



Practical Clock and Watch Servicing

Distance Learning Course

Technician Grade

Introduction

BRITISH HOROLOGICAL INSTITUTE

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Founded in 1858, the British Horological Institute is the professional body for clock and watch makers and repairers in the UK. It provides information, education, professional standards and support to its members around the world.

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Overview

This is the Introduction document to the British Horological Institute’s Distance Learning Course in Practical Clock and Watch Servicing.

It describes the course structure and explains how you will progress through the lessons.

It also tells you how to set up a workshop area for the practical work.

This book is yours to keep. Feel free to write notes in the left margin, which is made wide for this purpose.

IMPORTANT! – make sure you read these boxes as they contain supplementary information which adds detail to the main text.

Welcome!

You are holding the Introduction to the...

Practical Clock and Watch Servicing – Technician Grade

...Distance Learning Course (DLC) operated by the British Horological Institute, the professional body for horologists in the United Kingdom. There are many overseas members who join the Institute and use the Distance Learning Course.

This course, combined with some experience, will give you the skills, understanding and knowledge you need to be a competent technician.

Horology is both a science and a craft. Most of our effort in this course will concentrate on the craft. You will learn how to repair and service basic clocks and watches. Further grades of study will enable you to undertake more complex repairs.

However, it is important to understand the theory, because it helps you understand **why** something happens, and why a clock or watch is designed in a particular way. Without understanding the theory you will find the actual servicing of clocks and watches much more difficult.

Clocks were first made long before “engineering” in the modern sense existed, and many clocks still retain features which do not align with modern engineering practices. Having an engineering background is a good start, but you may need to put aside some of your preconceptions! Regardless of your background, this course is designed to lead you on your way to being an expert.

Why it is a good thing to learn

Nowadays people use low cost quartz clocks and watches to tell the time; they do the job exceptionally well. However, people still enjoy owning and using mechanical watches and clocks because they have an enduring fascination which electronic devices just cannot offer. Also, many timekeepers have a strong sentimental value to the owner and some have historical significance. In recent years, mechanical Swiss watch sales have exceeded quartz watch sales by value. **All mechanical timekeepers require maintenance and repair – cleaning, lubrication and replacement of worn parts**, and in fact the demand for clock and watch repairs is as high as it has ever been.

If you are considering horology as a career, you will be successful providing you do an excellent job. You will work with a wide variety of timekeepers and you will gain tremendous satisfaction from improving and adding value to everything that passes through your hands.

Even if you do not wish to become professional, you should learn to do the work well and will be able to take great pride in your achievements. Working on your own collection is an excellent pastime, and you will be able to sell it or pass it on knowing you have left it in better condition than you found it.

Will I be able to learn this?

This course is designed to help people with a wide range of abilities; you will need a certain amount of mechanical aptitude but usually this can be achieved with practice. Unless you are designing your own clock from scratch, there is very little mathematics required in horology; it is mainly just simple arithmetic.

How this course is structured

The Technician Grade Distance Learning Course is the first of the new courses which follow the syllabus for the BHI / EAL examinations. The Institute works with the Awarding Body EAL (Ema Awards Ltd) to provide nationally accredited examinations for clock and watchmaking. There are two more Distance Learning Courses covering a further two years to prepare students for the various units required for the *Diploma in the Servicing and Repair of Clocks / Watches* and the *Diploma in the Repair, Restoration and Conservation of Clocks / Watches*.

- The Technician Grade DLC (first year course) prepares students for the *Diploma in Clock and Watch Servicing*.
- The second year course prepares students for the first year of the *Diploma in the Servicing and Repair of Clocks / Watches*.
- The third year course prepares students for the second year of the *Diploma in the Servicing and Repair of Clocks / Watches* and the *Diploma in the Repair, Restoration and Conservation of Clocks / Watches*.

This is the first year of the course – the Technician Grade – and it consists of:

- *Introduction* (this book)
- *Lessons 1 to 12* (twelve separate books)

Lessons

Each year of the course consists of twelve Lessons. Each Lesson has some theory and some practical content, and at the end of every Lesson are questions and a practical exercise. If you have paid for tuition, you can send the questions and practical work to your tutor and gain feedback on your progress, along with corrections and answers to your questions.

Although you can progress at any speed, the Lessons are nominally intended to be undertaken one per month, so each part of the course would last a year, and the whole course would last three years. That is why most people refer to each part of the course as a “year”, and this is informally known as the “first year course”.

Examinations

All of the examinations, the *Diploma in Clock and Watch Servicing*, the *Diploma in the Servicing and Repair of Clocks / Watches* and the *Diploma in the Repair, Restoration and Conservation of Clocks / Watches* are nationally accredited.

Detailed information about the qualifications and examinations are available from the British Horological Institute (BHI) headquarters.

Syllabus Units for the Diploma in Clock and Watch Servicing

The examinations are held in May / June each year. If you wish to gain the Diploma in Clock and Watch Servicing you must enter:

- *Theory of Clock and Watch Servicing*
- *Constructing Clock Components*

and either

- *Servicing and Correcting Faults in a Single Train Clock Movement*
...or...
- *Servicing and Correcting Faults in a Quartz Watch*

The Distance Learning Course covers the syllabus for each of the units.

Study Streams

Each Lesson in this Technician Grade course is split into four “streams”:

1. **Knowledge and Understanding:** all of the material in this stream is within the syllabus for the Unit – *Theory of Clock and Watch Servicing*.
2. **Workshop Skills:** The entire syllabus for the Unit – *Making Clock Components* is covered in this stream; some of the aspects are also included in the Unit – *Theory of Clock and Watch Servicing*.
3. **Clock Servicing Skills:** this will cover all the clock-related practical work for the Unit – *Servicing and Correcting Faults in a Single Train Clock*; some of the aspects are also included in the Unit – *Theory of Clock and Watch Servicing*.
4. **Watch Servicing Skills:** this will cover all the watch-related practical work for the Unit – *Servicing and Correcting Faults in a Quartz Watch*; some of the aspects are also included in the Unit – *Theory of Clock and Watch Servicing*.

This approach enables you to target your studies at the particular examination Units you want to enter.

Getting your work assessed

If you have chosen to have your work assessed, you will need to send it to your Tutor at the end of each Lesson.

A good approach for practical work is to fasten a tie-on label, with your name and student number, to each part. Put your work into a small plastic food container, which itself is labelled with your name, address and student number. Make sure you write these on your answer papers as well, in case they become separated from the practical work.

Wrap metal parts in bubble film or similar, to stop them rattling around in the container. Put the plastic container in a box or bag for posting.

Leave plenty of room on your answer paper for the tutor to make comments.

Your practical work and answer sheet will be returned to you after the tutor has assessed them.

A word about technical drawing

Technical Drawing was an optional Unit in the previously accredited qualification but is not required for the *Diploma in Clock and Watch Servicing*. It is therefore not included as part of the Technician Grade Distance Learning Course. The skills for Technical Drawing are useful for the student to help develop the ability to make and understand drawings and sketches of clock and watch parts. In the examinations which are to follow, the ability to use Technical Drawing skills will be required to produce escapement drawings.

