This PDF version of the manual is arranged to look like the original A5 booklet.

Page 1 of the booklet is on a page by itself (to the right of this note), pages 2 and 3 come next to each another etc. Page 16 is on a left page by itself.

# !CallChnge

a church bell ringing program

by

Kate & David Crennell

# Church bell change ringing demonstration on RISCOS computers.

The application !CallChnge animates a band of from 5 to 16 bell ringers and allows you to change their order of ringing in the standard way.

If you do not ring church bells yourself, first read the section: 'An Introduction to church bell ringing'.

The section: 'Some Call Changes you can try' has a few named changes to help you get started.

Program tested on versions of RISCOS 3, 4 and 5 including an A4, 7500FE, Kinetic StrongARM RISC PC, Iyonix and VirtualAcorn* on a PC running Windows.

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Our web page for RISCOS ringing applications is:
*http://fortran.orpheusweb.co.uk/Bells/*
If you know of any other ringing applications for RISCOS, please let us know so that we can add them to these web pages. There are useful links to a glossary and to 'Learn to ring' pages.

* Available from http://www.virtualacorn.co.uk

## Contents

**Type conventions.**

This program uses the usual RISCOS conventions in the text with respect to mouse buttons:

<Select>    the left mouse button
<Menu>    the middle mouse button
<Adjust>    the right mouse button

Words normally spoken in the tower are enclosed in double quotes, e.g. "Look To".

*Italic* text is used for technical terms used in bell ringing and in the program.

**Bold** text is used for headings and when defining keywords in program windows.

# An Introduction to church bell ringing

Church bells hung for change ringing are mounted on a 'headstock' supported in bearings. A rope wrapped around a wheel attached to the headstock allows the ringer to swing the bell.



stay

headstock

slider
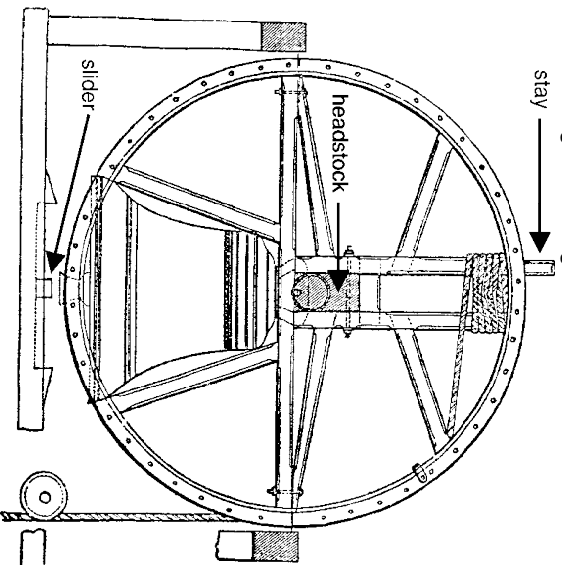
Before change ringing can begin the bells must be 'rung up'. The ringer pulls on the rope in time with the natural swing of the bell, increasing its amplitude until eventually the bell rises to and just passes the mouth up position. A piece of wood called a 'stay' pushes the 'slider' to one side or the other, allowing the bell to rest in the 'Up' position. After the bell has been rung up, the ringer pulls it back gently to the balance point and then each successive pull of the rope turns the bell through a full circle, first in one direction and then in the other. These two pulls of the rope are called 'handstroke' and 'backstroke' respectively, the two together being known as a 'whole pull'. The clapper turns faster than the bell, catching it up and striking it when it is about 3/4 of the way round. Notice how the clapper rests against the rim on opposite sides of the bell at the top of the two strokes in the next diagram.
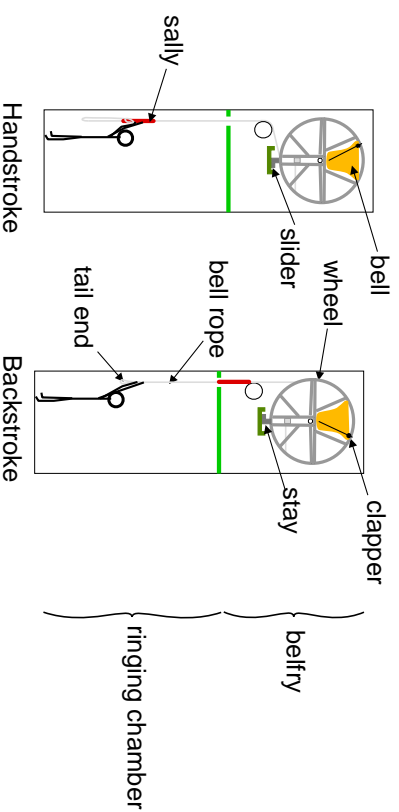
These two diagrams show the positions of a bell ringer just before pulling off on the two strokes. On the left is the *handstroke* where the hands are on the thick fluffy *sally*. On the right is the *backstroke* with the hands near the end of the rope. Between these two strokes the bell and wheel do a complete turn. The ringer always keeps the end of the rope held in one hand even while they are both on the sally.

