle.
Arm chair	Incorrect term for double framed.
Automatic winder	Electrically powered device to wind clock.
Barrel	Wood or metal cylinder around which the weight line is wound.
Bell crank	Lever to transfer the pull of a wire through 90°.
Belfry	Chamber where bells are hung.
Bell hammer	Hammer to sound bell.
Bevel gear	Set of gears to transfer turning of a rod through 90°.
BHI	British Horological Institute.
Birdcage	Type of clock frame. (End to end or side by side)
Bob	Weight on the end of the pendulum.
Bolt and Shutter	Type of maintaining power.
Bushing	Brass bearing in which pivots run.
Cam	Shaped device to raise a lever.
Carillon	Common description of a tune barrel. Set of 23 or more bells.
Cast iron	Iron cast in a mould.
CCC	The Council for the Care of Churches.
Centre wheel	Wheel in going train turning once an hour.
Chair frame	Incorrect term for double framed.
Chiming	The sounding of bells each quarter of an hour.
Click	Device to stop a wheel turning backwards.
Compensation pendulum	Pendulum specially constructed so that it keeps correct time at different temperatures.
Count wheel	Wheel to set the number of blows struck when the clock strikes.
Crutch	Device which connects the escapement to the pendulum.
Dead beat	Type of escapement.
Differential (Epicyclic)	Gears used in a maintaining power or automatic winder.
Diocesan clocks adviser	Person familiar with turret clocks who helps local diocese.
Dog clutch	Device to set hands to time.
Double framed	Type of turret clock frame.
Double Three-legged Gravity	Type of escapement.
End to end	Type of train arrangement in a birdcage frame.
Epicyclic	Gears used in a maintaining power or automatic winder.
Escape wheel	Wheel on which the pallets act.
Escapement	Device to release one tooth at a time and to impulse pendulum.
Face	Incorrect term for a dial.
Faculty	Legal document in the C. of E. giving a parish permission to do specified work on a church building or its fittings.
Flatbed	Type of turret clock frame.
Fly	Fan-shaped device to limit the speed of striking.
Foliot	Timekeeping device consisting of a weighted bar.
Frame	Iron, wood or brass structure to contain movement's wheels.

Friction clutch	Device to set hands to time.
Going train	Train of gears which drive the dial.
Great wheel	The largest wheel in a clock train.
Harrison's	Type of maintaining power.
Huygens endless chain	An endless chain used in an automatic winder.
Impulse movement	Electrical movement which advances hands in half minute steps.
Jack	Decorative figure or automata which strikes a bell.
Leading off rod	Rod connecting the clock to a dial.
Leading off work	Collection of rods and gears to connect the clock to a dial.
Line	Line suspending the driving weight, usually of galvanised steel.
Maintaining power	Device to keep clock running whilst it is being wound.
Monkey up the rope	Automatic winder where the motor climbs up a chain.
Motion work	Reduction gears behind a dial to drive the hour hand from the minute hand.
Movement	Clock mechanism.
Night silencing	Device to turn off striking and chiming during night hours.
Override switch	Safety switch on an automatic winder.
Pallets	Parts of an escapement which engage the escape wheel teeth.
Pendulum	Device swinging at a constant rate.
Pinion	Small gear of 12 teeth or less.
Pinwheel	Type of escapement.
Pivot	Part about which a wheel turns.
Plate and spacer	Type of clock frame.
Posted frame	Type of clock frame.
Power winder	Automatic winder which winds up original weights.
Pulley	Used to guide weight lines.
Quarter striking	Chimes which sound every 15 minutes.
Rack	Device to count number of blows to be sounded at the hour.
Ratchet	Gear wheel with saw-like teeth arrested by a click.
Rating nut	Nut to adjust the timekeeping of a pendulum.
Recoil	Type of escapement.
Setting dial	Internal dial to enable external dial to be set to time.
Side by Side	Type of train arrangement in a birdcage frame.
Snail	Cam which sets how far a rack falls.
Striking	The sounding of a bell at the hour.
Suspension spring	Thin spring from which the pendulum hangs.
Synchronous motor	Electrical motor driven by the mains.
Ting Tang	Quarter striking sounded on two bells of different notes.
Train	Collection of gear wheels.
Tune barrel	Device to play tunes on bells.
Turret clock	Clock with a public dial and/or sounding on a bell.
Up	Bells supported mouth up and ready to ring.
Verge	Type of escapement.
Waiting train	Type of electrical turret clock.

Warning	The release of the striking or a chiming train a few minutes before striking or chiming.
Winding crank	Handle to wind clock.
Winding jack	Reduction gear to make winding a clock easier.
Winding square	Square on barrel onto which the winding crank is fitted.
Wrought iron	Iron forged to shape by a blacksmith.

