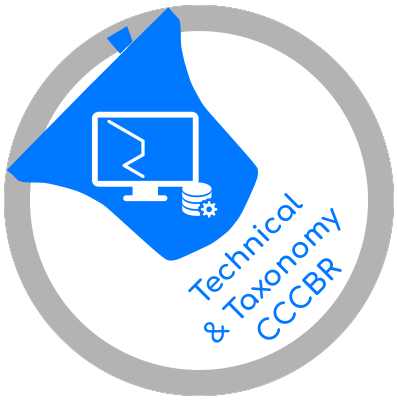

The Central Council of Church Bell Ringers

Framework for Method Ringing — Appendices

Appendices

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Contents

Appendix A. Place Notation

1. Place Notation

A compact symbolic notation for specifying a Change or a sequence of Changes.

1. Place Notation can be used to describe:
   a) Adjacent Changes or Identity Changes
   b) Jump Changes
   c) Conditional Changes

A. Adjacent and Identity Changes

1. A Change is represented in place notation by listing the Places made, starting from the earliest Place to the latest Place. All remaining pairs of adjacent bells swap.

Example:

With 6 bells, the Change between the Row 214365 and the Row 241356 is written '14'.

Further explanation:

The bells in 1st's Place and 4th's Place in the example above remain in the same Places in both Rows. The pairs of bells in Places 2 & 3 and Places 5 & 6 swap.

2. Places are represented by the same single characters as are used for bells, as described in 3.B.1.

Example:

With 12 bells, the Change between the Row 2143658709TE and the Row 123456780T9E is written '9T'.

3. In an even-Stage Change only, all adjacent pairs of bells may swap, such that no Places are made. This is called the cross Change, and it is denoted in place notation with either 'x', 'X' or '-'.

Example:

With 8 bells, the Change between the Row 12463857 and the Row 21648375 is the cross Change.

4. When a place notation includes external Place(s) (i.e. 1st's Place and/or the highest-numbered Place of the Change) and internal Place(s), this may be abbreviated to just the internal Place(s) because the external Place(s) can be inferred. When an even-Stage place notation comprises the two external Places only, this may be abbreviated to either just 1st's Place or just the highest-numbered Place of the Change because the other external Place can be inferred.

Example:

With 6 bells, the Change 14 can be abbreviated to 4.

With 7 bells, the Change 147 can be abbreviated to 4.

With 8 bells, the Change 1458 can be abbreviated to 45.

With 12 bells, the Change 1T can be abbreviated to 1 or T.

Further explanation:

Note that, by convention, internal Places are never abbreviated, even when it would still be clear what the full

Change is.

For example, the 7-bell Change 12347 could be abbreviated to 24, and 3rd's Place, as well as 1st's Place and 7th's Place, could all be inferred. However, by convention, this Change is only abbreviated to 234 – internal Places are always specified.

5. When using place notation to describe a sequence of Changes, a dot is inserted between the place notation for each change. However the dot is omitted on either side of a cross Change.

Example:

On 5 bells, an example sequence of 6 Changes is 3.1.5.3.1.3.

On 6 bells, an example sequence of 12 changes, including use of the cross Change, is 36x36.14x12x36.14x14.36.

In abbreviated form, this latter sequence might be written 3-3.4-2-3.4-4.3.

6. Many Methods have a sequence of Changes that takes the form A, B, ~A, C, where A is a sequence of Changes, ~A is the same sequence of Changes as A but in reverse order, and B and C are individual Changes. These methods have Palindromic Symmetry (see Section 4.B.1). As an alternative to notating the sequence in full, comma notation can be used to save space, as follows:
   - Where two sequences of Changes (represented by place notation) are separated by a comma, this indicates that each of these sequences is to be interpreted as a palindrome and expanded as follows: When the last Change in the sequence is reached, the Changes are then repeated in the reverse order starting with the penultimate Change, if any.
   - Where there is only a single Change on either side of the comma, there is no penultimate change as described above, and therefore nothing to expand. The single Change is therefore incorporated without adjustment.
   - A method with a sequence of Changes of the form A, B, ~A, C can therefore be notated: AB,C

Example:

Canterbury Little Bob Minor has a full place notation of 34.16x14x16.34.12.

