STRINGING

A Ringing Program for
RISC OS machines

by
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assisted by
Kate & David Crennell

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AUTHOR'S NOTE

Stringing, a program for producing ringing diagrams with sound, was originally written for the BBC Micro and the Acorn Electron in 1983. Its present updated manifestation for RISC OS machines owes much to the kind endeavours of Kate and David Crennell who modified the program to run on RISC OS, improved the programming style and added 'real church bell' sound with synchronised striking. To this I have added the facility to connect a dumbbell or ring a bell from the keyboard, which can be both fun and challenging – as well as being excellent for developing a good ear and a good sense of rhythm.

Stringing is not aimed specifically at any particular section of the Exercise as it has something to offer a wide range of inclinations and abilities. However, it does have potential as a training aid and for this reason I have included a section towards the back of the booklet for those in the early stages of change ringing. Even so, using Stringing does assume some basic knowledge of the origins and principles of bell ringing. A brief resumé is included in this booklet but the following programs are highly recommended to those new to the Art (and those not so new!):-

Bells and Bellringing by the late Ann Parmenter, a multimedia general introduction to ringing, excellent for tower 'Open Days' (PC version also available).

CallChnge by David Crennell. Rings call changes with animated ringing, complete from ringers to bells and wheels.

Methods by David Crennell. Rings methods with animated ropes and ringers.

Visit http://fortran.orpheusweb.co.uk/ for details of these programs.

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For those new to the Art and Science of Change Ringing:-

APPENDIX

INTRODUCTION

Stringing can be used for:-

🔔 Learning the 'blue-line' for new methods.

🔔 Studying the structure of methods and observing in action what happens at bobs and singles.

🔔 'Ringing' a bell from the keyboard or, with suitable additional equipment, from a dumbbell or silenced tower bell, helping to develop a sense of rhythm and the ability to 'hear one's bell'.

🔔 Practising calling and splicing.

🔔 Enjoying the sound of perfectly struck ringing

Ringers with limited experience are particularly invited to pay attention to pages 19 et seq before using the program.

Present Features

- Over 150 stored methods, from 3 to 12 bells.

- Other methods can be rung by entering the 'place notation' at the keyboard.

- 'Blue line' displays with synchronised striking.

- Facility to ring a dumbbell or ring one bell from the keyboard.

- Option to save a touch to file for subsequent printing.

It is hoped to develop Stringing further into a proper WIMP program. Progress on this and on other improvements in a growing 'wish list' will depend on the degree of interest shown.

Wish List of possible future improvements

Option to save directly to the file of stored methods a place notation entered at the keyboard.

INSTALLATION

Stringing has been tried and found to work satisfactorily on the following machines:-

    IYONIX pc*
    StrongArm RiscPC running OS 3.7 and 4.02
    RiscPC600, running OS 3.7
    A7000 running OS3.6
    A5000 running OS3.1
    A440/1 fitted with Arm3 upgrade and running OS 3.1
    Virtual Acorn and Virtual RiscPC on a PC*
    Raspberry Pi

Stringing may also run on earlier or slower machines but the striking may be irregular on complicated methods.

You can run Stringing from floppy disc by double clicking on the !Stringing icon. Alternatively you can first install it on hard disc by dragging the icon to the directory of your choice.

Although !Stringing is not a Desktop program, it does detect the graphics mode in which the desktop is running, and uses that for its displays. This means that, for example, changing from 800 x 600 pixels (the preferred mode) to 640 x 480 will make the characters significantly bigger. (There is a small price to pay for this enlargement – the 'fit' of changes is not quite so good and a touch longer than 74 leads will corrupt the screen display). On the A400 series the screen mode should be set to mode 27 if using a multi-scan monitor; if not use mode 12 or 15.

Stringing relies on the presence of ColourTrans version 1.57 or later for correct display of the chosen colours. (ColourTrans is found, typically, in !System.310.Modules.Colours). In the rare event of the module being missing or unseen the program will stop with an appropriate error message.

The dumbbell option is not available on the IyonixPC or on PCs running Virtual Acorn or Virtual RiscPC

RUNNING

Double click on the !Stringing icon with the mouse select button.

The program should be reasonably self-explanatory when loaded. Most of the input statements are protected against invalid data but you are not totally protected against your own folly!

Inevitably there are questions to be answered before ringing can start. With practice, this is soon only a brief chore, particularly as the Return key can be used to select the default options.
[If you want a quick demonstration and haven't the time or inclination to read further, then Press any key, type 109 and Return, Return, Return, Return, Return, Press N. To finish early press Escape.]

Initially you will be invited to choose from the 150+ methods on the menu or enter a place notation (See also PLACE NOTATION p.10).

[There is also the option to ring a dumbbell as a single bell for demonstration and training purposes and to check the striking point.]

Once the method has been established, you will be asked whether you wish to enter a touch in advance, in which case you will be asked for the composition (see TOUCHES, p.10). You will then be asked for details of the display format you require (see DISPLAYS, p.12) and whether you wish to ring a bell from the keyboard or ring a dumbbell or silenced tower bell.

Ringing will commence with Rounds, of which only the backstroke will be permanently displayed on screen. Ringing will finish with the row of Rounds with which the ringing comes round* (in the case of a multi-part touch entered in advance or loaded from file ringing will continue until Rounds occur in the final part). When ringing a dumbbell there will be an extra whole pull of Rounds before the bells stand. In the absence of Rounds, ringing will continue indefinitely until Escape is pressed.

This can be a problem if it is desired to call a multi-extent touch or quarter peal 'live' at the keyboard. To get round this first enter a multi-part 'touch' of plain courses, the parts corresponding in length to the parts of the touch.

STORED METHODS

The stored methods file accompanying the program currently includes:-

'SINGLES':
Plain Hunt
Stedman

MINIMUS:
Plain Changes on 4*
Plain Hunt
Plain Bob
Double Bob
Canterbury Place
Single Court
St. Nicholas
Oxford TB
Stedman
Stedman (alt.version)

DOUBLES:
Eight and Forty*
Cambridge 8 & 40*
Twenty all over *
60 on 3rds
Plain Hunt
Plain Bob
April Day
Bastow Little Bob
Huntspill Bob
Julie McDonnell Bob
New Bob
Rev. Canterbury
Shipway Place
Twineham
Union Bob
Winchendon Place
All Saints Bob
St. Alphage Bob
St. Hilary's Bob
St. Martin's Bob
St. Nicholas Bob
St. Osmund's Bob
St. Remigius Bob
St. Simon's Bob
Stedman Slow Course
Grandsire
Antelope

Carter's Principle
Cloister
Erin
Stedman
Crambo

MINOR:
Plain Hunt
Original
Plain Bob
Little Bob
Double Bob
Ashford Little Bob
Bastow Little Bob
St. Clements Bob
St. Simons Bob
Single Court
Double Court
Single Oxford Bob
Double Oxford Bob
Double Stedman
Amersham Alliance
Perivale Alliance
Kentish Delight
Southwark Delight
College Exercise TB
Kent Treble Bob
Killamarsh Treble Bob
Oxford Treble Bob
Alnwick Surprise
Annable's London S.
Beverley Surprise
Bourne Surprise
Cambridge Surprise
Canterbury Surprise
Carlisle Surprise
Chester Surprise
Durham Surprise
Hull Surprise
Ipswich Surprise
London Surprise
Netherseale Surprise
Norwich Surprise
Primrose Surprise

Rossendale Surprise
Surfleet Surprise
Warkworth Surprise
Wells Surprise
Westminster Surprise
York Surprise

TRIPLES:
Plain Bob
New Bob
Bob Minor (middle 6)
Canterbury Pleasure
St. Edmundsbury Bob
St. Martin's Bob
St. Simon's Bob
Middlesex Bob
Mortimer
Grandsire
Reverse Grandsire
St. Clement's Bob
Union
College Bob
Single Court
Double Court
Single Oxford Bob
Double Oxford Bob
Hereward Bob
Erin
Cloister
Stedman

MAJOR:
Plain Bob
Little Bob
Gainsboro' Little Bob
Single College Bob
Single Oxford Bob
St. Clements Bob
Double Norwich CB
Duffield
Albion Treble Bob
Fifty Treble Bob
Kent Treble Bob
Oxford Treble Bob