THE AUTHOR

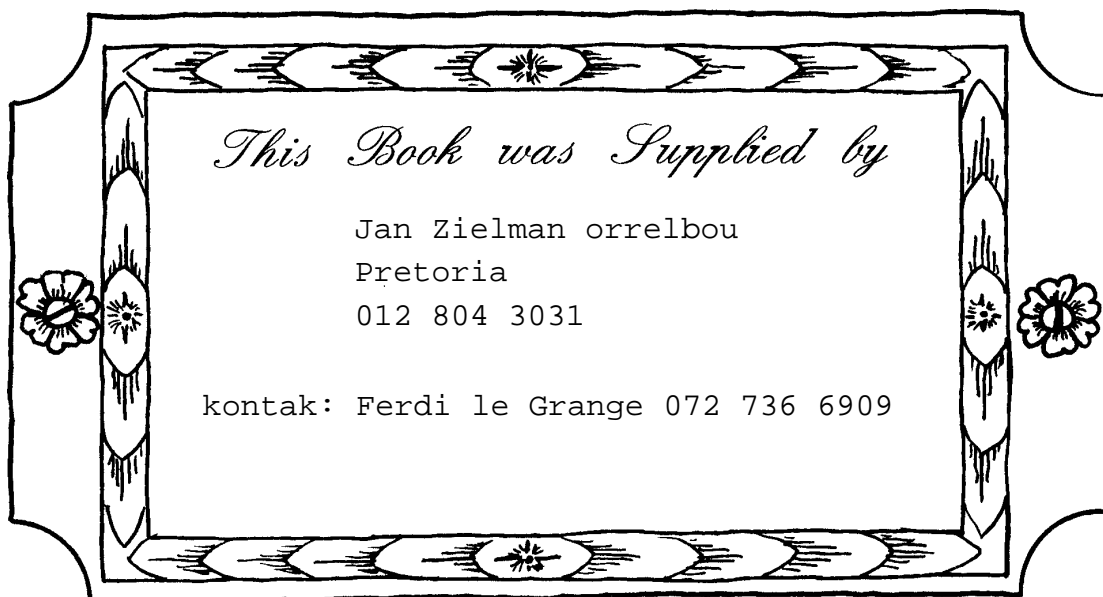
Chris McKay's interest in turret clocks started when he was 11. His first restoration job commenced when he was 18 and took 10 years. Since that start he has seen many hundreds of turret clocks and taken thousands of photographs. An early member of the AHS Turret Clock Group, he was much affected by the enthusiasm of the late David Nettell. He is now Chairman of the Group and the Publicity Officer for the AHS.

Chris is a Chartered Engineer who has a broad experience in the electronics industry from field service through to sales and marketing. After a career move, he now teaches technology and computing in a secondary school.

ACKNOWLEDGEMENTS

Many people read through the various drafts of this booklet and offered helpful alterations, additions and corrections. To all those who assisted me I offer my thanks, without them The Turret Clock Keeper's Handbook would have been a very incomplete book. I would like to especially thank Tom Robinson and Jonathan Betts who corrected many of my errors and made valuable suggestions.

Chris McKay



POSTSCRIPT

Dear Turret Clock Keeper,

When I travel around, I make a point of taking notice of public clocks. The variety of buildings where these are housed never ceases to amaze me and being an enthusiast, my immediate thoughts are what type of mechanism is driving the hands. Whether this turns out to be an ancient clock or one which dates from the twentieth century, they all have one thing in common— somebody looks after them.

As the turret clock keeper you are one in a succession of keepers who have looked after your clock; this is often a role that is rarely noticed until things go wrong, or the time shown on the dial is inaccurate. Thanks, appreciation and perhaps more importantly, adequate training, are something which are seldom forthcoming. This booklet does not set out to make turret clock experts out of everyone, but it is intended to assist you in your important role and help point you in the right direction when help is needed.

In these days when ‘heritage’ is all the fashion, we would like this publication to help you to continue the good work that you do and in some small way for you to know that you are appreciated for your hard work, and long may you continue. I further hope that this publication will arouse a greater interest in turret clocks and assist in keeping them working well into the future. It would be good to think that some clocks which are out of service at present could be recommissioned and that we have through our efforts, sparked the interest for this to happen.

I would urge you to help us with our turret clock database, and complete the turret clock recording form included in the centre of this booklet. By so doing, you will be helping us to ensure that our turret clock heritage is recorded for posterity. This form may be photocopied or alternatively you may obtain additional copies from the office of the AHS.



Mike Bundock
Secretary AHS Turret Clock Group

Rear Cover

Italian Proverb

Warning sign to ringers to pull off the bell hammers before starting to ring. 1861.

*Time is a file that wears
and makes no noise*