This sequence takes the form A, B, ~A, C where:

A = 34.16x so ~A = x16.34

B = 14

C = 12

Canterbury Little Bob Minor can therefore be notated: 34.16x14,12

Further explanation:

In some Methods, the single Change is to the left of the comma, and the longer sequence is to the right.

For example, Grandsire Doubles can be notated: 3,1.5.1.5.1

This expands to: 3.1.5.1.5.1.5.1.5.1

If the sequences of Changes on both sides of the comma are greater than one Change in length, then both sides should be expanded.

For example, Carter Singles can be notated: 3.3.1,1.3.3.3

This expands to: 3.3.1.3.3.1.3.3.3.3.3.1

B. Jump Changes

1. Jump Notation

A compact symbolic notation for a Jump Change.

1. The notation required to describe a Jump Change, is as follows.
2. A pair of Places enclosed in round brackets indicates that the bell in the first of these Places jumps to the second of these Places in the next Row. The rest of the bells in the span of Places within the round brackets each move by one Place to accommodate the jump.

Example:

(14) indicates that the bell in 1st's Place jumps to 4th's Place in the next Row. The bells currently in 2nd's, 3rd's and 4th's Places each move down a Place in the next Row.

So, (14) would take Row 1234 to Row 2341.

Similarly, (41) would take Row 2143 to Row 3214.

Further explanation:

The two Places enclosed in round brackets are at least two Places apart.

3. A contiguous set of Places enclosed in square brackets indicates how the bells in these Places are transposed from one Row to the next.

Example:

[3412] indicates that the bells in the current Row are "read" in the order 3rd's Place, 4th's Place, 1st's Place, 2nd's Place in order to generate the next Row.

So, [3412] would take Row 2143 to Row 4321.

Similarly, [4321] would take Row 1324 to Row 4231.

Further explanation:

The set of Places enclosed in square brackets comprises at least three Places, and these Places are contiguous – i.e. they comprise a set of Places that form an adjacent set.

4. Where the bracketed notations (round or square) don't account for all Places in a Change, standard place notation conventions apply. I.e. remaining pairs of bells cross, and there may be inferred external Place(s).

Example:

The Minor Change (24) specifies what happens to the bells in Places 2, 3 and 4. The remaining Places are therefore 1st's, 5th's and 6th's. Following standard place notation conventions, 1st's place is Made, and the bells in 5th's and 6th's Places cross.

So, Minor Change (24) would take Row 123456 to Row 134265.

Similarly, Caters Change [6543] would take Row 214365978 to Row 125634798.

Further explanation:

If desired, the full Change may be specified in square brackets, even when external Places and/or crosses could be inferred. So, the Caters Change [6543] above could also be specified as [216543879]. However, this is considered less clear to the reader, and is discouraged in Section B.7 below.

5. When needed, bracketed notation may be combined with each other and/or with standard place notation to define a Change. Where more than one instance of bracketed and/or standard place notation are used to define a Change, there should be no overlap of Place ranges or individual Places. Furthermore, and following standard place notation convention, the various Place ranges and individual Places are ordered from lowest Place to highest Place.

Example:

(13)4(75) defines the Triples Change that takes Row 1234567 to Row 2314756. Note that there is no overlap of Places in the three sections of the notation.

(14)(53) should not be used since the range of Places in the second section (3-5) overlaps with the range of Places in the first section (1-4). This Change is more clearly described as [23514].

(24)[765]8 defines the Royal Change that takes Row 1234567890 to Row 1342765809. Again, there is no overlap of Place ranges or individual Places in the notation.

(24)8[765] and [765](24)8 are not correct notations because Place ranges and individual Places are not ordered from lowest Place to highest Place. This Change should be notated (24)[765]8.

6. Dot notation is used to delineate separate Jump Changes in the same way as for standard place notation. Dots are only omitted before and after the cross Change. Also, as with standard place notation, internal Places Made are always specified, even when these could be inferred.