The bell ropes are usually arranged in a circle in the ringing chamber so that each ringer can easily see all the others and notice how their arms move.

The person with the highest note *(Treble)* bell starts the ringing by calling *"Look To"* to get all the ringers to hold their ropes in preparation, then *"Treble's Going"* and finally *"Treble's Gone"* when the bell has passed the balance point and begun to fall. *"Stand"* is called to stop the ringing; the ringers all allow their bells to pass the balance point and rest gently on the stay.

*Rounds* is the name given to ringing the bells in order from the highest to the lowest note, and is how all ringing begins and usually ends.
For six bells this is written out as the line of numbers *1 2 3 4 5 6* .

The Central Council of Church Bell Ringers web site has more information on all aspects of ringing:
*http://www.cccbr.org.uk/*



Handstroke                Backstroke

sally

slider

wheel

bell

bell rope

tail end

clapper

stay

belfry

ringing chamber

# An Introduction to Call Changes

Church bells have been rung in England for almost 1000 years to call parishioners to church. Originally churches had just one bell, probably rung by the priest who conducted the service. In time more bells were bought and rung. About 400 years ago the idea of changing the order of the bells was suggested, with a conductor calling the *changes* to tell the ringers which bells to swap. Later, *methods* were developed where the order of the bells changes according to a pattern memorised by the ringers. *Call Changes* are often the first thing a beginner learns after *rounds*; they are still rung in most church towers from time to time.

Bells are normally tuned to a major scale; some sequences sound more pleasing than others. The more popular ones have names, a few of these are suggested later in the section 'Some Call Changes you can try'.

Bells are heavy, often very heavy; a ringer can only make a small alteration to the swing of a bell when it is in motion. However, because the bell can be held stationary at the balance, it is possible for the bells to change their striking order but each bell can only move by one position in the order.

The convention for *Call Changes* is that the instruction to change is called by one of the ringers, often known as the *Caller*, near the beginning of a handstroke; during that stroke and the next backstroke the other ringers prepare for the new order which happens when the next handstroke is rung.

# Disc Contents

Within the application !CallChnge, there are three directories (to see them, hold down Shift while double-clicking <Select> on the !CallChnge filer icon):-

**Docs:** documentation directory with the following files:

| | |
|---|---|
| DataFormat | Describes the format of the data file for storing call changes (see section: *Format of data file for storing changes*) |
| Intro | An introduction to church bell ringing |
| Pitch | How to correct the pitch of the sound. This is especially important if you are using the program on VirtualAcorn |
| Strokes | A !Draw file showing the two strokes used in church bell ringing |
| TryThese | An introduction to call changes you can try |

**Resources:** directory of data used by the program

| | |
|---|---|
| churchbell | Sound sample of church bell |
| D16/spr | Animation sprites defined for 16 colours |
| Options | users settings stored from one session to the next |
| pitch | change from standard pitch *(see Docs.Pitch) |
| Templates | window definitions |

**Examples:** directory of examples of call change sequences which you can play back:

PlainHunt5   One lead of Plain Hunt Doubles (full blow for each change)
Queen16   Rounds to Queens and back for 16 bells in 14 multiple calls
Queen8   Rounds to Queens and back for 8 bells in 12 single calls
Titum6   Rounds to Tittums and back for 6 bells in 6 single calls
Titum8   Rounds to Tittums and back for 8 bells in 6 multiple calls
Whit6   Rounds to Whittingtons and back for 6 bells in 10 single calls
Whit12   Rounds to Whittingtons for 12 bells in 12 single calls

# Program Running Instructions

This Desktop program shows an animated set of Church bells with their ringers and allows users to practise *Call changes* to improve their listening skills and change the order of ringing of the bells. It is intended for those who are learning to ring or devise new calling sequences; it follows the usual conventions and phrases used in the tower.