Setting up your workshop

You can repair clocks and watches with little more than a table and a clamp-on vice. However, it is far more effective to have a space dedicated to the task, so you can leave your work-in-progress on the bench and have somewhere convenient to store your tools and parts.

If you have a choice (which is most unusual), select a room which avoids working in direct sunlight.

Look to your kitchen for an example of what a good workshop looks like. The surfaces are smooth and durable and the room is well lit. There are cupboards and a sink. Indeed, the kitchen is a workshop in its own right. However, we do not advocate using your kitchen as a workshop, but as an example of what you should aim for: an ideal workshop has plenty of storage; plenty of smooth flat surfaces; good lighting; a generous supply of electrical sockets; a smooth, easily cleaned floor; and a sink.

Bench

You will require some sort of work surface. It is often possible to rescue unwanted kitchen surfaces when a kitchen is being upgraded. A kitchen worktop is usually made of thick, dense chipboard with a hard, smooth melamine surface. This is an ideal surface for horological work because it is

rigid and easy to keep clean. The main disadvantage is that it is too thick for most clamp-on vices and the rounded front is a shortcoming.

Although you can build your own bench from scratch, it can be quite costly and is often easier to make one from manufactured parts.

For instance, you can buy a table top and table legs (Figure 1 and Figure 2). The tops work really well for our purposes and are surprisingly cheap. Make sure the top is at least 500mm deep, and it should be 1200mm or more wide, 1500mm if you have the room. Two standard sizes that work well are 800mm deep by 1200mm wide (80cm x 120cm), and 800mm deep by 1500mm wide (80cm x 150cm).



Figure 1 – low cost table tops make good workbench surfaces



Figure 2 – adjustable legs are invaluable

These table tops are available in solid wood or a low-density material with a laminated surface. The latter are more rigid (less “bouncy”), but their extra thickness means that some clamp-on vices will not fit. The solid wood ones will accept any type of vice, but you may need to brace them underneath for the maximum rigidity. If you buy the solid type, do not bother bracing it until you find it is necessary. The vice should be mounted on the bench so that the top of the jaws is at your elbow height when you are standing at the bench.

A horological workbench needs to be quite high, which is why you should buy adjustable legs which screw onto the top; they are very rigid. Again, the cost is low – comparable with making the legs yourself from timber.

It is important that you adopt a good posture when working at the bench. Your back should be straight, and you should not be hunched over the work. For horological work you want the bench quite high. A height of 900mm is a good start. Note that this is somewhat higher than a normal table. It places the work at a comfortable distance from your face when you are sitting at the bench, avoiding the need to stoop. If you find 900mm is a bit too high for comfort when you are standing (for instance, to file an item held in a vice), consider setting the bench lower and making a simple plinth which you can place on the bench for work when you are sitting down. This system works really well.

You can make the plinth from a piece of kitchen worktop, with four feet made from rubber door stops. This will lift away from your bench when necessary, and is a good compromise if you do not have room for two separate benches one for work when you are standing up and one when you are sitting down.

Whatever you choose, adjust the height until you are comfortable.

There is one last piece of advice: fasten a strip of wood, hardboard or other convenient material around the left, right and rear sides of the bench so that a lip, or low wall, is formed. This stops tools rolling off the bench and will sometimes catch small clock or watch parts which fly out of your tweezers.

Chair

You need a chair which runs smoothly on castors, turns about its axis and is adjustable in height. Gas lift chairs like this are available in all furniture shops and are quite cheap (Figure 3). Some computer superstores sell them, too. They are also available second hand from office surplus stores. Do not buy one with arms, as they get in the way for workshop use.



Figure 3 – gas lift rotating chair

Lighting

If you can afford it, and are allowed to do it, plenty of fluorescent lights are the way to go. Fluorescent lights do not cast shadows, which is an enormous advantage.

The ones which hang from the ceiling on chains are best, because they concentrate the light closer to your work. Ideally they should be over the benches rather than in the middle of the room. This usually means mounting them parallel with the walls, and about 400mm in from the wall.

In reality you may not be able to fit fluorescent lights around the ceiling, although even just replacing the standard pendant lamp in the middle of the room with a fluorescent lamp helps enormously, and is easily reversible.

You will also need some adjustable bench lamps (Figure 4). A good arrangement is to buy one fluorescent twin tube table lamp, and one or two desk lamps with a normal 60W pearl bulb (or low energy equivalent). Between them they will meet most of your lighting needs; especially if you have some ceiling mounted fluorescent lighting.



Figure 4 – bench lamp

Tools

It is commonly said that you should only buy the best quality tools. However, this can be very expensive, and may not be the best use of money if you use a tool only rarely. In many cases you need to make a judgement between cost and quality.

Good quality screwdrivers are important and as part of the course you will learn how to ensure that the blade fits the screw accurately.

One good way to get good quality tools is to buy them second hand. Clock fairs often have stalls with used tools, and it is always worth looking to see if there is something that you will require.

Finally, you will make some tools yourself. This can be very satisfying, and you can ensure that they are of good quality.

As we work through the course we will introduce the tools that you need to buy.

Storage

You need your tools to be easily accessible, but not in the way. Some self-discipline is required here; the temptation to leave tools lying around on your bench should be avoided. It slows you down as you search for them.

Strips of wood on the wall with holes in them, or clips screwed to them, make good tool storage. Another technique is to stretch a length of wire between two wooden spacers; this will support screwdrivers, nippers, pliers, and so on.

Low cost mechanics' tool boxes are not suitable as the tools lie in a heap and are hard to find. Toolboxes with trays and cut-outs work well, but are very expensive.

You also need to store various parts, bits and pieces. Low cost plastic storage boxes, with or without internal partitions, are available in all hardware stores,

kitchen supplies, as well as supermarkets. You can also use jam jars and tins when their contents have been used. Transparent containers have obvious advantages.

In general, it is better to avoid using lots of shelves for storage, as they get very dusty. Low cost cupboards, including second hand kitchen cupboards, work better.

Tools you will need

The list given below gives many of the items which you will find necessary during this first year of study. They are not all required at the outset but can be added according to progress through the course.

- Bench vice
- Steel ruler 12"/300mm
- Scriber
- Engineer's square
- Centre punch
- Dividers
- Files – various sizes and cuts; including a set of needle files
- Hacksaw – large and small
- Piercing saw
- Hammers – various sizes
- Micrometer (metric) or digital calliper
- Eye glass
- Screwdrivers – various sizes; including a set of watchmaker's screwdrivers
- Tweezers – various sizes and types
- Movement holder
- Blower
- Pliers
- Arkansas stone slip
- Drills – imperial and metric
- BA taps and dies – purchase according to the sizes which are required
- Pin vice
- Water of Ayr stone (if available)
- Watchmaker's Lathe – an 8mm lathe is the best for the purpose but a 6mm lathe is also good and cheaper to purchase second hand. A small centre lathe can fulfil the requirement for turning at this stage.
There are many different makes of lathe and the BHI will be happy to advise and help source one for a student.