Burnopfield Delight	Tavistock Surprise	Lincolnshire Surprise
Cooktown Orchid Del.	Trafalgar Surprise	London Surprise
Hurstpierpoint Del.	Ullesthorpe Surprise	Pudsey Surprise
Ireton Delight	Uxbridge Surprise	Rutland Surprise
Shoreham Castle Del.	Warnham Surprise	Superlative Surprise
Sussex Delight	Watford Surprise	Swindon Surprise
Ashstead Surprise	Wembley Surprise	Yorkshire Surprise
Belfast Surprise	Winchester	Brave New World
Bristol Surprise	Xerxes Suprise	Warnham Little Surpr
Cambridge Surprise	Yass Surprise	Warnham Park Surpr.
Cassiobury Surprise	Yorkshire Surprise	Winchester Surprise
Chichester Surprise		
Christchurch Surprise	CATERS:	CINQUES:
Cornwall Surprise	Plain Bob	Grandsire
Deva Surprise	Grandsire	Erin
Ealing Surprise	Double Norwich C.B	Stedman
Fordcombe Surprise	Erin	
Fluospar Surprise	Stedman	MAXIMUS:
Glascow Surprise		Plain Bob
Lessness Surprise	ROYAL:	Little Bob
Lincolnshire Surprise	Plain Bob	Kent Treble Bob
London Surprise	Little Bob	Bristol Surprise
Kneesworth Surprise	Kent Treble Bob	Cambridge Surprise
Norwich Surprise	Oxford Treble Bob	Londinium Surprise
Pudsey Surprise	Bristol Surprise	Newgate Surprise
Rutland Surprise	Cambridge Surprise	Orion Surprise
Superlative Surprise	Isleworth Surprise	Yorkshire Surprise

The opportunity has been taken to include several of the earliest methods ever rung – 'The Plain Changes on four bells', 'The Twenty all over', 'An Eight and Forty' and 'Cambridge Eight and Forty'. All four are included in Richard Duckworth's *Tintinnalogia*, published by Fabian Stedman in 1668. The latter three were described as:-

> "old Peals on five Bells, which (though rejected in these days, yet)
> in former times were much in use ... Cambridge Forty-eight, for
> many years, was the greatest Peal that was Rang or invented... ".

Including them in Stringing provides an opportunity to hear the sort of change ringing one might expect to have heard in the fledgling years of change ringing in the first quarter of the 17th century. '60 on 3rds', still rung in call change towers, makes an interesting comparison.

[In Stringing these methods are for convenience included under Minimus or Doubles. This is not strictly correct as they are only single-change methods].

PLACE NOTATION

Methods not on the menu can be rung by entering the place notation. This can be the notation for either the whole lead or, where appropriate, the half lead, in which case the program will reverse the notation to complete the lead. Lead-end places at plain leads and at calls are entered separately allowing, for example, choice of 4th or 6th place Bobs.

A notation entered at the keyboard will be saved to file 'PNotn*methodname*', from where the data can be dragged to the stored methods file if desired for future use. See under ALTERING THE METHOD FILE, p.15.

COVER

Methods on 5 changing bells or less can be rung with or without a covering bell.

TOUCHES

A touch can be entered at the keyboard (in P,B,S ... format) and rung and/or saved to an !Edit file for later re-use. Touches can also be written direct in !Edit (remembering to include a carriage return after the last call). Saved touches are stored in the directory 'callings' which can be found by holding down Shift and double-clicking on !Stringing. A few sample touches will be found in the directory, including '1260ST' (a simple quarter of Stedman Triples) and '40320', the extent of Plain Bob Major as rung in July 1963. Touches can be entered in up to 12 parts, of equal or unequal length, with maximum of 255 leads in each part.

A touch can also be called 'live' by pressing P, B or S as required. Calls can be made at any time during the lead, up to the normal calling position, and will over-ride any calls programmed in advance. A late call made after a lead-end has begun will be briefly displayed but ignored,

Calls entered at the keyboard will be displayed at the foot of the screen against 'Key'. Up to four characters will be displayed (to allow for a method number as well as a call). The 'rightmost' P, B or S will be the one actioned as the call.

An incorrect call can be cancelled by pressing the space bar; the correct call

can then be made. An incorrect call can also be superseded just by pressing P, B or S as required but this will corrupt any change of method number entered before the call. If a mistake in calling is made when ringing spliced it will be safest to re-enter the method number and the call.

Should a touch be accidentally miscalled, all is not totally lost – see under FRESH START? (Y/N), p15.

Examples of simple touches:-

120	Plain Bob Doubles	PPPBPPPBPPPB
120	Grandsire Doubles	BPBPSPBPBPSP
120	Stedman Doubles	PPPPPPPPPS
120	Plain Bob Minor	BPPPBBPPPB
139	Grandsire Triples	PPSBPBBPPP
144	Stedman Triples	SPPSPPPSBBBPSPPSPPPSBBBP
160	Plain Bob Major	BPPBBBPPBB

SPLICING

Lead-end splicing is possible between compatible methods rung on the same number of changing bells (excluding principles and methods stored as principles). A change of method is selected by typing the required method number, from the menu, at any time during the latter part of the lead and before the start of the lead-end (i.e. slightly earlier than in the tower). An invalid method call, e.g. to a method on a different number of changing bells, will be ignored. As in the tower, any call for Bob or Single must be entered before a change of method.

It is only possible to splice methods already stored in the program, though a method entered by typing in the place notation directly can be used as the first in a spliced touch.

When entering a method change, the keys should be pressed positively but fairly briefly. The autorepeat delay on the keys has been extended slightly but if keys are held down excessively there is still a risk of instructions being misinterpreted, e.g. '1' being misread as '11'.

Changes of method entered at the keyboard will be displayed at the foot of the screen against 'Key'. Up to three characters will be displayed (to allow

for a call as well as a method). Remember that any call for Bob or Single must precede a change of method, e.g. S22. If a method number is entered incorrectly and re-entered it will be necessary to repeat any call for P,B or S.

DISPLAY OPTIONS

Display 'C': Two bells, according to choice, are displayed in red and green and the rest in white, on a black screen.

Display 'W': All the bells are displayed in 'black on white' (actually dark grey on an off-white ground) with a red line through the path of one bell and a blue line through the path of another, according to choice.

In displays 'C' and 'W':-
1. The Return key may be pressed instead of entering a bell to be displayed in colour. This will select the default bell – the treble for the first choice and the last changing bell for the second. Alternatively, selecting a number two greater than the number of changing bells will suppress the colour/line.*
2. The changes do not scroll up the screen but fill the screen and then start overprinting from the beginning, with a blank space to separate changes being rung from those rung previously. The number of changes rung and the number of leads completed are also given.
3. The composition entered (if any) will be displayed, provided it is less than 60 leads long. The actual lead-ends rung (i.e. P, B or S) will be displayed up to the first 154 leads. These limits of 60 and 154 are set to prevent the screen layout from being corrupted when in a 640 x 480 display. Note that the full composition, and actual touch rung (up to a maximum of 476 leads), can be reviewed, after 'Escape' or completion, by selecting the FRESH START? (Y/N) option.
4. The option will be offered to ring a bell from the keyboard or ring a dumbbell, if connected. See also under KEYBOARD RINGING below. *Note that if you elect to ring a dumbbell or bell from the keyboard, that bell will automatically over-rule a default choice for blueline bell.

Display 'S': This is a scrolling format, useful when printed output is required – the changes can be saved to an !Edit file in the 'results' sub-directory. The results directory will be found by holding down SHIFT and double-clicking on !Stringing. The process will be very much faster if the 'without Sound' option is chosen.
[There is at present a known problem with spliced ringing. A change of method will stop changes being printed to file.]

KEYBOARD AND DUMBBELL RINGING (to a method)

With displays 'C' and 'W', one bell can be sounded from the keyboard or by a dumbbell (or silenced tower bell) linked to the computer by suitable sensing and interface equipment (See APPENDIX).

With the keyboard option the computer sounds all the bells for one whole pull of Rounds. The method then starts and the chosen bell sounds only when key Z or key K is depressed. Note that in the present version live calls for Bob, Single and changes of method are likely to be ignored, if ringing a bell from the keyboard.

With the dumbbell option, ringing is started by turning over the dumbbell. After a whole pull the other bells join in at approximately the correct time, the ringer then adjusting the speed of the dumbbell as necessary. Two pre-selected means are provided for starting into changes. With option 'P' rounds continue indefinitely until the 'G' key is pressed (and held down briefly). At the next handstroke display the call to start the method will be displayed and the method will commence at handstroke a whole pull later in the normal way. With option 'A', the default option, the method starts after 5 whole pulls of Rounds unless Key 'G' is pressed to force an earlier start.

SOUND and PITCH

The Sound is provided by a built in digitised recording of a church bell, set initially in the key of C. The key and volume can be adjusted during ringing – see under USE OF SPACE BAR below. In display 'W' the tenor note is displayed at the foot of the screen.