Start the program by double-clicking on the :ICallChnge icon to load an icon on to the icon bar. The program detects the screen mode of your desktop because it requires at least a16 colour mode. Although it may run in other modes, the bell wheels might look oval.

Click <Menu> over the icon on the icon bar to see 3 options:

**Call Change**

Info    displays a small window with program details
Help    displays a window mostly with running instructions
Quit    stops the program

Click the <Select> mouse button over the icon on the icon bar to see the main window with the running parameters which are saved between runs:
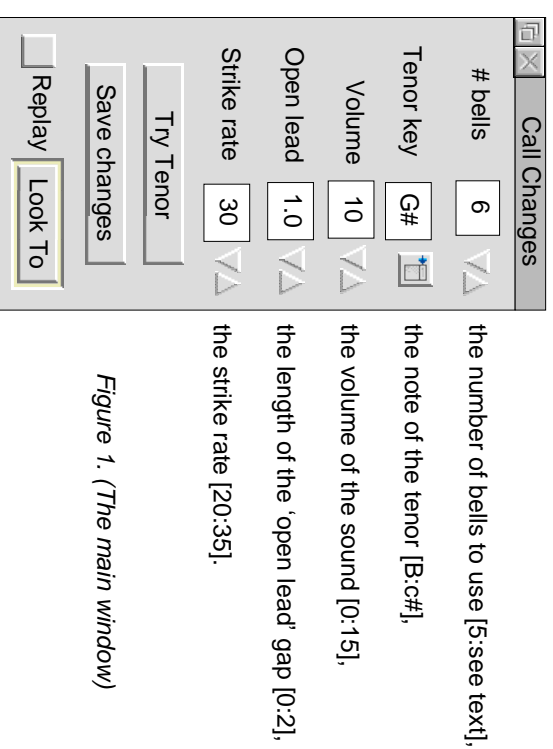
**Call Changes**

| # bells | 6 | ◁▷ |
| Tenor key | G# | |
| Volume | 10 | ◁▷ |
| Open lead | 1.0 | ◁▷ |
| Strike rate | 30 | ◁▷ |

Try Tenor
Save changes
Look To
Replay

the number of bells to use [5:see text],
the note of the tenor [B:c#],
the volume of the sound [0:15],
the length of the 'open lead' gap [0:2],
the strike rate [20:35].

*Figure 1. (The main window)*

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**# bells** allows you to change the number of bells by clicking <Select> on the 'up' or 'down' arrows, or <Adjust> will change it the other way. The minimum number of bells is 5 because the program performs changes by waiting until the two bells to be swapped are both vertical between back- and handstrokes and then interchanges them. This only happens for 5 or more bells; with fewer bells two adjacent bells are never vertical at the same time. (We may be able to use fewer bells if enough people ask for it, but we started with 5 because you cannot make as many different changes on 4 bells.) The maximum number of bells depends on the number of pixels across the screen since the images are set 64 pixels apart; to use 16 bells you need a screen width of 1024 pixels.

| mode | screen width | max. number of bells |
|---|---|---|
| 27 | 640 | 10 |
| 31 | 800 | 12 |
|  | 1024 | 16 (absolute maximum) |

Changing the pitch of the ring. Click on the icon next to **Tenor Key** to see the range of possible keys expressed in musical notation. Select the one you want which should then appear in the small icon to the left.*

Click on the arrows next to **Volume** to change the volume of the sound (Maximum 15, Minimum 0 ) Asking for zero volume will cause a warning message: *The bells are silent with volume=0*, this can be useful if you are checking your calling sequence and do not want to annoy others around you.

Click on the **Try Tenor** button towards the bottom of the window to hear the sound.