In addition, consumables such as:

- various grades of wet or dry paper
- materials for polishing such as: Brasso, Autosol (from motor spares shops)
- Pegwood and pith
- Cleaning fluids

These can usually be purchased from materials dealers or mail order.

How the British Horological Institute can help

Purchasing the Distance Learning Course is the first step to becoming a skilled horologist. The course provides all the knowledge to enable you to make a start on servicing and repairing clocks and watches but to master these skills requires more than reading. It is only as a result of determination and practice that you will be able to gain the ability to confidently handle small watch components, turn and file metal accurately and finish brass and steel components to a suitable standard.

Even though there are detailed step by step explanations describing, for example, how to dismantle and re-assemble a watch movement you will only become confident and proficient by completing the exercise a number of times.

Learning these skills by distance learning is a greater challenge than actually being present in a college and receiving the advice and instruction from a tutor. When something goes wrong or the clock mechanism is different to the example on the bench there is no one to ask for advice. This section suggests opportunities which can assist the student and help to ensure success.

Seminars

The British Horological Institute arranges many seminars in the clock and watch workshops at Upton Hall. The seminars are usually of two days or one week duration and accommodation is available at Upton Hall. Seminars provide a learning experience beyond just the formal workshop sessions during the day; there is a chance to discuss the problems you have experienced with theory and practical work with other students and the seminar tutor.

The workshops provide a range of equipment for students to use and skilled tutors to teach you how to undertake many of the exercises in the Distance Learning Course. In some instances there is a series of seminars to gradually extend your skills. For example, *Basic Watch Mechanical; Service / Repair, Day / Date Automatic Watches;* and *Chronographs* form a series of three seminars directed at students at various stages learning how to service mechanical watches.

A list of seminars is published in the *Horological journal* each month; there is an annual programme with popular seminars being offered more than once. Whether you wish to learn the basic skills required to service a quartz watch or master the repair of platform escapements there is likely to be a seminar to guide your learning.

Branch Meetings

Although the opportunities for overseas students are limited, there are over twenty branches of the Institute in the United Kingdom. Branches are not directed by Council and the staff at the Institute but rely on the enthusiasm of committed members to arrange a programme of evening lectures, demonstrations, visits and displays. Branch lectures provide a varied range of topics to cater for members' interests; there is the added benefit that you can make contacts and learn from others in a convivial atmosphere.

Branch meetings are regularly reported in the *Horological Journal* and a list of Branches and Branch Secretaries is published in the *HJ* each month.

The Horological Journal

The *Horological Journal* makes a valuable contribution to continuing professional development. A wide range of articles caters for the interests of the majority of members. This Distance Learning Course provides the backbone for study but a broad knowledge of horology is desirable. Whether your enthusiasm is for classic watches or longcase clocks there are high quality articles written by authors with specialist knowledge.

The Institute website

You may originally have “discovered” the Institute via the website but few have fully explored the breadth of information available. If you require guidance on planning your workshop or detailed information about ETA calibres you need look no further than www.bhi.co.uk. A particularly useful section is “Education” where you can access details of the various seminars and also information about the examinations for horology: the syllabus and past examination papers. There are hints and tips for candidates and each of the “Helping Hand” articles written specifically for students and published in the *HJ* can be downloaded.

You will require a username and password to raise issues on the Members’ Discussion Board; in addition to general enquiries, there is a separate section for Distance Learning Course students. Perhaps your difficulty in understanding a particular topic is shared by others who can help to provide the answer. A username and password can be obtained by sending an email to the Membership Services department at the Institute, giving your membership number. The Institute’s email addresses are printed at the bottom of the Contents page of the *Horological Journal*.

Open days at the BHI Headquarters

There are three regular opportunities to visit the BHI Headquarters: the “Spring Forward” and “Fall Back” shows take place when the clocks are changed; and the three day “Annual Show” is planned for June each year. When the Institute Headquarters is open to the public, the workshops are usually on show with demonstrations provided by members. The Annual Show includes trade stalls.

You may want to look at lathes to help you decide your most appropriate purchase, study the action of the lever escapement or seek guidance about a particular aspect of watch construction. It is likely that someone will be there who can help. There are often valuations for clocks and watches and an auction of horological items, tools and spare components. Not just a good day out but an opportunity to increase your knowledge from experts and purchase items for your workshop.

The Library and the Collection

In addition to the open days, members are able to use the library and the collection by arrangement for information and research. The Librarian and Curator is always willing to assist by directing students to appropriate textbooks; every copy of the *Horological Journal* is available in bound editions.

Enquiries by letter and email can often provide the answer to that important query about the historical background of a maker.

Examinations

You may wonder how examinations can help you in your studies to become a clock or watchmaker.

Examinations provide a target for learning and enable you to check your progress against recognised standards. The qualifications are nationally accredited with students in the United Kingdom and abroad entering the examinations annually.

The challenge of gaining individual units which lead to a recognised qualification will contribute to your determination to progress. The content of this Technician Grade course is based on the syllabus for the qualification, the *Diploma in Clock and Watch Servicing*. As well as helping you to learn horology, your studies are directed towards passing each of the units:

- *Theory of Clock and Watch Servicing*
 - *Constructing Clock Components*
- and either
- *Servicing and Correcting Faults in a Single Train Clock Movement*
- ...or...
- *Servicing and Correcting Faults in a Quartz Watch*

Further examinations lead towards professional membership of the Institute.

Although not within the brief of the title “How the British Horological Institute can help” you should also be aware of:

Clock Clubs

There are clock clubs arranged by enthusiasts for anyone interested in horology in the locality. There is often a very varied programme of lectures, visits and demonstrations. As with the Institute Branch Meetings, clock clubs offer the chance to meet others with similar interests and benefit from visiting speakers.

Epping Forest Horology Club

Epping Forest Horology Club is described as “a hands-on clock and watch workshop club”. Membership of EFHC enables you to use the facilities provided in specialist clock and watch workshops. There are sessions with tuition from experienced horologists. EFHC prepares students for the EAL / BHI Examinations in horology and provides the facility of an Examination Centre for many of the examination Units at its centre north east of London.

Glossary of horological terms

Addendum	The portion of a gear tooth above the pitch circle diameter.
American chuck	See Collet.
Anchor escapement	A type of clock escapement in which the pallets can resemble an anchor. Also known as a recoil escapement.
Annealing	Reducing a metal to a softer state by heat treatment.
Annular balance	A plain uncut circular balance made of a single metal or alloy.
Apparent solar time	See Solar time.
Arbor	A spindle which carries a wheel or pinion e.g. centre arbor.
Arc of vibration	The length of the arc described by a pendulum or balance in making a swing from one extreme to the other. Called the semi-arc of vibration if measured from the centre of swing to one extreme.
Arkansas stone	A very fine grey/white coloured natural oilstone used for polishing hard metals. Pronounced "AR-can-sore".
Automatic watch	A watch wound by the normal walking movements of the wearer, either in the pocket or on the wrist.
Backlash	Non-productive free movement between a screw and its nut (e.g. a feedscrew) or meshing gears. See also Shake.
Balance spring	The spring controlling the balance bringing it to its neutral position. Also called the hairspring. Generally a flat spiral in shape but may occasionally be a helical (cylindrical) shape.
Balance	The oscillating wheel which determines the time interval of each vibration of a watch or platform escapement. Also called the balance wheel. There are two generic types: <ol style="list-style-type: none"> 1. An uncut balance which is usually mono-metallic. 2. A cut balance which is usually bi-metallic and used where significant temperature compensation is needed.
Banking	A stop pin or stop block. In the lever escapement, the part against which the lever rests while the escapement is not actually in operation. It limits the travel of the lever. In a cylinder escapement a pin – the banking pin – in the balance rim which hits a banking pin beneath the cock.