SPEED

Except when ringing a dumbbell, the program sets the initial speed of ringing according to the number of bells being rung, ranging from approximately 44 changes per minute on four bells to 22 changes per minute on twelve. However, when ringing a dumbbell the initial speed is set, on all numbers of bells, at 33 changes per minute to suit a typical mini-dumbbell. In either case the speed can be varied during ringing – see under USE OF SPACE BAR below. In display 'W' the speed in changes per minute is displayed at the foot of the screen.

PAUSE

Pressing CTRL and SHIFT together will halt the program. Carefully releasing SHIFT while holding down CTRL will display and sound individual bells.

USE OF SPACE BAR

The volume, pitch and speed can all be altered during ringing by holding down the SPACE BAR and pressing keys as follows:-

Volume:
SPACE plus cursor left arrow (quieter) or
cursor right arrow (louder)
Pitch:
SPACE plus cursor up arrow (higher) or
cursor down arrow (lower)
Speed:
SPACE plus < (slower) or
> (faster)

Note that use of the space bar on its own or in conjunction with other keys as just described will cancel any change of method or call entered 'live' for the next lead-end. The instructions will need repeating when the alterations have been completed or halted. Any call programmed in advance will not be affected.

GO AGAIN? (Y/B/N)

After ringing has ended, whether through reaching Rounds or by pressing Escape, the 'GO AGAIN? (Y/B/N)' option will be displayed. Pressing 'Y' offers an exact repeat, i.e. the last method rung, complete with display choice, bells in colour, chosen keyboard or dumbbell bell, and previous composition (as entered in advance, not as called live from the keyboard). Pressing 'B', offered only if the previous run had been with a keyboard or dumbbell bell, provides the option to change that chosen bell. In all other respects the first run choices will be preserved. If 'N' is pressed, 'FRESH START? (Y/N/S)' will be offered.

FRESH START? (Y/N/S)

FRESH START should be used for anything other than an exact repeat. **Pressing key Y** provides various options to review and repeat the touch just rung. The repeat facility, for example, can be used to allow the computer to repeat a miscalled touch up to the point where the mistake occurred. The option will also be offered to ring a new method.

It is also possible to review and vary the place notation. This facility can be useful for correcting a notation entered incorrectly or for varying the notation of one of the methods stored in the program. For example, Cambridge Maximus with a 6ths place Bob could be rung by selecting the method from the menu, starting the method, using 'Escape' to access the FRESH START options, keys 6 and 7 to copy the original in-lead notation as the new version and then entering a different place Bob.
(It is not possible to vary the in-six notation for Stedman with this facility, though the notation for Bob and Single places can be altered, except in Stedman Doubles).

Pressing key S allows the dumbbell to be rung as a single bell, striking the note of the tenor.

Note that the GO AGAIN and FRESH START options preserve any changes made to volume, pitch or speed during the previous run. The one exception is that when ringing a dumbbell any speed alteration is preserved only for GO AGAIN. Conversely, if the program is restarted by double-clicking on !Stringing, the volume, pitch and speed will revert to the preset values. At this stage of development the program will not recall or repeat changes of method. Any repeat will restart in the last method rung.

ALTERING THE METHOD FILE

Method data are stored in the text file 'methods', which can be found by holding down Shift and double-clicking on !Stringing. To add a new method, either enter the notation at the keyboard (see p.10 above) and drag the data from the saved file across to the method file or write direct to the method file. In the latter case, in particular, care is needed to identify the various fields, separated by commas, in the individual method definitions. The 17 fields, of which the last nine relate to principles such as Stedman, are as follows:-

Method title
Number of changing bells
Place notation for lead (this can be for either the whole lead or half a lead)*
Notation for Plain lead-end
Notation for Bob
Notation for Single
Whether the notation is for the whole lead or half a lead ('W' or 'H').
Whether a cover bell is required ('Y' or 'N')
for Principles:-
Notation for starting part 'six', if present (e.g. Stedman Triples)
Notation for first 'six'
Notation for second 'six' (if different from first)
Notation for Plain lead (end of 1st 'six')†
Notation for Plain lead (end of 2nd 'six')†
Notation for 'Bob' (end of 1st 'six')†
Notation for 'Bob' (end of 2nd 'six')†
Notation for Single (end of 1st 'six')†
Notation for Single (end of 2nd 'six')†

> †If there is only one type of 'lead-end', the notation for P, B & S may be stored either here or in fields 4,5 & 6. If there are two sixes and the 'lead-ends' are entered here they must be entered for both sixes, even if the same.

*Using the whole-lead notation avoids any risk of a hiccup at a change of method while the program reverses the half-lead. The notation is entered in standard form; lying-behind places may be omitted, unless necessary to define the method. Use O (or nought), E and T for 10, 11 and 12 respectively.

The following is an example of a stored method (Westminster Surprise Minor):-
6,X34X14X12X36X12X36X12X36X12X14X34X,12.,14.,1234.,W,N,,,,,,,,,,

where the elements, each followed by a comma, are as follows:-
Number of changing bells: 6,
Place notation for lead: X34X14X12X36X12X36X12X36X12X14X34X,
                                (if the final character is not an X, add a final
                                dot before the comma.)‡
Place notation for Plain lead-end: 12.,
Place notation for a Bob: 14.,
Place notation for a Single: 1234.,
Whether the notation is for a whole or half lead: W,
Whether a cover bell is required: N,
Other fields not required: ,,,,,,,,, (nine commas)

Adding a method in this form is not difficult and can readily be altered if a

mistake has been made. However, it does involve accessing the vital methods file. A spare copy of the file is supplied in directory 'reserve'!

Two-hunt methods are slightly more difficult to enter. The notation has to be that for the whole lead and two rows need to be set aside for the lead-end. For example, Oxford Bob Triples requires entering as follows:-

    Notation: 3.1.5.1.7.1.7.1.7.1.7.1
    Places at Plain Lead: 5.1
    Places at Bob: 3.1
    Places at Single: 3.123

As can be seen in the full list of fields above, the last nine fields are used for principles such as Stedman, which require special treatment. For example, Stedman Triples has been stored as a separate notation for each six, with a part six to start with. This approach lends itself well to altering the starting position in Stedman, by altering the part six to suit. It can also be used for other principles. For example, Erin Triples can be rung by entering the notation for Erin ("3.1.3.1.3.") as the first six, with "X" for the 'plain lead' and "." for the part six. This will allow even "Bob, Go Erin" to be rung.

The in-lead notations for methods which start with part-leads, such as Double Norwich Court Bob Caters, can also be usefully stored as principles. This approach can also work with awkward Variations. April Day and St. John the Baptist Doubles, for example, are single hunt methods rung with a Grandsire Single as the Bob. The notation for the 'Bob' effectively extends to the first row of the plain course. Such variations can be included in the method file by ignoring the field for the in-lead notation, entering instead the full plain lead notation as the notation for a part 'six' and the plain notation, less the initial row, as the notation for a first 'six'. St John' Doubles can thus be stored as:-

St. John the Baptist Bob,5,,5.125.5.,3.123.3.,3.123.3,W,Y,5.1.125.123.5. 123.125.1.,1.125.123.5.123.125.1.,,,,,,,

(There is at present a small known 'bug' in that with variations of this type the lead-end type is likely to be attached to all rows of the lead-end.)

‡Note that the practice in some publications of using X in Doubles methods to indicate just the bells in firsts and seconds swapping while the remaining bells stay still is not followed in Stringing. The logical notation '345' must be used.

PROGRAM NOTES

The program works by manipulating strings. Basically, each row is divided into two strings; an 'upstring' comprising the bells in odd positions and a 'downstring' comprising the bells in even positions. A string for the next row is then compiled by selecting alternately and in order from the down and upstrings. Where no place is to be made this procedure is applied to the whole row. Where a place or places are to be made, the program works progressively along a row applying the crossing procedure between places.

No particular programming merit is claimed for the approach adopted except that, undiscovered 'bugs' excepting, it does what is claimed of it.

KNOWN BUGS

Minor problems known about and awaiting attention:-
1. If ringing a bell from the keyboard, 'Live' calls and changes of method are likely to be ignored.

OTHER POBLEMS!

In case of difficulty, please write, telephone (01273 843718) or e-mail (jrn@orpheusmail.co.uk) for advice.

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FOR THOSE NEW TO THE
SCIENCE AND ART OF CHANGE RINGING

GLOSSARY OF TERMS

Frame - rigid wooden or metal structure supporting the bells.

Headstock - the short wooden or cast iron beam to which a bell is attached, having gudgeon pins at its ends rotating in bearings attached to the frame.

Wheel - flanged wooden wheel attached to the headstock, enabling the bell to be swung by means of a rope attached to the wheel.

Fillet or }- the hole in the sole of the wheel through which the rope
garter hole } passes to its fastening around the spokes.