Example:

(13)(64) defines a single Change, whereas (13).(64) defines two Changes.

(31)4[765] correctly defines a Triples Change. Convention is to include the 4 since it's an internal Place Made, even though it could be inferred.

7. Where the same Change can be represented in more than one way, it is preferable for the simplest form to be used, as follows, in order to make the Change's operation most apparent to the reader:
   i) Use standard place notation for all crosses and Places Made where other bell(s) are not jumping over these bells;
   ii) Use round-bracketed notation in preference to square bracketed notation where possible; and
   iii) Separate square bracketed notation into the smallest sets of contiguous Places.

Example:

Use [432]7 rather than [432657];

Use (25) rather than [3452];

Use [432][765] rather than [432765];

Use (24)5[876] rather than [3425876].

8. Adjacent and Identity Changes are self-inverse, meaning that the same Change applied twice in succession produces the starting Row. However this may not apply to Jump Changes. Therefore, when the comma notation described in Section A.7 above is used and Jump Changes are involved, not only are the Changes in ~A in reverse order, but any Jump Changes in A are inverted in ~A.

Example:

Cambridge Treble Jump Minor has notation x3x(24)x2x(35)x4x5,2

Expanding the comma notation gives x3x(24)x2x(35)x4x5x4x(53)x2x(42)x3x2

Note that the Jump Changes are inverted in the second half of the Lead.

9. The comma notation described in Section A.7 above should not be used if the last Change in the sequences on both sides of the comma are not self-inverse Changes. Such a Method would not have Palindromic Symmetry, and use of the comma notation would therefore be misleading. In this case, the sequence of Changes should be written in full, without the use of the comma notation.

Example:

The Minimus Method with notation x14x(13)x14x12 appears to have the structure A, B, ~A, C, where A = x14x, B = (13) and C = 12.

However, (13) is not a self-inverse Change, and this Method is therefore not palindromic. The Method therefore should not be described using comma notation, and the full notation should be used.

C. Conditional Changes

1. Conditional Notation

A compact symbolic notation for a Change or a sequence of Changes that is applied only if a specified condition is met.

1. Conditional notation is used to describe Dynamic Methods, and can also be used to represent some Static Methods or rule-based Compositions more concisely.
2. Conditional notation takes the form of a sequence of *alternative* clauses: `placenotation{condition}placen` Each clause consists of a Change or sequence of Changes as described in Section A and/or B above, followed by a condition enclosed in braces {}. The alternative clauses are applied in sequence. When an alternative is reached, its place notation is applied, generating one or more new Rows, and the final Row is then tested against its condition:
   a) If the condition is satisfied, the generated Rows are retained and the sequence restarts from the beginning of the first clause;
   b) If the condition is not satisfied, the Rows are discarded and the next alternative in the sequence is applied in the same way.

Example:

Dixon's Minor: `-{h}12{1}14{2,4}16`

This means: cross (`-`) at every handstroke (`h`); whenever the treble leads (`{1}`), make 12; whenever either the 2 or the 4 is leading (`{2,4}`), make 14; otherwise make 16. The sequence restarts from the first alternative after each Change that satisfies its condition.

3. A condition consists of one or more masks that are tested against the final Row after the place notation is applied. A mask is a string of characters representing bells and wildcards, written in the order of the Places they occupy.
   a) Each bell character in the mask requires that exact bell to be in that Place in the Row. The wildcard `x` (lower-case) matches any bell in that Place.

Example:

`{1}` is satisfied if the treble is leading; `{xxxxx1}` is satisfied if the treble is in 6th's Place (trailing).

   b) More than one mask separated by commas can be included to represent an OR condition: the

condition is satisfied if *any one* of the masks matches the Row.

