All about CHANGE RINGING

RINGING

It is traditional to start and finish ringing with rounds

'Rounds' on 8 bells

1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8

The traditional notation shows each bell as a number starting at '1' for the treble (lightest bell) and running down the numbers to the tenor (heaviest bell).
Bells are usually tuned to the major scale. If there are more than 9 bells, letters are substituted, so 0 = 10, E =11, T = 12, A = 13, B = 14, C = 15, D = 16.

Strokes

The mechanical system by which bells are rung 'full circle' means that when the bell is first pulled off with the woolen tuft ('sally'), the bell sounds at 'hand-stroke' and when the tail end is pulled down, the bell sounds at 'back-stroke', and brings the bell back to its original position.

Each ringer aims to strike his bell to a regular rhythm

It is also traditional that the bells are rung with a small pause before the leading hand-stroke sounds, producing an even beat of 16 followed by a small hesitation:

1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8   1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8   1 2 3 4 5 6 7 8 1 2 3 4..

For method-ringing we write each hand-stroke and back-stroke row one below the other:

1 2 3 4 5 6 7 8 -each bell is ringing at hand-stroke
1 2 3 4 5 6 7 8 -each bell is ringing at back-stroke
1 2 3 4 5 6 7 8 -each bell is ringing at hand-stroke
1 2 3 4 5 6 7 8 -each bell is ringing at back-stroke
1 2 ..

There are 2 systems to vary the order that bells ring:

Call changes

- the appointed conductor calls out the change that is to take place.
Changes are rarely called quicker than every two strokes of the bells.

Method ringing or Scientific

– by which all the ringers learn a method (- a pattern) and the appointed conductor starts, modifies and ends the piece of ringing.

A different change is rung at every stroke of the bell.

The aim is to avoid repeating a change in any piece of method ringing

In principle, a change takes place between two rows, however in normal bell-ringing parlance, the word 'change' is used rather than 'row'.

Pieces of ringing:

Plain Course – rung without any calls of ***"Bob!"*** or ***"Single!"***
Extent – ringing all the changes possible – used most often for 5 bells, where an extent is 120 changes (takes about 5 minutes) and 6 bells 720 (about 30 minutes)
Bob course – a short piece with a call of ***"Bob!"*** at each treble lead.
Touch – a piece of ringing, with some calls, providing changes without repetition for the length of time desired.
Quarter Peal – a long touch - a popular length of ringing with a minimum of 1,260 changes, continuing for around 45 minutes
Peal – a piece of ringing with a minimum of 5,040 changes (on up to 7 bells or 5,000 for more bells), continuing for around 3 hours.

When changing on an odd number, in a tower with an even number of bells, it is usual for the tenor to 'cover' (rings last bell in each change).

How many different changes are there?

No. of bells	Stage suffix	No. of different changes	Approx. time to ring
3	Singles	1 X 2 X 3 = 6	a few seconds
4	Minimus	1 X 2 X 3 X 4 = 24	1 minute approx
5	Doubles	1 X 2 X 3 X 4 X 5 = 120	4 minutes
6	Minor	720	25 minutes
7	Triples	5,040	3 hours
8	Major	40,320	24 hours
9	Caters	362,880	9 days
10	Royal	3,628,800	90days
11	Cinques	39,916,8002.	27 years
16	Sixteen	Quite a lot	Um!

What is Music in Change ringing?

Although non-ringers appreciate the overall effect created by bells rung to changes, and can hear differences between call changes and method ringing, or odd bell methods with a cover compared with even bell methods, further musical appreciation is something acquired through study, generally by ringers themselves as they become more experienced in listening to method ringing.
Music in ringing is the appreciation of the musical properties of individual changes contained in a touch, and the sequence in which changes are heard. The sequence of changes is determined by the choice of method; consequently one will hear people say things like 'Bristol [Surprise] is a musical method' or 'that was a very musical touch of Stedman'. The reason for this is that people like the way that a particular method generates repetitions and rotations of a subset of bells within the changes. Methods can be rung to compositions that maximise the musical combinations of bells within the changes without causing any repetition of entire changes which would render the touch false.
Composing is a great skill, which has been greatly aided by using computer programs to prove that no change is repeated.

METHODS

The mechanics of a bell swinging full-circle means that we need to restrict its move to one position.

Not possible:	Possible:	Possible:	Possible:
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8
	| X | | | | |	| X X X |	X X X X
4 8 2 6 7 1 3 5	1 3 2 4 5 6 7 8	1 3 2 5 4 7 6 8	2 1 4 3 6 5 8 7

The basic method incorporating this rule is called ...