Stay & Slider - a device for allowing a bell to be left at rest in the inverted position. A short vertical wooden post (the stay) projecting above the headstock engages with a pivoted wooden bar (the slider) moving between stops, when the bell is mouth uppermost.

Sally - the tufted woollen grip woven into the rope at the point where it is caught at the end of the backstroke. The origin of the name is uncertain but probably derives from the bobbing of the sally at handstroke, perhaps analogous to to sallying forth from a castle to make a surprise attack and retreat.

Tail end - the free end of the rope, usually turned back on itself for a short distance in a series of loops.

Full circle - the 'English' method of ringing in which the bell swings approximately 360° at each stroke, rotating from upside down to upside down.

Handstroke - the stroke of the bell which starts with the hands pulling down on the sally and ends with the hands above the head holding the tail-end.

Backstroke - the stroke of the bell which starts with the hands above the head and ends with the hands catching the sally.

Half pull - one stroke of the bell, either handstroke or backstroke.

Whole pull - two successive strokes of the bell, usually handstroke followed by backstroke.

Rounds - the bells ringing in order down the scale, represented on paper by numbers 'descending' from 1 (the treble or lightest bell) downwards, e.g. 12345678.

Row   - a row of figures representing the bells striking once.

Change/s   - literally the progression from one row to the next, but commonly used to describe the row itself.

Call Changes - a system of ringing in which the order in which the bells sound only changes on spoken command.

Leading   - the act of being being the first bell to ring in the order. For example, in Rounds the treble is leading.

Leading is normally 'open handstroke', i.e. there is a space after every backstroke equivalent to the interval between one bell and the next, e.g. `123456123456  123456123456`.

Covering   - the act of continually ringing last in the order, while the other bells are ringing changes. Methods on odd numbers of bells are usually rung with a covering bell, those on even bells without.

Inside   - a term used to describe bells other than the treble and the covering bell, if any.

Plain Hunting - working one's way through the bells a place at a time in successive changes, from being first to last (hunting 'up' or 'out') and last to first (hunting 'down' or 'in').

12345 The term 'Hunting' was in use from the earliest
21435 days of change ringing and is described in
24153 *Tintinnalogia*, 1668, thus:-
42513 "... the name of *Hunt* is properly given to it because
45231 of its continual motion up and down amongst the
54321 other *Bells* ... . Always observe, that when the *Hunt*
53412 moves from the foremost *Bell* towards the
35142 hindmost, then it *hunts* up ... but when it moves or
31524 *hunts* from the hindmost Bell, towards the Bell that
13254 leads, then it *hunts* down ... "
12345

Dodging   - a temporary change of direction, in which two bells briefly swap places,

35124
31524   e.g. in these changes the 5 steps briefly back in its
13254 hunting up path to dodge with the 2.
→ 13524   (As the dodging in this example occurs in 3rd and
31254 4th places while the 5 is hunting up and the 2 is
32145 hunting down, the 5 is said to be dodging 3-4 Up
23415 and the 2 to be dodging 3-4 Down)
24351

20

Making Places - a temporary stop in the hunting progress of a bell, in which it remains in one place for an extra blow or blows,

$\rightarrow$
35124
31524
13254
13524
31254
32145
23415
24351

e.g. in these changes the 2 is making 2nds place. (The term 'making places' is usually reserved for places made 'inside'. Although the treble is making firsts place this would normally be referred to as the treble 'leading').

Treble Bob } - A variation of plain hunting, in which the treble dodges in
   Hunting}   every available position, e.g.
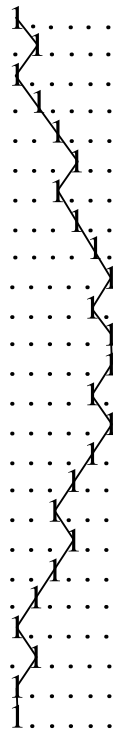
Method   - a pattern for producing continuous changes, in which the 'inside' bells follow the same course (but starting in different positions), while the treble has a simpler hunting path. Method names describe both the name of the method and the number of bells on which it is to be rung, e.g. Grandsire Doubles – the Grandsire method rung on 5 bells.

21

Names for the number of bells are:-

Minimus - changes on 4 bells

Doubles - changes on 5 bells

('Doubles' because at every change two pairs of bells change places, e.g.

```
12345
 x  x
21435
  x  x
24153 etc.)
```

Minor   - changes on 6 bells

Triples   - changes on 7 bells
               (Triples – 3 pairs change)

Major   - changes on 8 bells

Caters   - changes on 9 bells
               (Caters – 4 pairs change)

Royal   - changes on 10 bells

Cinques - changes on 11 bells
               (Cinques – 5 pairs change)

Maximus - changes on 12 bells

Principle	- a particular class of method in which the treble follows the same path as the other 'inside' bells. Pre-eminent among principles is Stedman.
Blue line	- the path followed by one bell through the others, traditionally printed in blue (red for the treble).
Lead end (lead head)	- the row in which the treble having hunted up to the back has hunted down to the front and returned to its starting point – the backstroke change in Rounds before the method commenced. The changes between one lead-end and the next are loosely referred to as a lead.
Plain Lead	- the change/s made at the lead-end if neither Bob nor Single is called. For a simple method, this may be the defining feature of the method. For example, Plain Bob comprises plain hunting, except at the lead end where the bell in 2nds place makes 2nds place and the bells behind dodge.
Bob	- a call which interchanges the places of three adjacent bells.
Single	- a call which interchanges the places of two adjacent bells.
Plain Course	- the changes that can be rung in a method before Rounds recur (assuming no Bobs and Singles are called).
Treble Bob } methods }	- Methods in which the treble follows a treble bob path.

Surprise } - Treble Bob methods in which "at least one internal place is
  methods } made at every cross-section" – *Standard Methods.*

Pricking (changes) - archaic term for writing out changes on paper.

Place Notation - coded way of representing a method.

Splicing - Changing method during ringing, usually at the lead end, frequently practised with Surprise methods.

Counting} - a vital means of remembering one's place in the changing
  places } order of the bells. For example, when ringing the treble to plain hunting on 5 bells one would count as follows:-

12345
21435   2nds (place; i.e. 2nd in the order)
24153   3rds
42513   4ths
45231   5ths
54321   5ths
53412   4ths
35142   3rds
31524   2nds
13254   Lead
12345   Lead

Ropesight - the art of being able to pick out which rope to follow. "It is the faculty of being able to pick out the bell which has to be followed that is the foundation of all change ringing." – *Ropesight*, J.W. Snowdon.

Striking - e.g. 'Good' or 'Bad': The regularity of the ringing – the evenness of the gap between the sounding of adjacent bells.
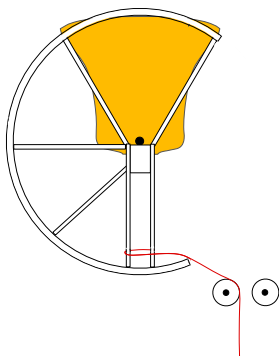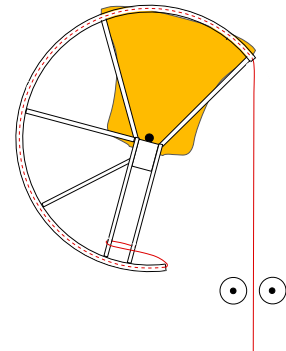
HISTORY

If history does not interest you or you think it is irrelevant feel free to skip this section but remember that the author at least thought it relevant or he would not have included it!

Bell hanging gradually advanced in the Middle Ages. The simple lever, attached to the 'head stock' supporting the bell, gave way in turn to the quarter wheel and then the half wheel as bells were swung through an ever greater arc. By the late sixteenth century, in the reign of Elizabeth I, bells were being hung with generous 'half wheels' allowing bells to be rung full circle.
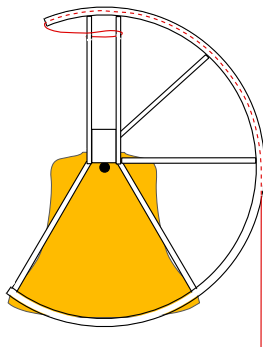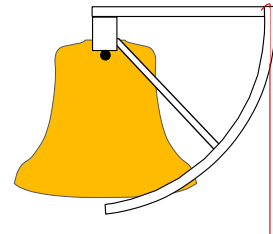
[The wheel depicted in these diagrams is intended to be generally indicative of wheel development c.1600, but not to be an exact representation of any particular wheel. Note that the final quarter of a full wheel serves to strengthen it and facilitate its construction in two halves; it is not used by the rope, as inspection of a worn wheel will show.]