Click on the arrows next to **Open lead** to change the pause before the first bell's hand stroke. Values from 0 to 2 in steps of 0.2 are allowed. The standard open lead has a value of 1 meaning there will be pause of one blow before the handstroke. Closed leads have a value of 0.

Click on the arrows next to **Strike rate** to change the speed of ringing. Values of 20 to 35 are allowed. A strike rate of 30 means that 30 rounds are rung in a minute and is about normal for six bells. For 12 bells the normal rate would be about 25 per minute.

**Save changes** and **Replay** are described later.

Click on **Look To** to start the animation which takes place in a special ringing window which cannot be moved; it takes all the Wimp time so that the ringing speed is not affected by other Wimp activities which might have been taking place.

* See page 11 for how to make minor adjustments to the pitch.

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In *Call Changes* the two bells which are going to swap their position in the order do so when they are both about to ring at *handstroke*; hence a sequence always sounds twice, the *handstroke* then the *backstroke* in the same order and will continue with the same sequence in pairs until a new change is *called*.

The ringing starts half a second after the ringing window is set up.

One *whole pull* (two strokes) is rung before you can make any changes. This simulates the time needed in a tower for the ringers to settle down and correct their striking. Watch the ringers hands perform a 'Mexican Wave' as they ring the hand and backstrokes. Ringing stops at the end of a backstroke after you have clicked over the word *stand*.
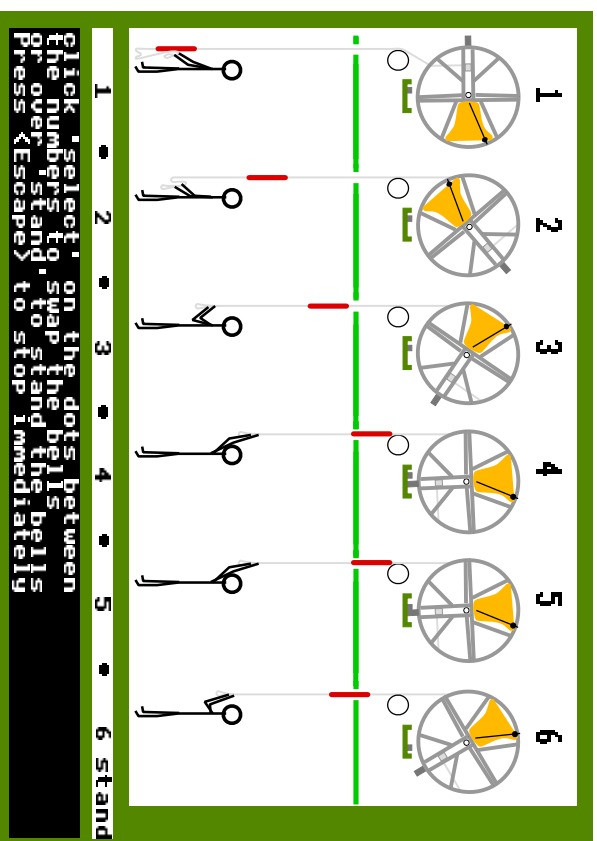


*Figure 2. (The ringing window)*

```
Click 'select' on the dots between
the numbers to swap the bells
or over 'stand' to stand the bells
Press <Escape> to stop immediately
```

1 • 2 • 3 • 4 • 5 • 6 stand

At the top of the window your ringers and their bells are ready to start ringing rounds; in this simulation, for simplicity all the bells and their wheels are the same size although they each have a different pitch; in a real tower the higher pitched bells are smaller with correspondingly smaller wheels. Instructions telling you how to change the order of ringing are at the bottom of the green ringing window.

A line of bell numbers is shown just below the ringers. Click with the <Select> mouse button near the dot between the bells which you want to swap at the start of the next handstroke. You can make more than one change at a time by clicking near the dots of more than one pair from left to right; e.g. click between 2•3 and 4•5. Each bell can be involved in only one of these changes.

After making your changes, click over the word 'stand' to stop the ringing. When all the graphics and sound have stopped you can click on the 'Close' icon of this ringing window.

Press the <Esc> key in an emergency and the ringing window will immediately disappear.

The grey button at the bottom left in the main window (Figure 1.), **Replay**, is used to play back a composition after it has been made: <Select> *Replay* to put a tick in the box, then click over *Look To*.