Bevel gear	Gears which connect arbors that are not parallel. Connecting arbors whose axes intersect, they are usually used to connect arbors at right angles to one another.
Bezel	That part of a watch or clock which holds the glass (or crystal) protecting the dial and hands.
Bi-metallic	Made from two different metals. A bi-metallic balance rim is made of two different metals (brass and steel) fused together to provide compensation for changes in temperature.
Birdcage movement	A clock movement with a frame constructed from bar material in the shape of a birdcage as distinct from a movement where the frame consists of plates connected by pillars. Also called a posted movement.
Blue pivot steel	Carbon steel supplied in a hardened and tempered condition which is blue in colour from its heat treatment (tempering). Used mainly where strength is required e.g. making balance staffs. Carbon content, 0.7% – 0.8% carbon.
Bluing	Colouring steel by heat treatment.
Bob	The weight attached to the end of a pendulum rod.
Boot	See Curb pins.
Boss	A cylindrical projection giving extra strength or length to a bearing hole or gear wheel.
Bouchon	A bush. Also available as lengths of hollow wire (bouchon wire).
Bow	<ol style="list-style-type: none">1. A tool rather like an archer's bow, used for driving work in the turns.2. That part of a watch case which is used for attaching a pocket watch chain.
Brace	A barrel hooking consisting of an extra piece attached to a mainspring to secure the spring to the barrel.
Bracket clock	A spring driven clock designed to stand in a semi-permanent position, e.g. on a bracket, shelf, mantelpiece or table. Also known as a spring-driven table clock or mantel clock.
Brass	An alloy of copper and zinc.
Brazing	A form of hard soldering. A method of joining metal by melting brass which fuses onto the parts to be joined.

Breguet balance spring	See Overcoil.
Bridge	A detachable supporting bracket in the form of a bridge (i.e. has two feet). Used to provide a bearing for the pivot of an arbor, or pivots of arbors which are external to the clock/watch plate.
Broach	<p>Cutting broach: A five sided tapered cutting tool used to enlarge a round hole.</p> <p>Smoothing Broach: A tapered tool used to smooth or burnish the inside of a pivot hole.</p>
Brocot escapement	An escapement consisting of pallets in the form of semi-circular pins. Invented by Achille Brocot (C19th).
Brocot suspension	A suspension block permitting adjustment of the effective length of a pendulum. Invented by Achille Brocot (C19th).
Burnishing	A method of improving the finish on a piece of metal by rubbing the surface with a hardened steel tool, the surface of which has a fine grain at right angles to the direction of movement. Mainly used to obtain a high standard of finish to pivots or pivot holes.
Burr	The rough edge or burr left on metal after filing or machining operations.
Bush	<ol style="list-style-type: none"> 1. A hollow cylinder or shouldered hollow cylinder used to correct wear in a pivot hole. 2. A bearing in clock or watch plates.
Bushing wire	A cylindrical piece of brass with a central hole from which bushes can be easily made. Usually made of hard brass.
Button	The external component of a watch used to wind the watch and set the hands to time. Also called the crown.
Calendar work	The mechanism which allows the day/date to be automatically displayed on a clock or watch.
Calibre	The size (in lignes) or layout of a watch movement.
Callipers	A measuring instrument used to determine the internal or external diameter of a component.
Cam	A (usually) rotating disc which has the outer edge shaped to lift levers, etc.

Calotte	A watch case that fits into a folding case made from metal or leather.
Cannon pinion	The pinion turning with the centre arbor which carries the minute hand and drives the motion work.
Carriage clock	A portable clock usually in a brass frame with glass panels on all four sides fitted with a platform escapement.
Carrier	A driving clamp fitted to work to be turned between lathe centres.
Catching	<ol style="list-style-type: none"> 1. Catching a centre – forming a centre using a graver. 2. The butting of the tips of wheel teeth against pinion leaves or escapement pallets against the escape wheel.
Centrifugal fly	See Fly.
Chatelaine	An ornamental strap or chain by which a pocket watch may be hung from ones' belt or dress.
Chiming clock	A clock which chimes at the quarters and at the hour in addition to the number of hours being struck at the hour.
Chops	<ol style="list-style-type: none"> 1. False jaws to protect a component being held in a vice. Usually made of a soft material e.g. aluminium, copper, wood. Also called clams. 2. The pieces of metal which support the suspension spring of a pendulum.
Chronograph	A watch with an independent centre seconds hand (usually driven from the fourth wheel), which may be started, stopped and made to fly back to zero. Also functions as an ordinary timepiece.
Chronometer	<ol style="list-style-type: none"> 1. An instrument having a detent escapement for measuring time accurately. 2. A marine chronometer: used by navigating officers when determining a ship's longitude.
Circular error	<ol style="list-style-type: none"> 3. A high quality wrist watch. <p>The error in timekeeping which is caused because the pendulum follows a circular path instead of a cycloidal path. If the semi-arc is less than 2 degrees (4 degrees total swing), the error is small.</p>
Clams	See Chops.
Click	A device, sometimes called a pawl, which acting on the teeth of a ratchet or gear wheel allows it to turn in one direction only. It is usually held against the wheel teeth by a click spring.

Cock	A detachable bracket in a clock or watch movement used to provide a bearing for the pivot of an arbor which is external to the clock/watch plate. It has one foot, as distinct from a bridge which has two feet.
Collet	<ol style="list-style-type: none"> 1. A split collar sprung in position on a staff or arbor; e.g. a balance spring collet. 2. A split chucking device which can be used to hold an object by tightening the jaws. Usually used with a lathe. Sometimes called an American chuck. 3. A collar used to attach a wheel to an arbor.
Compensation	A term usually used in connection with a balance or pendulum which has provision for automatic correction for changes in rate due to rising or falling temperature.
Concentricity	When the periphery of a wheel or similar is equidistant from the centre (i.e. the wheel runs true).
Contrate wheel	A gear wheel with teeth set at right angles to its periphery. Generally used in carriage clocks and verge clocks and watches.
Count	Referring to a clock / watch train, the vibrations of the pendulum or balance in order to enable the clock / watch to keep time.
Count wheel	The notched wheel which determines the number of blows sounded on older striking clocks. Sometimes called the Locking plate. Superseded by rack striking.
Crown	See Button.
Crutch	The part of a clock which links the pendulum to the escapement.
Curb Pins	The pins fitted to the index of a watch or platform escapement which control the active length of the balance spring. On modern watches, there is usually just one curb pin together with a boot.
Cut balance	See Balance.
Cycloid	A line traced by a point on the circumference of a circle rolling without slip on a straight line.
Cycloidal tooth	A gear tooth form commonly found in clock and watch gear trains. See Epicycloid and Hypocycloid.
Cylinder escapement	A type of escapement invented Ca.1700 characterised by a cylinder to transmit impulses to and from the balance.
Dart	Another name for the guard pin in a lever escapement.