Plain Hunting

1 2 3 4 5 6 7 8
X X X X
2 1 4 3 6 5 8 7
| X X X |
2 4 1 6 3 8 5 7
X X X X
4 2 6 1 8 3 7 5
| X X X |
4 6 2 8 1 7 3 5
6 4 8 2 7 1 5 3
6 8 4 7 2 5 1 3
8 6 7 4 5 2 3 1
8 7 6 5 4 3 2 1
7 8 5 6 3 4 1 2
7 5 8 3 6 1 4 2
5 7 3 8 1 6 2 4
5 3 7 1 8 2 6 4
3 5 1 7 2 8 4 6
3 1 5 2 7 4 8 6
1 3 2 5 4 7 6 8
1 2 3 4 5 6 7 8

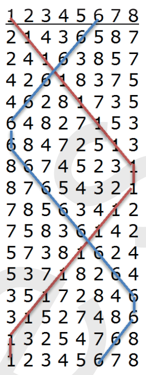
– shown here on 8 bells.
Starting with rounds at back-stroke:

Now, if we draw a line joining up the path of a bell, we see that the same pattern emerges for every bell

- called the 'blue line' because that is how it was printed in early publications.
The line through the treble (no. 1) is shown in red.

In plain hunting each bell follows the same pattern but starts at a different point on the pattern.

It is much easier to memorise the shape of this pattern than to remember which bell you have to follow.



Frustratingly, this pattern repeats after 16 changes
(about half a minute of ringing)

So how do we access the other 40,304 different changes?

Step 1: Meet

Plain Bob Major

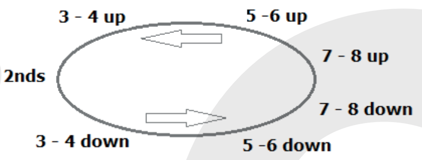
- it is written out down the right hand side of this poster ➔ ➔ ➔ ➔ ➔

Still plain hunting until every time the treble (no.1) leads (- first bell in the change), the next bell follows it twice then itself leads. This is called 'making 2nds place'. To prevent repetition the other six bells are made to exchange positions – 'to dodge'- before recommencing plain hunting.

The red line shows the treble plain hunting still. The blue line shows the path of bell no. 2 and the green line shows the path of bell no.4. You can see that they have the same pattern but displaced.

The ringers will remember the blue line and know where to begin. The numbers in circles on the right hand side show where each bell starts off along the blue line.

Another aid to memory is to remember the rotation of work of each bell when the treble leads as: dodge 3-4 down; 5-6 down; 7-8 down; 7-8 up; 5-6 up; 3-4 up; make 2nds place and repeats. This is called the 'circle of work'.



Circle of work for Plain Bob Major

The changes are set in motion by the appointed conductor calling ***"Go Plain Bob Major!"*** A call of ***"That's all!"*** means that the bells are about to reach rounds and that they are to continue ringing rounds until the conductor calls ***"Stand!"***, whereupon they set the bells at hand-stroke.

But this only gives 112 different changes!
(about five minutes to ring)

Step 2: Next there are two types of **'calls'** which alter the pattern between one change and the next. These are ***'Bob!'*** and ***'Single!'***

The conductor can call these at the appropriate time following a composition.

The effect of these calls is shown at the bottom on the right.

With the right composition ..

All 40,320 changes can be rung without repetition!

All 40,320 changes were rung to Plain Bob Major on the foundry campanile bells, Loughborough, in 1963 in 17 hours 58 minutes!

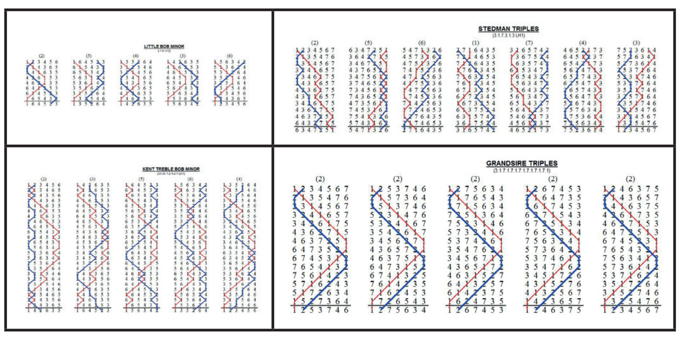
Photos by Robert B. Smith / Taylors, Eayre & Smith

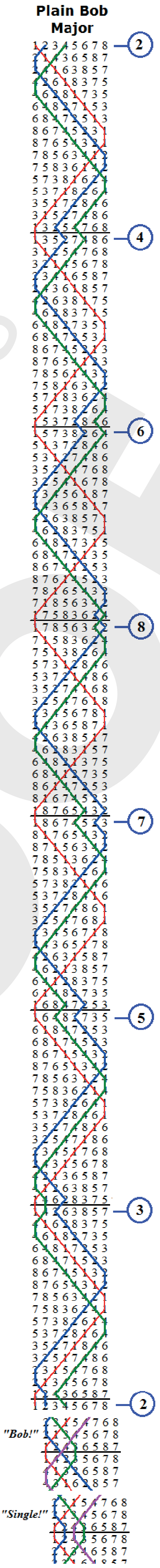
Names of Methods

For example, Cambridge Surprise Major, where

Cambridge is the NAME
Surprise is the CLASSIFICATION showing how it is constructed
Major is the STAGE or how many bells are changing (see item at left)