There was a significant difference between the wheels of Elizabethan times and those used today. The rope was attached to the main vertical spoke at the top of the wheel. There was no 'hand stroke' as we know it. At one stroke, equivalent to 'backstroke' today, almost all the rope would have been around the wheel and a good pull would have been possible. At the other stroke there would have been no rope on the wheel – it would all have been at the ringer's feet – there would have been no bobbing of the rope and no means of helping the bell on its return stroke. The ringer could thus only control every other stroke. Rounds and simple variations in the order – Call Changes – would have been all that was possible. This would have been the situation when Elizabeth I is recorded as having heard the bells of St. Michael's Cornhill ringing in the order 135246 – known ever since as 'Queens' in recognition of her approval of the musical effect.

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Controlling a bell in this way would have been rather like ringing a bell up to just below the balance without touching the sally.

A great step forward then occurred. Whether by thought or happy accident it was discovered that by tying a cord round the rim of the wheel at the point where the garter hole is today the rope would bob as the point of attachment of the cord passed the lowest point – the bell would 'go on the sally'. The formerly uncontrolled return stroke became the 'handstroke' and for the first time full control of the bell at both strokes – hand and back – became possible. The scene was ripe for the development of change ringing.

Although the exact date of this discovery is not known – but almost certainly early in the 17th century – the development itself is clearly alluded to in *Tintinnalogia* where the author, in giving instructions for remedying odd-struckness, notes that:-
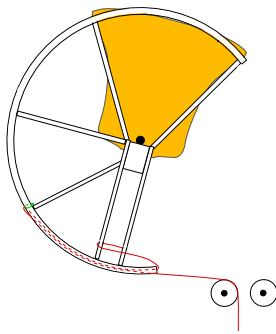
"... sometimes the fault of the stroke is in the Sally, which you may remedy by tying the Fillet (or little Cord about the rim of the Wheel, which causeth the dancing of the Rope) nearer or farther off the main Spoke ..."

The name 'garter' or 'fillet' hole, for the point where the rope now passes through the sole of the wheel, preserves the memory of this little cord.

The open handstroke lead

In most parts of the country it is the practice to ring with open-handstroke leads, i.e. after every backstroke there is a space equivalent to the sounding of one bell before the next handstroke, e.g. `123456123456 123456123456`.

The open lead is not just something created by whichever bell happens at that moment to be leading. It occurs because every bell is allowed to rise higher at the start of the handstroke than at backstroke. More time is spent after the moment of strike before the return swing begins and so the interval between the bell striking at backstroke and the next handstroke is correspondingly longer than the interval between hand and back. This difference is adopted by the average ringer without conscious realisation and passes unnoticed, except when listening to the lead. However, it is of

considerable significance in understanding when in change ringing the ringing rhythm changes at 'the front' and 'the back'.

[Readers unconvinced by this tortuous explanation can readily test it for themselves in Stringing. Choose a method on a small number of bells with a covering bell, say Grandsire Doubles, and tap out the rhythm of the tenor bell, counting the number of taps between handstroke and backstroke and between backstroke and handstroke. If desired the ringing speed can be reduced by holding down the space bar and pressing the < key.]

The reason for ringing with an open handstroke lead is uncertain. However, it may well go back to the days of half-wheel ringing in the 16th century where the bell was only pulled at 'backstroke' and so rose higher, and therefore more slowly, before returning.

Call Changes and early methods

At first sight there may seem to be little similarity between Call Changes, where the bells repeat the same order until a new change is called, and modern method ringing, where the order changes each time the bells sound. Historically, the gulf was not so great, as there was an evolutionary phase, now forgotten – the ringing of Plain Changes, where only one pair of bells changed places at each change. It must have been an obvious step to progress from call changes to a simple pattern of plain changes which could be memorised in advance. Plain Changes have long been obsolete but in them was established the principle of hunting, where one bell worked its way through the others a place at a time. The difference from modern methods was that typically only one bell plain hunted. Other bells were either 'half hunts' or 'extream bells'. The methods were constructed according to definite rules but there was no regular path rung by all the 'inside' bells as there is today. The changes could be made at every stroke or at every handstroke or they could be 'walked' – changes being made after several whole pulls, "which is commonly used by young practisers". Examples of plain changes have been included in the methods file.

Plain Changes were still rung at the time of *Tintinnalogia,* 1668, but were becoming obsolescent. 'Cross Peals' had arrived, Grandsire and Plain Bob among them.

RINGING CALL CHANGES

Though the ringing of perfectly struck Call Changes is a worthy art form in its own right, Call Changes are often practised by beginners as a step forward from Rounds.

Call changes have not been included as an option in Stringing. However, the following notes may be helpful when practising in the tower.

There are several ways of calling call changes, in each case the call being made at handstroke to take effect at the next handstroke:-

Calling up
    in which the pair of bells to change places are called,
e.g. '2 to 3' or just '23' to change from 12345 to 13245

Calling Down
    in which the bell moving down is called down to the bell which it is to follow.
e.g. '3 to 1' to change from 12345 to 13245

'Calling everything',
e.g. '2 to 3, 3 to 1, 4 to 2' to change from 12345 to 13245

Calling Down is sometimes preferred over Calling Up; it being thought slightly easier. However, any difference is marginal and Calling Up has two great advantages:-

1. It is historically the 'proper' way to do it and is the method used where Call Change ringing is practised 'seriously'
2. It preserves the understanding that two bells are to change places, by calling just the changing pair.

Points to remember when ringing Call Changes (calling-up method):-

1. If your number isn't called, your place in the order hasn't changed, even though you may now be following a different bell. So, keep ringing in the Rounds rhythm.
3. If your bell is the first of a pair called you are about to move up a place in

the order, so let the bell rise higher at the handstroke when you move up to follow the second bell called. (Then resume the Rounds Rhythm)

4. If your bell is the second of a pair called you are about to move down a place in the order, so check the bell slightly as you make the change, but whom do you follow? This is the one difficulty with the 'Calling Up' method.* The secret is simply always to be aware not just of which bell you are following but also which bell that is following. Then when moving down a place you will know whom to follow. For example, if you are ringing the 5 in the row 132456 be aware that not only are you following the 4 but also the 4 is following the 2. Then when, for example, the call '4 to 5' is made to effect a change from 132456 to 132546 you will know that you have to move down to follow the 2.

To assist a beginner in this situation a conductor may be tempted to supplement the call '4 to 5' by '5 to 2'. The author's personal practice when doing this (sparingly) is always to use the word 'follow' or 'after' in such a supplementary call, e.g. '4 to 5, 5 follow 2' so that the beginner never forgets that in the 'proper' call the first bell always moves up a place and the second bell always moves down.

*The 'Calling Down' method also has its hurdle, similar in difficulty.

(The last method – 'Calling Everything' has little to commend it. The beginner concentrates only on doing what he is told and loses all sense of the direction in which he is moving and the change of rhythm required. Good striking is impossible)

PLAIN HUNTING

Once a would-be change ringer can handle a bell proficiently in Rounds, and perhaps Call Changes also, depending on the practice of the tower, the next step is to acquire the gift of ropesight and learn to plain hunt.

Plain Hunting is the action of working one's way through the other bells a place at a time. It is basis of all method ringing. Once you have acquired ropesight and the ability to plain hunt there is nothing, given ordinary intelligence and good health, that you can't achieve by practice and application.

There's no complete substitute for the real thing and Stringing can't on its own teach you ropesight. Nor can it entirely replace the value of traditional paper and pencil. However, unlike pencil and paper it is dynamic and it can help you to explore and understand in advance what you are seeking to do when you first attempt to plain hunt. There is no doubt that understanding what you are attempting to do is a great help to achieving it, as well as helping to make the most of precious practice opportunities in the tower.

Let's take as an example plain hunting on 5 bells with the tenor covering, and assume you are going to ring the treble:-

<u>123456</u>
214356   2nds (place; i.e. 2nd in the order)
241536   3rds
425136   4ths
452316   5ths
543216   5ths
534126   4ths
351426   3rds
315246   2nds
132546   Lead
123456   Lead

Ringing starts with rounds. You are leading. When the ringing has settled down the conductor will call at one handstroke 'Go plain hunting'. This to give a you a whole pull's warning. You continue to lead at the backstroke but prepare to start at the next handstroke.

Now the moment arrives – you are to move from leading into 2nds place, i.e. you are to be the second bell to ring. So you have to view the ropes of the other bells 2, 3, 4, 5 (ignoring the tenor, which is covering) watch the first one pull off, which will be the bell that is now leading, and then pull off yourself. As you do this count to yourself '2nds'. This is easy enough in theory and not too difficult in practice – provided you remember that when you are hunting 'up to the back' (moving progressively from being first bell to last bell) you must ring a little slower than normal, to allow another bell to drop down in front of you each time you ring. To provide the necessary delay you must pull the rope a little harder and allow your bell to rise slightly higher towards the balance.