*With Replay selected the stored sequence will be followed; otherwise you are expected to 'call' your own sequence as you go along.*

When replaying a composition, the bottom of the ringing window has a white background, the first line has the number of stored changes and the second simulates the 'calls' made in the tower.

The button **Save Changes** is initially 'greyed out', it can only be used after you have made a composition with some changes; it will not save just rounds. After ringing some changes, save your composition to a file by clicking over *Save Changes* to bring up a 'Save' window with a file icon which can be dragged to a filer window in the usual way.

To replay a previously saved composition, drag its filer icon to the main window (or to the icon-bar icon). This overwrites any stored changes you may have just made. The number of bells parameter will be changed to those used when you saved the composition.

The format of the saved file is described with an example in the section 'Format of data for storing changes'; it is a text file which can be edited to make new compositions or taken to the tower to remind you what to call.

**Making minor adjustments to the pitch of the ring**

The key of the tenor (as shown in the *Tenor key* box in the main window) may vary slightly depending on the computer you are using.

You can compensate for this by changing the text file 'Resources.pitch' within the application.

It contains one number defining how much to sharpen the note. A value of +(-)341.3 theoretically sharpens (flattens) it by one semitone.

# Some Call Changes you can try

**Rounds**

This is the name given to ringing the bells in order from the highest to the lowest note, and is how all ringing begins and usually ends. The bell ropes in a tower are usually arranged in a circle so that all the ringers can see each other, but the sequence order is written in a line.

For six bells, *Rounds* is written out as *1 2 3 4 5 6*.

**Queens**

You can swap the order of the bells by clicking with the mouse between the numbers in the line below the ringers, shown by the X in the text below. Only the 'inner' bells on the line swap, and it does not matter whether you swap 2 and 3 or 4 and 5 first.

Start in rounds *1 2 3 4 5 6*

```
           X         swap 2 and 3
gives  1 3 2 4 5 6
             X       swap 4 and 5
gives  1 3 2 5 4 6
           X         swap 2 and 5
gives  1 3 5 2 4 6 .
```

This is called *Queens*, because it is thought that Queen Elizabeth I heard the bells of St. Michael's, Cornhill ringing in this sequence and liked it very much. Usually the sequence of changes will be reversed to get back to rounds before the ringers *stand* their bells. So to get back to rounds from Queens you reverse the changes: swap 5 and 2, then 5 and 4, then 3 and 2.

Queens on 8 bells is the sequence *1 3 5 7 2 4 6 8*.

Try making this for yourself with !CallChnge, and see what is the minimum number of changes it needs.

**Tittums** (ti-tum-ti-tum-ti-tum)

on 6 is *1 4 2 5 3 6*

on 8 is *1 5 2 6 3 7 4 8*

on 12 is *1 7 2 8 3 9 4 0 5 E 6 T*

(0 represents bell 10, E bell eleven, T twelve).

These are the more popular named changes, others are: Back rounds, Whittingtons, Roller Coaster, and Weasels. Their sequences are given below for various numbers of bells.

**Back Rounds** (or nearly)

The tenor (the heaviest bell with the lowest note) may be at either end of the sequence; the ends are called *front* (the first one to ring) or *back*, the last one to ring. Thus:

on 6 it is *6 5 4 3 2 1* or *5 4 3 2 1 6*

on 8 it is *8 7 6 5 4 3 2 1* or *7 6 5 4 3 2 1 8*.

Tradition has it that in time of war bells rung in this fashion were a signal that the country had been invaded.

**Whittingtons**

This is the sequence which Dick Whittington (and his cat) is said to have heard on his way out of London where he had gone to seek his fortune and finding it more difficult than he had expected was on his way home; when resting on Highgate Hill he heard the 12 bells of St Mary-le-Bow, ringing:

*5 3 1 2 4 6 E 9 7 8 0 T* ( 0=bell 10 E=eleven T=twelve)

which he thought were saying to him:

Turn A- gain Whit-ting-ton Thrice Lord Mayor of Lon-don
5 3 1 2 4 6 11 9 7 8 10 12.

On 6 it is: *5 3 1 2 4 6* and on 8: *1 2 7 5 3 4 6 8*.