Dead-beat escapement	A type of clock escapement in which there is no recoil during the supplementary arc. Usually ascribed to George Graham C18th.
Dedendum	The portion of a gear tooth below the pitch circle diameter.
Demagnetiser	A device for removing residual magnetism from watch movements, steel work or tools such as tweezers.
Depthing	The operation of correctly positioning and/or adjusting the gear wheels and pinions centres so that the pair will run with the depth of engagement to give least possible frictional loss. The distance is often determined by the use of a depthing tool. Also known as pitching.
Detent	<ol style="list-style-type: none">1. A form of click or pawl or stop.2. A name given to the chronometer escapement.
Detached escapement	An escapement where the pendulum, or balance, is free or almost free from influence by the motive force (e.g. lever escapement, detent escapement).
Dial clock	A circular type of clock and case sometimes referred to as school clock, office or kitchen dial. English dial usually refers to the familiar fusee movement fitted into a rectangular case bearing a large circular dial.
Dial washer	A thin curved springy washer placed between the hour wheel and dial on a watch to prevent the hour wheel from riding up and disengaging from the minute pinion.
Diamantine	Fine white powder mixed with oil used for polishing steel.
Die	A tool used for cutting external screw threads on rods, etc.
Discharge pallet	See Exit pallet.
Disengaging friction	The type of resistance present when a wheel tooth acts on a pinion leaf after the line between the centres.
Dog screw	<ol style="list-style-type: none">1. A screw with a portion of the head cut away used to secure watch movements to the watch case / watch dials to the movement.2. A screw with a cylindrical point (dog-point) used to engage with a circular groove in a shaft or arbor.

Douzième	<p>An old French unit of measurement.</p> <p>12 douzièmes = 1 ligne; 12 lignes = 1 pouce.</p> <p>1 douzième = 0.0074 inches = 0.188 mm</p> <p>1 ligne = 0.089 inches = 2.256 mm</p> <p>1 pouce = 1.0657 inches = 27.069 mm</p>
Draw	<ol style="list-style-type: none"> 1. The angle on the pallet stone in the lever escapement. It ensures that the lever is pressed against the banking pin. 2. The process which occurs when the lever moves to the banking after locking.
Driven wheel	The pinion (or wheel) of two intermeshed gears which is driven by the other. Also termed as “the follower”.
Driver	The wheel (or pinion) of two intermeshed gears which transmits the drive to the other.
Drop	The free movement of the escape wheel which takes place after impulse is complete and before locking.
Drop dial	A type of dial clock where the case projects below the dial. See also Dial clock.
Dynamic friction	See Friction.
Ébauche	An unfinished movement; sometimes a movement not yet fitted into a case.
Eccentricity	When the periphery of a wheel or similar unit is not evenly disposed about its pivot centre it is in a state of eccentricity. It may be out of true or out of round (or both). See also Concentricity.
Elinvar	An alloy used for balance springs for an uncut balance. Its elasticity is little affected by changes in temperature, it does not rust and is non-magnetic.
End shake	See Shake.
End stone	See Stone.
Engaging friction	The type of resistance present when a wheel tooth acts on a pinion leaf before line between the centres.
Entry pallet	The first pallet to be engaged by each escape wheel tooth.
Epicyclic gear	Gearing in which one gear is fixed (the sun gear) and other gears revolve around (the planetary gears). Found in some turret clocks and tourbillon watches.

Epicycloid	A line traced by a point on the circumference of a circle rolling without slip on the exterior of another.
Equation of time	The difference between apparent solar time and mean solar time. See Solar time. Usually published not as an equation but as a graph of time difference against days of the year.
Escapement	The mechanism in a mechanical clock or watch which both regulates the speed of the train driving the hands and provides an impulse to maintain the oscillations of the pendulum or balance.
Escapement error	Errors in isochronism inherent in the particular escapement.
Exit pallet	The last pallet to be engaged by each escape wheel tooth. Also called the discharge pallet.
Feather edge	See Burr.
Flank	The part of a wheel tooth or pinion leaf which contacts the mating gear teeth below the pitch circle. The part above the pitch circle is called the face.
Flat balance spring	A balance spring without an overcoil.
Fly	A rotating vane which acts as a governor to control the speed of a striking train by using air resistance. A centrifugal fly has spring-loaded vanes which extend as the speed increases.
Foliot	An early form of balance in the form of a pivoted bar with adjustable weights; used in early verge escapements.
Follower	<ol style="list-style-type: none"> 1. The second of two intermeshed wheels, driven by the other. The driven wheel or pinion. 2. The part of a lever which follows the contour of a cam.
Fork	That part of the lever of the lever escapement into which the ruby pin or impulse pin engages. Also called the notch.
Frame	The assembly usually formed by plates connected by pillars designed to provide bearings for the wheels and pinions of a clock or watch movement.
Free escapement	An escapement in which the balance or pendulum has contact with the other parts for an insignificant portion of its motion.
Free sprung	A watch or chronometer movement with a balance and spring but no index. It is adjusted for rate by the movement of screws on the balance rim.

French silvering	See Silvering.
Frequency divider	The electronic circuitry in a quartz watch or clock which reduces the impulses from a quartz crystal oscillator to drive the stepper motor.
Friction	<p>A force resisting motion.</p> <p>Static friction: the highest frictional force experienced when trying to get the moving component moving.</p> <p>Dynamic friction. A lower frictional force experienced when the moving component is moving.</p> <p>Rolling friction: The lowest frictional force of all experienced when the moving component rolls rather than slides.</p>
Frictional rest escapement	An escapement in which the pallets rest on the escape wheel (e.g. Graham dead-beat escapement) or cylinder (e.g. Cylinder escapement) during the supplementary arc.
Fusee	A mechanism for overcoming the variation in power provided from a mainspring as it unwinds. The mechanism is in the form of a “cone” with a spiral groove for a chain or line which transmits the power from the spring barrel to the fusee. At full winding the chain pulls on the smallest diameter of the cone and as the spring unwinds gradually pulls on the larger diameter thus transmitting an equal force to the pendulum or balance throughout the period of unwinding of the mainspring.
Gearing	Refers to the engagement of a toothed wheel with another or with a pinion. A train of gear wheels.
Gear wheel	See Wheel.
Geneva mechanism	See Maltese cross.
Going barrel	A mainspring barrel fitted with a geared rim driving the train directly (i.e. not via a fusee).
Grain	The fine lines left by filing or polishing in one direction.
Guard pin	The pin fixed at the end of the lever of the lever escapement which, when the watch is jolted, bears against the safety roller to keep the lever in its correct position. It prevents overbanking which causes the watch to stop. Sometimes known as the dart or safety finger.
Gut line	A line used for supporting clock weights or connecting a mainspring barrel to a fusee. Traditionally made from the intestines of sheep or goats but synthetic alternatives are available.