A few of the more popular methods out of thousands:



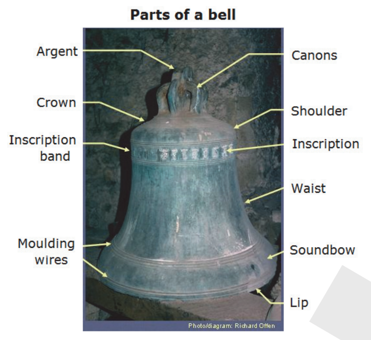


All about BELLS

Bells

The earliest archaeological evidence of bells dates from 3rd millennium BC, and is traced to the Yangshao culture of Neolithic China!

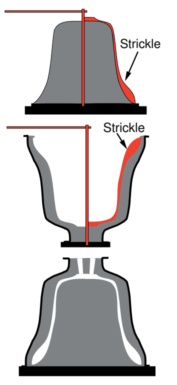
Western bells evolved to their present general shape about 1,000 years ago.



Casting

Bell metal is a bronze, containing 23% tin and 77% copper

The inner core is built up with a mixture containing sand, loam, straw or horse manure and goat hair. The fibres in the mould are important. They burn in contact with the molten bell metal, creating tiny tubes that help air to escape from the mould.



The final shape is controlled by rotating a 'strickle' - a wooden board shaped like the cross section of the bell to be cast.

The cope, or outer mould, is formed with the same material, inside a large iron bell shaped container. The strickle is used again to ensure the correct profile inside the mould.

When the moulds are dry they are clamped together. After the molten metal has been poured in, it is left for several days (depending on size) to cool down before the mould is broken off. The bell is cleaned and the top is ground level to provide an accurate mounting surface.

http://allsaintswokinghambells.org.uk/AbBells/index.html

Shape

The shape evolved to its present form, as founders experimented to find out what made a better sound.

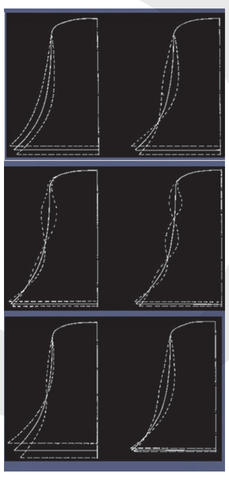
Current shapes are a compromise between the sound quality of the bell (which is heavily influenced by its profile), ease of casting, tuning and other characteristics such as weight and basic dimensions of importance when the bell is rung full circle.

Compared with modern bells, mediaeval bells were longer and thinner.

Improvement of bell sounds has occurred in periods of dramatic progress (for example, by the Hemonys in the 17th century; by English founders in the late 19th and early 20th century; and in the mid to late 20th century as the result of detailed research).

Today, there is no one formula for the profile of a bell that guarantees the best results for all purposes, and founders regard their bell profiles as commercially sensitive information.

Sound

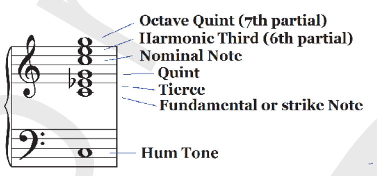


A bell sounds a variety of unrelated notes at the same time unlike an organ pipe or a guitar string, which generates notes related by precise numerical ratios.

When a bell is hit by the iron clapper, we hear a combination of notes, which come from different parts of the bell vibrating at different frequencies, intensities, attack and decay times.

These 'partial tones' combine to give each bell its characteristic tone.

Notes within a bell



Tuning

The science of modern bell tuning was only fully understood in the late 19th century, and is named after Canon Arthur B Simpson who first described it.

All UK founders subsequently adopted 'Simpson tuning', which controls five frequencies - the lower notes shown on the stave above.

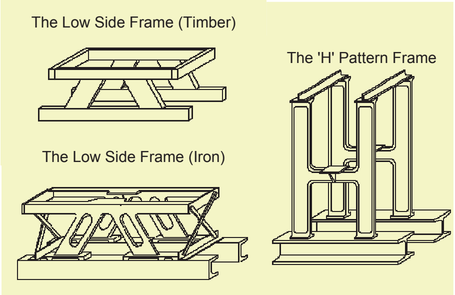
Tuning is a complex process though, so despite all the science, it still depends on skill and judgment.