Example:

`{2,3}` is satisfied if the 2 or the 3 is in the first Place of the Row; `{2,4}` is satisfied if the 2 or the 4 is leading.

c) Trailing wildcards at the end of a mask may be omitted for brevity. For example, `{1}` is equivalent to `{1xxxxx}` in a six-bell context and means "the treble is in first Place." The omitted trailing positions are assumed to match anything.

d) A mask may be followed by `h` or `b` to require that the Row is at a handstroke or backstroke respectively. If no mask characters are given before the stroke indicator, the condition is satisfied at every matching stroke.

Example:

`{h}` is satisfied at every handstroke; `{b}` is satisfied at every backstroke; `{x1h}` is satisfied when the treble is in 2nd's Place at a handstroke.

e) A mask may be followed by `+` or `-` to require that the Row parity is even (positive) or odd (negative) respectively i.e. whether an even or odd number of pairs of bells would need to be exchanged to obtain Rounds.

Example:

In Minor, `{xxxxx3-}` is satisfied when the 3 is behind and the Row parity is odd.

4. The alternative clauses are processed in the order written. When a later alternative would never be reached because an earlier one always satisfies its condition first, the later alternative is redundant. Conventionally, the most specific conditions should appear earliest in the sequence, with the least specific (or default) alternative last. Each alternative's place notation may specify either a single Change or a dot-separated sequence of Changes, using the conventions described in Sections A or B.

Example:

In Dixon's Minor `-{h}12{1}14{2,4}16`, the alternatives are ordered most-specific to least-specific: the handstroke cross first; then 12 when the treble leads; then 14 when 2 or 4 lead; and finally 16 as the default. A different ordering would produce an incorrect Method because a more general alternative might match before a more specific one.

5. Conditional Notation is designed primarily to define Dynamic Methods, where the choice of Change depends on the position of Bells in a preceding Row. However, the same mechanism can also express some Static Methods or rule-based Compositions more concisely when Blocks of Changes are repeated.

Example:

1. Plain Bob Sixteen can be expressed as `-{h}12{1}1D`. Cross at every handstroke; Place Notation 12 when the treble leads; at all other rows, use Place Notation 1D.
2. The wrong-home-wrong calling for a 720 of Plain Bob Minor can be expressed as `-{h}1234{12xx56}14{1xxx6,`. Cross at every handstroke; A single (1234) at a leadend when all the bells apart from 3-4 are home; A bob (14) at a leadend when the tenor is in 5ths, or 6ths place with the 5 running out; Seconds (12) at a leadend when the treble leads; at all other rows, plain hunt (16).

6. The condition mechanism is intended to be implementation-neutral. A computer-based ringing simulator implementing Conditional Notation should discard generated Rows when a condition fails and proceed to test the next alternative. In human-readable terms, the notation describes the rule by which the conductor or ringer would determine which Change(s) to ring by anticipating the final Row generated. In practice, Dynamic Methods need to be sufficiently simple and explained clearly to ringers — usually as a textual description — to make it easy to follow the logic represented by the Conditional Notation.
7. It should be noted that the same Dynamic Method can be expressed in multiple ways using Conditional Notation, so it cannot be used as a test of uniqueness.
8. The following table lists the Condition Place Notation for some Dynamic Methods that have been rung:

Dynamic Method	Conditional Notation	Description
Dixon's Minor	`-{h}12{1}14{2,4}16`	Plain Bob Minor with 14 being rung instead of 16 w
Reverse Dixon's Minor	`-{h}56{xxxxx1}36{xxxxx5,xxxxx6}16`	Reverse Bob Minor with 36 rung instead of 16 whe
Oxford Badger Minor	`-{h}12{1}1456{2xxxxx1,3xxxxx1}14{2,3}16`	Plain Bob Minor with 14 replacing 16 whenever 2
Monster Major	`-{h}12{1}16{2,3,4}18`	Plain Bob Major with 16 rung instead of 18 whene
Dixon's Doubles	`5{h}125{1}145{2,4}1`	Plain Bob Doubles with 145 rung instead of 1 whe