Tip: If you look at the figures above you will see that in the first change 21435 the bell you are following is the bell that followed you in the previous row – the final round. So there is a useful tip when hunting up – each time you move up a place you follow the bell that followed you in the previous change.

At the next change you move into 3rds place, so you have to count two ropes away before you ring. As before, you pull slightly harder than in Rounds so that the bell rises a little higher to make way for the bell hunting down to ring before you. Don't forget to count to yourself '3rds Place'.

Tip: One of the two bells you have to let pull off before you was the one you followed last time. So you may find it easier merely to count off the first of the remaining three bells (excluding the tenor, of course) but don't let this put you off remembering that you are in 3rds place. As before, the bell you are to follow is the bell that followed you last time.

At the next change you move into 4ths place, so you have to count three ropes away before you ring. As before, you pull slightly harder than in Rounds so that the bell rises a little higher to make way for the bell hunting down to ring before you. Don't forget to count to yourself '4ths Place'.

Tip: Two of the three bells in front of you are those you have already followed. Once again you have merely to find the first of the remaining two bells.

Then you finish hunting up by moving into 5ths place, counting four ropes away before you ring – easy to see the fourth rope as it is the only one you haven't followed so far.

Now you have reached the back and have a second blow in 5ths place. This time there is no bell to make way for and you need to check the bell slightly.

Having successfully hunted up to the back you now have to reverse the process and hunt down to the front again, counting three ropes away to drop down into 4ths place, two ropes into 3rds places, one rope into 2nds place and, at last, safe and sound back to lead.

It has to be said that hunting down to lead is a little more difficult than hunting up to the back. This is partly because it is slightly more difficult to

count the ropes away and partly because you have to ring more quickly. When hunting up to the back you were ringing more slowly than in Rounds but hunting down to the front you are ringing more quickly than in Rounds. checking the bell at each stroke so that it does not rise quite so high.

Tip: As you move into 4ths place, ignore the bell you have just been following in 5ths place and look for the last of the remaining three bells. At 3rds place ignore the bell you followed in 5ths place and the bell you followed in 4ths and look for the last of the two remaining bells and so on.

Another Tip: In simple methods you follow the bells down to lead in the same sequence as you followed them when hunting up to the back. If you note the order as you hunt up you will be able to use this as you hunt down. However, this method has its limitations – it doesn't work for every method – and should only be a temporary expedient. Certainly the wider temptation to try and ease the process of acquiring ropesight by memorising the order of the bells to follow when hunting up is best avoided! Short term gain equals long term pain and learning in this way will prove very restrictive when you don't know the order, for example when attempting to hunt the treble to a different method!

A great help in achieving success will be getting the rhythm right. If you have absorbed the above, you will have appreciated that there are three ringing speeds in plain hunting – the rounds rhythm, the hunting-up rhythm (slightly slower than rounds) and the hunting-down rhythm (slightly quicker than rounds). A good sense of rhythm is a valuable aid to good striking and to keeping in the right place if ropesight is temporarily lost.

The rhythm when plain hunting on 5 bells changes at the following points:-

Starting from leading:-
Handstroke: Slow down (i.e. pull the bell a little harder and let it rise a little higher) as you change from rounds rhythm to hunting-up rhythm and climb into 2nds place.
Backstroke: Maintain the hunting-up rhythm as you climb into 3rds place
Handstroke: Maintain the hunting-up rhythm as you climb into 4ths place
Backstroke: Maintain the hunting-up rhythm as you climb into 5ths place
Handstroke: Speed up slightly (check the bell) as you change into rounds rhythm and strike a second blow in 5ths place.

Backstroke: Speed up slightly again as you change from rounds to hunting-down rhythm and descend into 4ths place

Handstroke: Maintain the hunting-down rhythm as you descend into 3rds place

Backstroke: Maintain the hunting-down rhythm as you descend into 2nd place

Handstroke: Maintain the hunting-down rhythm as you drop down to Lead

Backstroke: Slow down slightly as you change from 'hunting-down' to 'rounds' rhythm and Lead for a second time.

Note that, providing you have hunted down at the correct rhythm and in the right places, there should be no need to slow down when leading at handstroke. The handstroke gap is already there, implicit in the difference between handstroke and backstroke, as explained earlier.

The most difficult rhythm changes are probably when moving up from leading into 2nds place (the tendency is not to get the bell high enough) and when moving from 5ths place down into 4ths place (the tendency is not to check the bell in enough).

[The reason for this difficulty is that at these points the natural difference between handstroke and backstroke adds to the required change of rhythm.]

Another key to success is counting places:-
– 2nds, 3rd, 4ths, 5ths , 5ths, 4ths, 3rd, 2nds, Lead, Lead ...

If you count your places resolutely it will help you preserve the rhythm, it will remind you of where you should be and, if you should get slightly adrift, then when you say to yourself 'Lead' you will be able by watching the tenor to slip exactly back into place – a fresh start every time you lead.

PRACTISING WITH STRINGING

You can use Stringing to help you gain an understanding of much of the above. For example, try tapping the rhythm of, say, the treble while Stringing is ringing some slow Grandsire Doubles and note these points – how the treble slows up at the backstroke lead as it changes from hunting down to rounds rhythm and then again as it moved up into seconds place and changes from rounds rhythm to hunting-up rhythm.

If you think you have really grasped the idea of plain hunting try ringing the treble to Plain Bob Doubles from the keyboard, using display W, first following the figures as a guide to when to press key Z to sound your bell, and then with your eyes shut! It's fun and a challenge, and very satisfying when you get it right. In one sense it's easier than in the tower – the other bells are always right (and you're not offending the neighbours!). In another sense it's more difficult – there's no time delay between pull and sound, unlike in the tower, and there's no inertia from several hundredweight of bell metal to keep you nearly right.

If you are using Stringing in conjunction with a dumbbell or silenced bell then the degree of realism is of course very much greater.

Counting places and listening to your bell are vital qualities to acquire for 'real' bell ringing.

RINGING BY THE BLUELINE

If you have progressed this far it's perhaps time you moved on to a proper ringing text book. Suffice it to say at this stage that the path an inside bell follows in a method is only plain hunting varied to greater or lesser degree. The shape of the line, with its 'dodges' and 'places' can be memorised and used as a path to ring by. For example, Plain Bob Doubles can be simply memorised, starting from the 5th bell, as three-four up, make 2nds, three-four down, four blows in 5ths (3-4up, 2nds, 3-4down, 4 in 5ths).

Display W in Stringing displays the blue line for any chosen inside bell very clearly (with a red line for the treble) and can be a useful aid when learning a new method.

Learning and ringing a method just by the blueline is rather like following a route learnt from a map without taking account of interesting places or scenery along the way – fine if you keep on the straight and narrow but limited if you get lost and stray from the way. Look for signposts – particularly where the blue line passes the treble – as well.

> "When you ring by the treble you shape your journey by the signposts. When you ring by the skeleton course (i.e. the blueline) you follow the map. The wise traveller does both"
>
> – *Standard Methods*, Jasper & William Snowdon, 1954.

PLACE NOTATION

The author well remembers his own first tied bell lessons forty years ago and how relaxation intervals between attempts to handle the bell were filled with instruction into the mysteries of Plain Hunting and Plain Bob Doubles. Writing down a horizontal row of numbers 12345 to represent five bells from the treble to the tenor, crossing/swapping the pairs from the front (**X**) to produce 21435, leaving the leading bell leading for a second time, (**1**) to avoid repeating the first change and swapping/crossing the remaining bells, producing 24153 and so on in successive changes (**X1X1 ...**) until in due course the treble came back to lead and seconds place was made to produce what we know as Bob Doubles. Pricking the changes in this way is still a valuable learning exercise.

It was some years before he learnt that all methods could be represented encryptically by their 'place notation', in the case of Bob Doubles X1X1X1X for the lead and 12 for the lead-end. Invented long before the computer era, place notation has found an additional use in the facility it offers for storing methods in computer programs.

It is actually possible to ring a method purely by knowledge of the place notation. However, most ringers find the 'blueline' approach more 'user friendly'!