Heat treatment	Alteration of the properties of a metal by heating it. Sometimes followed by rapid cooling. Can be used to change the colour of steel (see Bluing).
Helical gear	A gear wheel in which the teeth are cut at an angle to the axis to form part of a helix.
Heel	<ol style="list-style-type: none">1. The part of the tooth of a Swiss lever escapement which first acts on the pallet.2. See also Toe.
Hob	A type of gear cutter generally used for the mass-production of gear wheels and pinions.
Horns	The part of the lever in the lever escapement each side of the notch.
Horology	The science and practice of measuring time.
Hunter	A pocket watch with a hinged flip-up lid to cover the face.
Hypocycloid	A line traced by a point on the circumference of a circle rolling without slip on the interior of another. This locus is used in the design of gears for clocks and watches.
Idle wheel	A gear in a train of wheel and pinions which does not affect its ratio or speed. Its function is either to reverse the direction or make up the distance between other gears. Also called an idler.
Idler	See Idle wheel.
Impulse	The force transmitted to a balance or pendulum by the impulse face of the pallet.
Impulse clock	A clock driven by electrical impulses from a master clock. Sometimes called a slave clock.
In beat	A term used to signify that an escapement action is even, i.e. the balance or pendulum vibration is displaced equally in both directions of swing to release an escape wheel tooth.
Index	A lever on a lever escapement for adjusting the length of the balance spring and so bring to time.
Invar	A nickel iron alloy from which pendulum rods may be made. It has the advantage that it shows very little alteration in length due to temperature changes.

Involute	The curve formed by a point in a cord as it is unwound from a fixed cylinder. Gear teeth designed on this principle have a number of advantages for the vast majority of engineering applications, but suffer from being less suited to gear ratios where the wheel is the driver and the pinion has a low number of teeth.
Isochronism	Constant time. The clock or watch keeps the same time whatever the arc of the pendulum or balance.
Jacot tool	A specialised form of turns used in watchmaking and driven by a bow.
Jewel	A hard semi-precious stone used for pallets, pivot holes and end stones mainly in watches and platform escapements.
Keyless work	The winding mechanism on usually a watch but sometimes a clock which is wound by turning a button or crown rather than inserting a winding key.
Lantern pinion	A pinion in which the teeth are made of pin wire (trundles) held at the ends by metal discs.
Lantern runner	A jacot tool accessory, used when finishing the ends of a pivot.
Leaf	A pinion tooth.
Letting down	Releasing mainspring power prior to examination / repair.
Lever	<ol style="list-style-type: none"> 1. A pivoted bar or similar which, if force is applied at one point, will transmit the force to another point. 2. The part of a lever escapement which carries the pallets.
Lever escapement	A type of escapement invented by Thomas Mudge in 1759 characterised by a lever to transmit impulses to and from the balance.
Lift angle	The impulse angle.
Lifting piece	The part of a striking / chiming mechanism used to release the train causing the clock to strike / chime.
Ligne	See Douzième.
Line of centres	An imaginary straight line drawn through the centre of the pivot holes of intersecting gears or interacting components (e.g. pallet arbor and escape wheel arbor).
Locking	The stage in the action of an escapement when the escape wheel is arrested.

Locking plate	See Count wheel.
Long case clock	A grandfather clock, i.e. a clock which has a long case to accommodate weights and pendulum.
Lossier curve	The theoretical inner and outer terminal curves of a Breguet balance spring as designed by L. Lossier.
Lugs	<ol style="list-style-type: none">1. Rounded extension pieces on cocks or similar fitments for accommodating pivot or screw holes.2. Projections on wrist watch cases supporting the strap or bracelet.
Lunation	A lunar month; approximately 29 days, 12 hours, 45 minutes.
Lunar	Pertaining to the Moon.
Maltese cross	A type of stop work for limiting the winding of a mainspring. Also called a Geneva mechanism.
Maintaining power	A device designed to keep a clock or watch going while it is being wound. The device is referred to as maintaining gear.
Mandrel	A face plate of a watchmakers lathe provided with adjustable dogs and usually a spindle or running centre. The centre centres the work and the dogs clamp it into position.
Mantel clock	See Bracket clock.
Master clock	A clock which can transmit electrical impulses to drive slave clocks.
Mean solar time	See Solar time.
Metelinvar	An alloy used for balance springs with similar characteristics to Invar and Elinvar.
Mono-metallic	Made from a single metal, e.g. a balance rim made of a special alloy. Used in conjunction with a balance spring that needs no significant compensation for changes in temperature.
Moon work	Mechanism added to or incorporated in a movement for indicating the phases of the moon on a moon disc in the dial.
Motion work	The train of wheels in a clock or watch connecting the minute hand to the hour hand. 12 : 1 ratio.
Motor	An American term for the barrel and mainspring.

Movement	The mechanism for a clock or watch.
Nivarox	An alloy used for balance springs with similar characteristics to Invar, Elinvar, and Metelinvar. Has the special qualities of extreme hardness and almost complete lack of reaction to magnetism.
Notch	See Fork.
Ogive	A term for the tip of a gear tooth (usually a modified form of cycloidal tooth). See Rounding.
One second pendulum	A pendulum which takes one second to swing from its mid-point to one side and back to the mid-point again.
Oscillation	<ol style="list-style-type: none"> 1. A repetitive variation in time between two different states. 2. One complete cycle of an oscillator. In a mechanical clock or watch, one oscillation is one full cycle of the action of a balance and spring or pendulum from its starting position to one side, back through its starting position to the other side, and back to its starting position again. Other types of oscillation are possible such as the electrical oscillations found in a quartz crystal clock or watch.
Overbanking	<ol style="list-style-type: none"> 1. The condition in a cylinder escapement when “over-vibration” of the balance occurs and the toe of an escape wheel tooth becomes wedged behind the cylinder shell engaging lip, thus stopping the watch. The over-vibration is usually due to a missing or short banking pin. 2. The condition when the ruby pin obtaining in a lever escapement when the ruby pin gets on to the wrong side of the lever” due to a short guard pin, a short ruby pin or excessive end shake of the lever or balance staff.
Overcoil	A flat balance spring with its outer coil raised above the level of the remaining coils. Often referred to as a Breguet overcoil. Invented by A.L. Breguet (C19th).
Oyster watch	A waterproof watch made by the Rolex Company, hermetically sealed by mechanical means.
Pair case	A watch with an inner and outer case.
Pallet	That part of an escapement through which the impulse from the escape wheel is transmitted to the pendulum or balance. Also regulates the speed at which the escape wheel is allowed to rotate.
Pallet stone	See Pallet; also see Stone.