On 10 there are 2 possibilities:

*3 1 2 4 9 7 5 6 8 0* or *1 2 9 7 5 3 4 6 8 0*.

**Roller Coaster**

Some say only works well on 10: *3 2 1 6 5 4 9 8 7 0*.

Others say they like it on 8:

as *3 2 1 7 6 5 4 8* or *4 3 2 1 7 6 5 8* or *3 1 2 4 7 5 6 8*.

**Weasels** only exists on 5 and is the only change that has to be struck badly to sound right; it is *1 4 2 3 5*, but for best effect should be rung *1-4-23-5* so it may not sound right in !CallChnge where you cannot alter the timing at which one bell sounds relative to the next. The name comes from the last line of the nursery rhyme:

*Pop Goes the Wea- sel*
1   4   2 3   5.

You can read more about change ringing and the origins of these names in Steve Coleman's useful book:

*The Bellringer's Bedside Companion* published in 1994;
ISBN 0 9523896 0 6.

Michael Williams list of Call Changes has more interesting sequences to ring:

*http://www.campanile.co.uk/maw/callchanges.html*

## Format of data file for storing changes

This is an ASCII Text file

| | |
|---|---|
| Line 1 | The number of bells followed by the word "bells", optionally followed by the number of extra rounds to be rung at the beginning. |
| Line 2 | The first change defined in the "Ringing Up" method: "2-3" means that 2 and 3 swap places with 2 now following 3 this is usually called 'two to three' in the tower. Any number of compatible changes may be called at once, e.g. "2-3,4-5,6-7". The "calls" may be followed on this line by the number of extra times this change is rung. |
| Line 3+ | Similar to line 2 and so on until …. |
| Last line | The word "stand" |

Some examples are stored in the directory 'Examples' within the !CallChnge application.

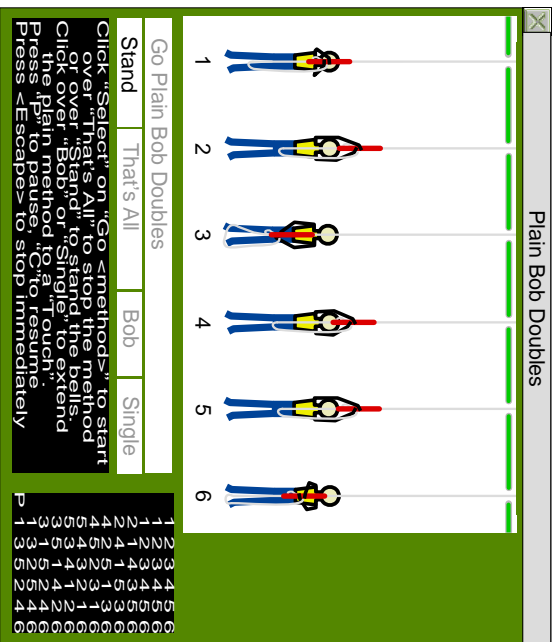Example of 6 bells moving to Queens with 2 extra Queens changes at the end:

```
6 bells
2-3,4-5
2-5 2
stand
```

Drop one of the example files supplied in the Examples directory into the main window (Figure 1) to hear what these changes sound like.
'Queen8' rings rounds to Queens on 8 bells and back to rounds.
'Tittum6' rings rounds to Tittums and back on 6 bells.

Have you tried our !Methods program? A demo version is on our web site:
*http://fortran.orpheusweb.co.uk/Bells/* (follow the links through 'RISCOS').

Plain Bob Doubles

| Plain Bob Doubles |  |  |  |  |
| --- | --- | --- | --- | --- |

1    2    3    4    5    6

Go Plain Bob Doubles

Stand     That's All     Bob     Single

```
Click "Select" on "Go <method>" to start
or over "That's All" to stop the method
Click over "Stand" to stand the bells.
Click over "Bob" or "Single" to extend
the plain method for a "touch".
Press "P" to pause, "C" to resume.
Press <Escape> to stop immediately
```

```
P 112233445566
  121324354655
  213142536446
  233415254625
  314352413566
  135524126466
```

We are always pleased to receive your comments and suggestions for
further programs:

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