Removing small amounts of metal from different parts of the inside of the bell adjusts the different frequencies. A modern bell is cast deliberately thick, and then tuned on a vertical boring machine (a giant lathe). Before these machines, metal was chipped away with a tuning hammer.


Photo: The Whitechapel Bell Foundry Ltd

Frames

Diagrams © D. Greenwood 2008



Change-ringing depends on accurate control of the bells when rung full-circle by rope and wheel, which in turn depends on strong bell frames and well-designed fittings.

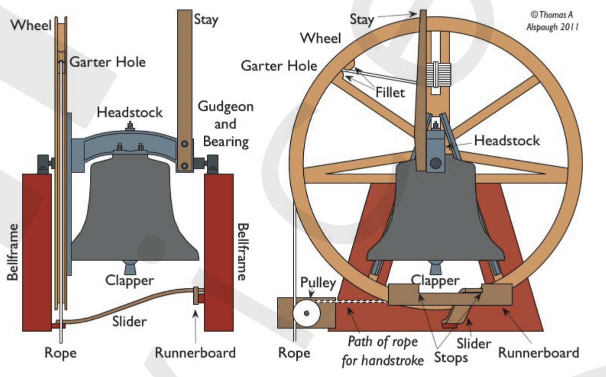
Church wardens' accounts indicate that mathematical change-ringing was fairly widespread by the early 17th century The dynamic loading about every 2 seconds from every bell rung full-circle is 4 times its weight downwards and 2.2 times its weight fore and aft. The new timber frames of that era accordingly had long heads, massive braces and no king posts. Such frames really did not alter in design right down to the 19th century, except that the timbers became slimmer.

Cast-iron was used for bell frames as early as the 1820s, but did not come into general use until the 1880s; and before the advent of the rolled-steel joist the iron side-members of the frame were still supported on oak beams.

Most metal frames are of the low-side type, with the bearings on top of them. But where space in the tower is restricted, high-side 'H' shaped frames are used.

Bell Fittings

http://miamibells.wordpress.com/ringing/glossary/



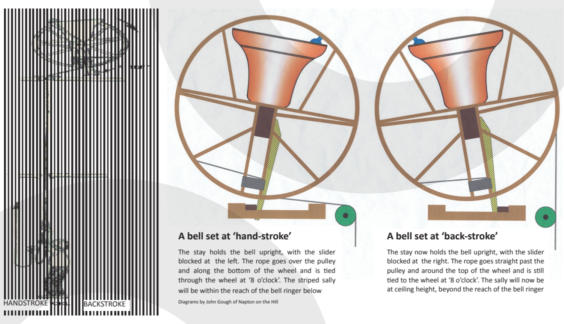
A bell hanging in its frame with the fittings needed for full-circle ringing. The bell is shown mouth downwards ('down') and safe.

Ringing bells

From the 'down' position the bells are successively swung higher and higher until they can be stopped ('stood' or 'set') as shown here. The bell is now said to be 'up' (and dangerous to untrained people) and is ready for use in the traditional English style of bell ringing.

The clapper is resting on the lower edge of the bell when the bell rests on the stay.

During each swing, the clapper travels faster than the bell, eventually striking the bell when roughly horizontal as it rises. At the balance point the clapper will pass over the top and rest against the sound bow.



Who?

"if you can ride a bicycle you can ring!"

Ringing is well within the capabilities of most people. The initial learning takes several weeks, after which you can begin to ring with the rest of the band. You never finish learning! Most ringers practise once or twice a week and ring for church services.

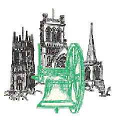
"Being able to count is all the maths you'll need and you can become a very good ringer without knowing anything about music."

Why?

- Lifelong learning experience
- Maintain a traditional skill
- A service to the church
- Team activity
- A great mental workout
- Friends around the world
- Opportunity to visit amazing places

Where?

Listen for the bells at a church near you or look for a tower on 'Dove'. Then go along and try it!



Dove's Guide for Church Bell Ringers

www.dove.cccbr.org.uk/home.php

Beware! once you've got the bug, you'll find it hard to give up:

"I learnt to ring over forty years ago and I still get the same buzz that I did when I first started."

Ringing Associations

To provide an organisation and opportunity for ringers to get together to practise and improve their skills, associations or guilds started in the 17th century and by the late 19th century covered most counties. More recently they have flourished within universities.

THE PETERBOROUGH DIOCESAN GUILD OF CHURCH BELLRINGERS
JAN 5th 1924

the central council of church bell ringers

All the associations and guilds are members.

CCCBR has many working committees whose volunteer members assist in all matters of bell ringing and maintenance.

The Council owns a weekly magazine for bell-ringers.

Property of Peterborough Diocesan Guild of Church Bellringers. Contact Public Relations Officer pro@pdg.org.uk.