Parting	The operation of cutting off a length from a piece of work while it is revolving in a lathe or turns. Also known as parting off.
Pawl	See Click.
Peening	The operation of stretching the surface and edges of metal parts by hammering.
Pendant	<p>1. The part of the case to which the bow or ring is fitted and by which the pocket watch may be hung. Generally contains the winding and hand setting button in keyless work.</p> <p>2. Used to define the orientation of a watch when timing in differing positions, e.g. “pendant up” (PU) which means the watch is held vertically with the pendant uppermost. See also Positional error.</p>
Pendulum	The swinging bob and its associated rod which determines the time interval of each vibration of a pendulum clock.
Periphery	The outer edge of (usually) a flat object or area. The circumference of a disc.
Perpetual watch	See Automatic watch.
Pillars	The distance pieces which hold together the front and back plates and form the frame of a clock movement.
Pinion	A small gear wheel (typically with less than 20 teeth) which meshes with a larger gear wheel.
Pin pallet escapement	A form of lever escapement in which the pallets are made of circular pins. Also called the Roskopf escapement.
Pin wheel escapement	A form of escapement in which the escape wheel teeth are made of semi-circular pins.
Pipe	A tubular projection or boss, e.g. that part of the minute hand which is pressed on the cannon pinion.
Pitch circle	<p>1. A circle defining the centres of two or more holes, etc. set at a constant radius from a central hole or axis. The hammer pins on a hammer wheel are on a pitch circle, which is defined by the pitch circle diameter (PCD).</p> <p>2. Pitch circle: The effective diameter of a wheel or pinion, i.e. the circle above and below which the tooth addendum and dedendum are measured. If two plain wheels, one driving the other by frictional contact only, were designed to replace two gear wheels and give the same ratio, their contacting diameters would be equivalent to the respective pitch circles of the replaced gear wheels.</p>

Pitching	See Depthing.
Pivot	<ol style="list-style-type: none">1. The reduced end of an arbor, staff etc, which runs in a hole, bearing, bush or jewel hole.2. The action of a lever, etc. pivoting or rotating about a post, etc.
Planishing	Bringing sheet metal to a fine, smooth finish by hammering or rubbing, typically with a planishing hammer or planishing tool. It is a form of burnishing.
Plates	Plates linked together by pillars to form the movement frame.
Plated movement	A clock movement with a frame constructed from plates connected by pillars.
Platform escapement	A lever or cylinder escapement mounted on a platform. Found primarily in carriage clocks.
Play	See Shake.
Poising	The operation of balancing any part which runs on pivots, i.e. adding or reducing weight at various points in the rim until it is of equal distribution all around the centre. Mainly applied to a watch balance.
Polishing	Producing a bright polished surface.
Positional error	Errors in isochronism caused by differing positions of a watch (dial down, pendant up, etc.).
Posted movement	See Birdcage movement.
Potence	A cock supporting a vertical arbor such as the escape wheel of a verge clock. Also spelt Pottance.
Power curve	A curve indicating graphically the decline in power of a mainspring from fully wound and completion of uncoiling.
Pouce	See Douzième.
Primitive circle	Another name for pitch circle.
Pusher	See Push piece.
Push piece	A button or knob in a watch case which operates an auxiliary function (e.g. starting/stopping a chronograph, setting the date, etc.).

Quarter screw	A long screw, usually four, sometimes fitted in a balance rim and used for mean time adjustments. Unscrewing the quarter screws (moving the screws outwards) results in an increase in the radius of gyration and a consequent increase in the inertia of the balance leading to a decrease in rate. See also Timing screw.
Quartz	A crystalline material used in highly stable electrical oscillators in quartz clocks and watches.
Rack	The toothed quadrant which acts as a controlling unit in a type of striking or chiming mechanism.
Radius of gyration	The distance at which the effective mass of a balance is concentrated from the centre of rotation. For a balance of fixed mass, it is effectively a measure of the inertia of the balance, and to a rough approximation can be taken as the outer radius of the rim.
Ratchet	A saw-toothed wheel, which in conjunction with a Click will turn in one direction only.
Rate	The amount by which a clock or watch gains or loses over a specified interval (usually one day).
Rating	The operation of adjusting a timepiece to record accurate time.
Recoil	<ol style="list-style-type: none"> 1. A slight backwards movement of the normal run of the train caused by certain types of escapement and designed to give an increase of impulse to the pendulum. 2. The very slight backwards movement of an escape wheel during unlocking. 3. Recoil escapement: An Anchor escapement.
Recoiling click	A click mechanism which allows the engaged wheel to recoil thus allowing some of the tension generated to be released. Mainly used to allow a watch mainspring to release partly from the fully wound state to prevent "knocking the bankings" and help prevent a spring from becoming locked by friction between its tightly wound coils.
Remontoire	A device which periodically rewinds an auxiliary spring or lifts an auxiliary weight to provide impulse to the escapement, thereby producing a more constant force and improved isochronism.

Repeater	<p>1. A striking watch or clock, which repeats the last hour at the press of a button or pull of a cord. Some watches also repeat the last quarter or even last minute. Designed for use in the dark.</p> <p>2. An alarm clock which repeats its alarm at intervals until silenced manually.</p>
Regulator	A timepiece used for keeping accurate mean time for regulating purposes in watchmakers' workshops or in observatories. They are fitted with compensating pendulums and their movements are of the simplest and most accurate form possible, i.e. everything is subordinated to good time-keeping.
Root circle	A circle drawn round the bottom of the tooth spaces of a gear wheel or pinion.
Roller	<p>1. That part of a lever "escapement" which is attached to the balance and through its ruby pin contacts the lever fork or horns.</p> <p>2. Cylindrical parts fitted to the balance staff of a marine chronometer which provide unlocking (small roller) and impulse (large roller).</p>
Rolling friction	See Friction.
Roskopf escapement	See Pin pallet escapement.
Roughing	The first stage of making a new part, preceding finishing operations.
Rounding	<p>1. The tip of a pinion tooth. See also Ogive.</p> <p>2. Making a sharp edge rounded either deliberately (e.g. with a file) or unintentionally (e.g. when using abrasive paper).</p>
Rubbing over	A form of riveting done in the lathe to secure a wheel to its collet.
Run	A term sometimes used instead of warn or warning.
Run to banking	In the lever escapement it refers to the movement of the lever after locking and until it is arrested by a banking pin. Sometimes "run to the banking".
Runner	An accessory used on the turns or Jacot tool in which a pivot runs during a turning operation.
Safety finger	See Guard pin.