APPENDIX
CONNECTING A DUMBBELL OR SILENCED TOWER BELL
(Not feasible with an IYONIX PC or with Virtual Acorn)

A suitable sensor and signal delay interface will be required. Designs are given overleaf. An optical sensor has been shown, largely for historical reasons. Other types, e.g. induction and Hall effect, are available:-
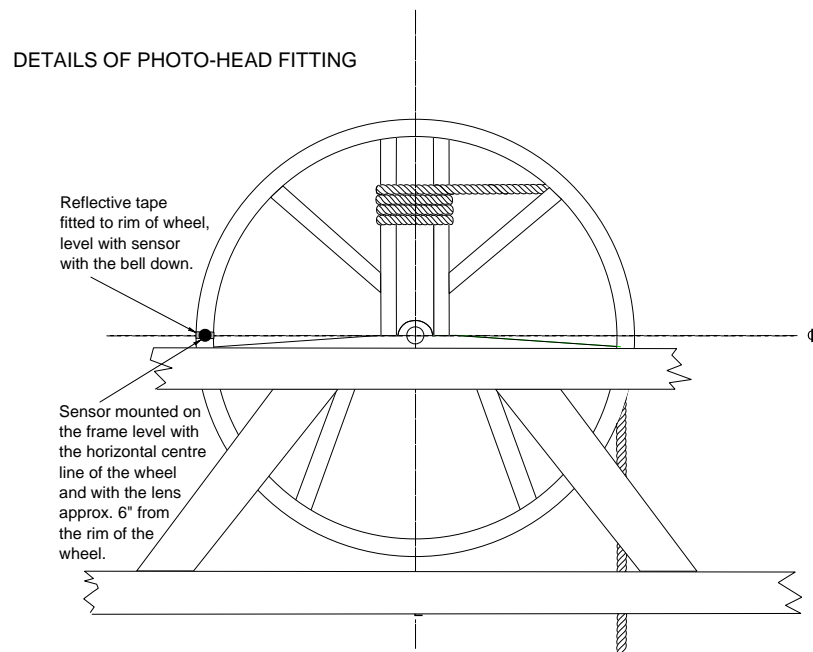
In addition:
Acorn RiscPC or A7000
The computer will need a backplane (if not already fitted) and an I/O card. Both are obtainable from CJE Micro's, 78 Brighton Road, Worthing NB11 2EN.

Raspberry Pi
A ribbon cable will be required to connect to GPIO pins on the Raspberry Pi.

Principle of Operation (optical sensor)

DETAILS OF PHOTO-HEAD FITTING

Reflective tape fitted to rim of wheel, level with sensor with the bell down.

Sensor mounted on the frame level with the horizontal centre line of the wheel and with the lens approx. 6" from the rim of the wheel.
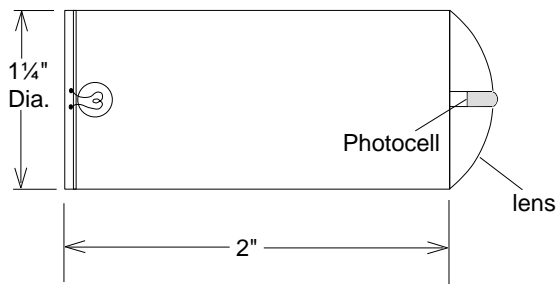
A light source in the photohead shines at the rim of the bell wheel and a reflector strip returns light to a photocell in the photohead as the reflector passes. The interface lengthens each pulse from the photocell to approx. 0.1 second and delays it by a fixed amount before passing it to the computer via the analogue port. The delay represents the time from when the reflector passes the sensor to the moment when the bell should sound and is adjustable to suit the individual bell.

Stringing sounds the chosen bell when it receives the delayed pulse from the photocell, as well as automatically generating the sound for all the other bells.
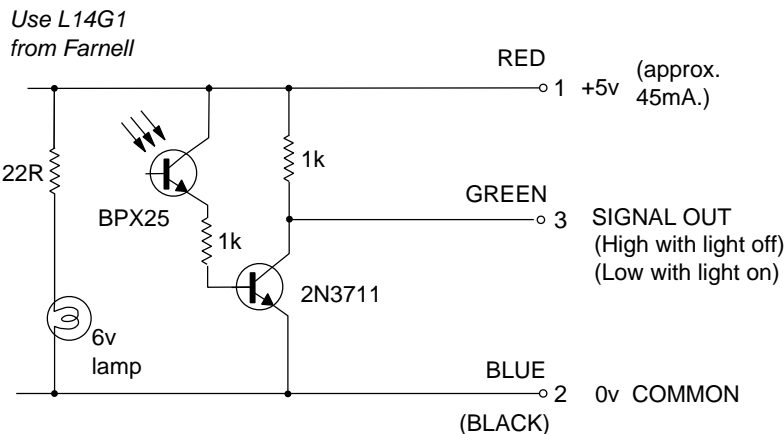
Hardware Requirements:-

PHOTOHEAD
(Peter Cummins design, redrawn from Alan Griffin sketch)

1¼"
Dia.

Photocell

lens

2"

Plano convex perspex lens
Radius of curvature ¾"
Focal length 1½"

Photocell mounted in centre of lens

*Use L14G1
from Farnell*

22R

BPX25

1k

1k

2N3711

6v
lamp

RED
1 +5v   (approx.
45mA.)

GREEN
3 SIGNAL OUT
(High with light off)
(Low with light on)

BLUE
2 0v COMMON
(BLACK)

Alternatively a compatible ready made sensor can be purchased from David Bagley. For details see www.ringing.demon.co.uk/sensors/sensors.htm

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Raspberry Pi connections
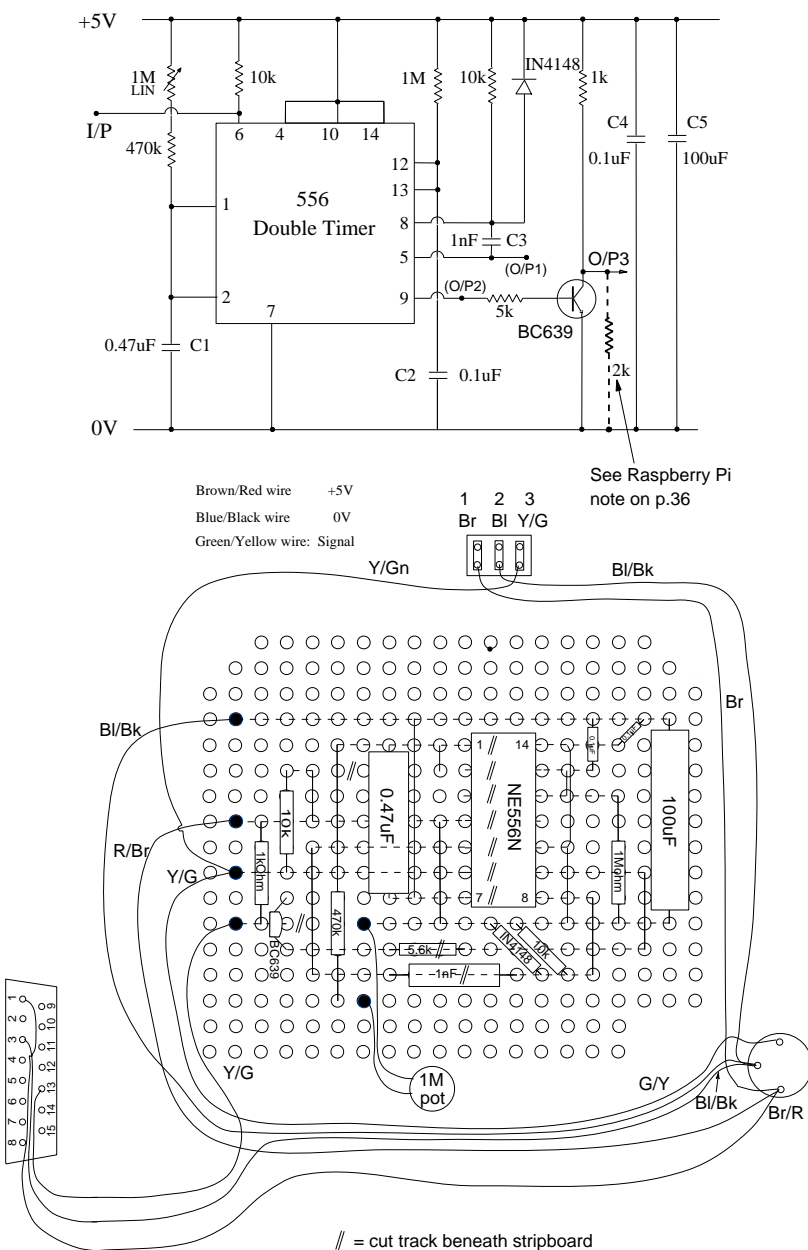The +5V line needs to be connected to GPIO pin 2 on the Raspberry Pi
The 0V line   "   to GPIO pin 6   "
The O/P signal   "   to GPIO pin 7   "
N.B. The signal voltage must not exceed 3.3V. To ensure this, a 2kΩ resistor needs to be connected between O/P3 and ground, as shown dotted in the circuit diagram.