Scraping	A hand-finishing process which, with skill, is used to bring a machined surface dead flat. Also used to impart a decorative finish. Done with a scraper.
Seat or Seating	<ol style="list-style-type: none"> 1. A surface specially prepared to take another permanently attached component (e.g. a bridge or cock secured by screws and located by pins) or by an interference fit (e.g. an arbor collet secured by a push or press fit). 2. A surface on which a component periodically comes to rest.
Second pendulum	See One second pendulum.
Sector	<ol style="list-style-type: none"> 1. An instrument for gauging the comparative sizes of wheels and engaging pinions. 2. Part of a circle enclosed by two straight lines drawn from the centre to points on the circumference.
Self-winding	See Automatic watch.
Set-hands mechanism	A device for periodically correcting the time shown on a clock or watch. Usually operates on the minute hand.
Shaft	An arbor.
Shake	<ol style="list-style-type: none"> 1. Non-productive free movement of a pivot or interrelated parts of a mechanism. Also known as play. 2. End shake: Endwise (axial) freedom or movement in an arbor between the pivot shoulders or endstones. 3. Side shake: Sideways (radial) freedom or movement in an arbor between a pivot and its bush or jewel hole.
Sidereal time	Time based on the time taken for the earth to revolve once about its own axis as measured with respect to a fixed star. The sidereal day is approximately one three hundred and sixty sixth part of a year, and three minutes fifty six seconds short of a mean solar day. Used by astronomers.
Side shake	See Shake.
Silvering	A method of creating a silver finish to brass dials, etc. A compound primarily of silver chloride is rubbed on as a paste, followed by cream of tartar, rinsing in water and drying. On completion a coat of lacquer is generally applied for protection.

Silver soldering	A form of hard soldering. A method of joining metal by melting an alloy of silver and copper which fuses onto the parts to be joined. Sometimes called silver brazing.
Skeleton clocks	A pendulum clock with its plates pierced out, usually not fitted into a case but displayed under a glass dome.
Skew gears	Helical gears on non-intersecting, non-parallel arbors commonly meshing at right angles.
Slave clock	A clock dial driven by a master clock.
Slip	<ol style="list-style-type: none"> 1. A slip stone, an abrasive stone used for finishing metal parts such as steel pallets. 2. The unintentional or deliberate condition that results from a friction drive failing to drive the unit mounted on it due to limited grip.
Snail	That part of a striking mechanism (shaped roughly like a snail shell) which, operating with the rack, regulates the number of blows being struck.
Solar time	<ol style="list-style-type: none"> 1. Time determined by the position of the sun at noon at the local meridian (longitude). Also known as apparent solar time. 2. Mean solar time. Solar time averaged out over the whole year (See Equation of time).
Spinning	The process of raising a flat disc to a domed shape in a lathe. The disc is spun in the lathe and generally rubbed over a former of the required shape. Can be used to make pocket watch cases.
Spur gear	A gear wheel meshing with another wheel or pinion on parallel shafts.
Staff	The spindle on which the balance or pallet seats. An oscillating arbor.
Stake	<ol style="list-style-type: none"> 1. A tool used, in conjunction with a punch in staking operations. 2. An old generic term for spindles, staffs, arbors, etc
Staking	The operation of driving the "stake" into the part in which it fits but used to describe many similar operations.
Static friction	See Friction.
Steel	An alloy of iron and carbon (typically less than 1%) Can be heat treated.
Stem	See Shaft.

Stepper motor	A small electric motor which “steps” through a defined angle of rotation at each electrical impulse. Found in quartz clocks and watches.
Stone	A jewel used for pallets (pallet stone) or to provide end location for an arbor (end stone).
Stop watch	An interval timer which, unlike a Chronograph, does not tell the time.
Stopwork	<ol style="list-style-type: none"> 1. The mechanism which allows only the middle turns of a mainspring to be used. This results in a more constant drive torque. 2. Sometimes used to describe the silencing mechanism on an alarm clock.
Stretching	The operation of increasing the surface area of sheet metal by hammering or compressing between rollers. Used principally for increasing the diameter of wheels.
Striking clock	A clock which strikes the hour or hours and half hours but does not chime.
Stud	<ol style="list-style-type: none"> 1. A type of post usually screwed at one or both ends and with a plain portion exposed above the screwed hole in which it is fitted. 2. A pin or small block used to secure a balance spring.
Supplementary arc	The arc of vibration at the extremities of the swing of a pendulum or balance when no longer being impulsed by the escape wheel.
Suspension	The springy steel strip supporting the top of a pendulum.
Swing	The motion of a pendulum or balance; its vibration.
Synchronome	A type of periodically impulsed electrical clock capable of operating slave dials. Previously used in offices and schools.
Synchronous clock	A clock whose timekeeping is synchronised to, and totally dependent upon a source of alternating current (usually the mains).
Tandem drive	The use of a single source of power for driving both time and striking trains.
Tap	A tool used for cutting internal screw threads in holes.
Tempering	Reducing the hardness of steel by heat treatment.
Terminal curve	See Overcoil and Lossier curve.

Tic-tac	A type of anchor escapement which embraces just two teeth of the escape wheel. Also a tic-tac clock.
Timepiece	A clock which tells the time only (it has no strike or calendar work).
Timing machine	An accurate instrument for counting the number of beats per hour. Used for checking the timekeeping of a clock or watch.
Timing screw	A screw, sometimes as many as twelve, used to adjust the radius of gyration of a balance and hence its period of oscillation. See also Quarter screws.
Ting tang clock	A clock which strikes on two bells or gongs at the first second and third quarters and on the lowest toned bell or gong only at the hour.
Tip circle	A circle drawn round the tips of the teeth of a wheel or pinion, i.e. outside the pitch circle.
Toe	A term used in describing the appropriate part of a mechanism which has the rough shape of a human foot, e.g. a club foot escape wheel tooth.
Topping	The operation of cutting or re-cutting the tips of wheel teeth usually after stretching.
Torque	Twisting force.
Tourbillon	A watch in which the escapement is fitted into a revolving carriage in order to average out positional errors.
Train	A system of intermeshed gear wheels and pinions used for transmitting power and (usually) reducing or increasing the speed.
Train count	Counting the number of teeth in a gear train in order to ascertain the overall gear ratio.
Trundle	See Lantern pinion.
Turns	A hand driven lathe.
Turret clock	A clock designed for mounting in a turret or tower, e.g. a church clock.
Uncut balance	See Balance.
Undercut	A recess cut at a shoulder which has the effect of eliminating any possible root radius or uncut screw thread left by a previous machining operation. Undercut permits accurate seating of the shoulder.

Underslung clock	A type of chiming clock in which the chiming hammer and their barrel are located below the main movement enabling the case to be made less deep.
Uprighting	The operation of aligning holes to ensure that the pivots running in them are vertical. May require rebushing if the holes are worn.
Vibration	The swing of the pendulum or balance in one direction only. See Arc of vibration.
Vienna Regulator	A wall timepiece, some of very high accuracy. Usually fitted with a long wood pendulum and a dead-beat escapement.
Warn	Refers to the movement of the warning wheel of a striking mechanism before the striking train is released.
Wheel	A larger gear wheel (typically greater than 20 teeth). Usually meshes with a pinion.
Winding shaft	A screwed spindle or stem through which the winding mechanism is operated.
Worm	A small gear wheel like a screw which meshes at right angles with a worm wheel. Great reductions in speed are possible without recourse to a train, but generally must act as the driver (cannot be driven).
Worm wheel	A wheel with spirally cut teeth made to mesh with a Worm. Generally must be the driven wheel.
Year clock	A clock which will run for a period of one year with one winding.
Yoke	An American term for check spring (set lever spring in a watch).
Young's modulus	The modulus of elasticity, sometimes called the coefficient of elasticity.
Zaandam clock	A style of Dutch clock.

END