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INTERFACE (Alan Griffin design)

Brown/Red wire   +5V
Blue/Black wire   0V
Green/Yellow wire: Signal

1 2 3
Br Bl Y/G

// = cut track beneath stripboard

The 556 timing chip comprises two 555 timing chips. The first produces the time delay between the reflector passing the sensor and the dumbbell sounding; the second lengthens the output pulse to 0.1 second. The delay can be varied from approx. 0.2 to 0.7 seconds using the potentiometer. The 470 kilohm resistor sets the range. The minimum permissible value of 1 kilohm will give a range of 0 to 0.5 seconds.

| Maplin Order Codes:	
Box	KC91
3 pin DIN ch.skt.	HH32
3 pin DIN plug	HH25
Connector block	L96
15-way D type plug	BK58
D-hood 15 way	FP28
Stripboard	JP47
1mm PCB pins	FL24
556 Timer	QH67
IN4148 Diode	QL80
BC639 Transistor	VR06
Capacitors:	
[C1] 0.47uF	BX80
or 0.33uF	BX79
[C2] 0.1uF	
polyester film	DT98
[C3] 1nF resin-	
dipped cer. plate	RA39
[C4] 0.1uF cer.disc	BX03
[C5] 100uF, 35V	
electrolytic	VH38

Note: Values of coupling capacitor C3 and smoothing capacitor C5 are not critical. C2 sets the output pulse to 0.1 second and needs to have a small temperature coefficient. C4 is a ceramic disc type, better at smoothing sharp pulses than the electrolytic in parallel with it.

| Resistors:	
1Megohm Lin.Pot.	JM76
Knob to suit	RW75
10kilohm (2 off)	M10k
470k	M470k
5k	M5k
1k	M1k
1M	M1M0
4 core cable	XR89

MAKING A MINI DUMBBELL

It is possible to make a 'mini' dumbbell for use at home. A wheel as small as 21" in diameter can be rung quite satisfactorily using 'mini-ring' technique, i.e. holding the tail-end permanently in one hand to control just the backstroke and using the other hand to control just the sally.

The author has such a mini dumbbell in his loft, with the rope falling to a ringing position on the upstairs landing. The 19" dia. core of the wheel, solid apart from two cutouts in the upper quadrants, is made of 25mm thick MDF (two thicknesses of 19mm would be even better) with outer layers of 4mm MDF to form the shrouding. Steel plates totalling approx. 6 lb are attached to the lower half of the wheel, giving an overall weight of approx. 15 lb. DIY plans can be downloaded from the author's website www.jrnorris.co.uk
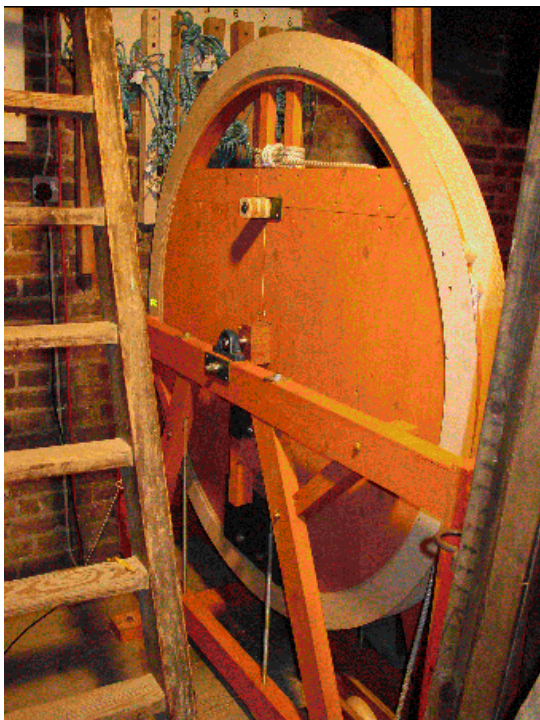
Full sized tower dumbbell
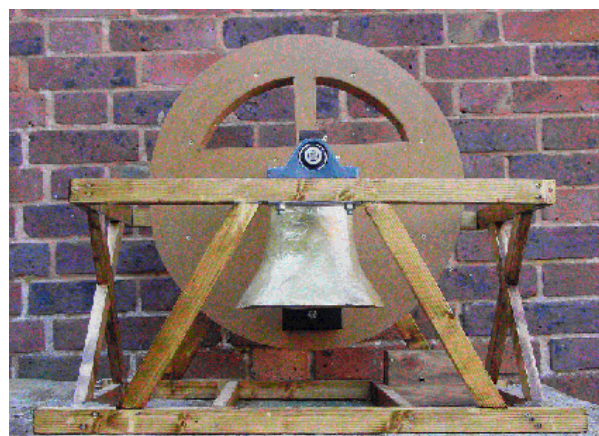
'Mini' dumbbell.
The mock papier maché bell is, of course, pure whimsy.

SOURCES OF INFORMATION

Software

The following information about other Acorn RISC OS ringing programs is taken from the Central Council of Church Bell Ringers' software catalogue, available on line at:-

www.cccbr.org.uk/ictc/SoftwareCatalogue

CallChange

What it runs on

Any RISC OS computer or under a **RISC OS emulator** running on a Mac or PC

What it does

Displays between 5 and 16 animated ringers who start in rounds and obey your 'Calls' which you do by clicking with your mouse between the bells whose order you want to change. Useful for beginners practising 'ropesight' or those starting to learn to call in the tower. A record is kept of your changes which can be saved to a file, which can be played back, or printed for later use in the tower. Supplied with a few popular changes, 'Queens', Tittums etc.

What it costs

1. Free to download from the web, with a PDF manual.
2. Provided free as a sample application to those who buy the VirtualAcorn CD
3. Can be supplied on PC format floppy disc for £5, (cheques payable to 'Fortran Friends' send to address below, all profits donated to Oxford Diocesan Guild Bell Fund)

Where to get it and/or more information

Fortran Friends, P.O.Box 64, Didcot, Oxon OX11 0TH, UK

01235 834357

http://fortran.orpheusweb.co.uk/Bells/software/

Review in the 'Ringing World' November 1st 2002

Methods

What it runs on

Any RISC OS computer or under a **RISC OS emulator** running on a Mac or PC

What it does

Animates a band of from 4 to 16 bellringers ringing most common standard methods. You can simulate conducting in the tower and save the method 'Diagram' to a file showing the red and blue lines. Any Bobs and Singles called are saved in the diagram. You can add your own methods.

What it costs

1. Freely downloadable demo version from the website
2. Complete version for £10 on PC floppy disc, includes UK postage, add £1 for EU countries, £2 elsewhere. PDF format manuual on disc, or A5 paper printed version for an extra £5. (cheques payable to 'Fortran Friends' send to address below, all profits donated to Oxford Diocesan Guild Bell Fund)

Where to get it and/or more information

Fortran Friends, P.O.Box 64, Didcot, Oxon OX11 0TH, UK

01235 834357

http://fortran.orpheusweb.co.uk/Bells/software/

Review in the 'Ringing World' November 1st 2002

Strike

What it runs on

Any RISC OS computer, e.g. Acorn A3000, A5000, RISCPC, Archimedes, Mico, Risc-Station (NB: second hand RISC-OS machines are very inexpensive.)

What it does

Strike simulates accurate repeatable striking errors and provides feedback on your ability to detect and correct them, as an aid to developing listening skills. Uses real bell sounds (4-16 bells). Used individually or by a group. Includes scores and league tables for performance.

What it costs

Strike costs £15 (most of which is a donation to bell restoration projects in Sonning Deanery).

Where to get it and/or more information

John Harrison, 2 Murdoch Road, Wokingham, Berkshire RG40 2DA, UK
0118 978 5520

RISC OS emulators

These emulators are available from **http://www.virtualacorn.co.uk**

The PC version runs the programs well with Windows 2000 or later. They also run on Windows 98 but with restricted function.

Publications

A wide range of ringing publications is available from the Central Council. The following brief extract is taken from the Council's website, April 2014:-

£10.00 The New Ringers Book
 £2.00 Beginner's Handbook
 £1.50 Towards Better Striking
 £3.00 Ringing Circles – a guide to basic methods
 £2.00 Raising and Lowering in Peal
 £3.50 Doubles and Minor for Beginners (also downloadable f.o.c)
 £3.50 Triples and Major for Beginners

All post free. Cash with order (cheques to *Central Council Publications*) and obtainable from:

CC Publications
Mrs B Wheeler
2 Orchard Close
Morpeth
NE61 1XE

E & O E.