9. The following Dynamic Methods have been described in theory but have not yet been rung or formally named:

Dynamic Method	Conditional Notation
Dixon's Grandsire Minor	`36{x1h}-{h}14{2,4}16`
Dixon's Grandsire Doubles	`3{x1h}5{h}145{2,4}1`
Ander's Monster Major	`-{h}12{1}14{2,4,6}16{7}18`
Pseudo-double Dixon's Minor	`-{h}36{xxxxx3-,xxxxx5-}56{xxxxx1-}14{2+,4+}12{1+}16`
Treble Bob Dixonoid Minor	`-12-{xx1h,xxx1h}-34-{h}36{1xxxx6,x1xxx6,xx1xx6}14{5xx1,5xxx1,5xxxx1,6`

Appendix B. Method Name Syntax

1. This appendix defines the set of characters that are recognised for use in Method Names. Having a defined character set serves two purposes:

   - It rules out certain characters that are hard to distinguish from other characters, which could otherwise lead to the misidentification of Methods. For example, the Unicode character LATIN SMALL LETTER L WITH STROKE (U+0142) could be used in a new Method called Płain Bob Doubles. This could easily be mistaken for Plain Bob Doubles.
   - It enables the growing number of software developers who make use of the Methods Library to know which characters their applications should support.

   The recognised character set is provided in a text file – see section 4 below. In addition, the 'Create New Method' feature in CompLib (https://complib.org/) will give a warning if one or more characters used in the name of a new Method are not part of the recognised set. The Central Council will also consider adding characters to the recognised set on request. Requests can be emailed to methods@cccbr.org.uk. This appendix also defines a Method Name comparison process to ensure Method Names remain clearly unique. For example, London No. 3 Surprise Royal is an existing Method. The comparison process would prevent London No.3 Surprise Royal, London No 3 Surprise Royal, and London No3 Surprise Royal from being named. This is considered beneficial to reduce the likelihood of misidentification of Methods.

2. In the following, 'the Unicode standard' refers to the latest version of the standard. See https://www.unicode.org/versions/latest/. Various attributes of individual characters are provided in the files comprising the Unicode Character Database (UCD). See https://www.unicode.org/Public/UCD/latest/ucd/. The UCD file https://www.unicode.org/Public/UCD/latest/ucd/UnicodeData.txt contains general category information (field 2, zero-based), normalization information (field 5), and lowercase folding information (field 13). These are used in the sections below. General category codes used in field 2 above are defined in https://www.unicode.org/reports/tr44/tr44-28.html#General_Category_Values. Unicode blocks are defined in https://www.unicode.org/Public/UCD/latest/ucd/Blocks.txt. Charts for the various Unicode blocks are available at https://www.unicode.org/charts/. Normalization is described in https://www.unicode.org/reports/tr15/tr15-45.html#Norm_Forms.

3. Method Names are a sequence of from 1 to 120 characters selected from:

   - The 62 Unicode characters enumerated in the Unicode standard as being in the Basic Latin block and having a general category of Lu, Ll, or Nd (upper and lower case letters, and digits).
   - The 62 Unicode characters enumerated in the Unicode standard as being in the Latin-1 Supplement block and having a general category of Lu or Ll, after excluding the Unicode character named MICRO SIGN.
   - The 18 Unicode characters named: SPACE EXCLAMATION MARK QUOTATION MARK DOLLAR SIGN PERCENT SIGN AMPERSAND APOSTROPHE LEFT PARENTHESIS RIGHT PARENTHESIS COMMA HYPHEN-MINUS FULL STOP SOLIDUS EQUALS SIGN QUESTION MARK POUND SIGN EURO SIGN TRADE MARK SIGN
   - The 20 Unicode characters named: SUPERSCRIPT ZERO SUPERSCRIPT ONE SUPERSCRIPT TWO SUPERSCRIPT THREE SUPERSCRIPT FOUR SUPERSCRIPT FIVE SUPERSCRIPT SIX SUPERSCRIPT SEVEN SUPERSCRIPT EIGHT SUPERSCRIPT NINE SUBSCRIPT ZERO SUBSCRIPT ONE SUBSCRIPT TWO SUBSCRIPT THREE SUBSCRIPT FOUR SUBSCRIPT FIVE SUBSCRIPT SIX SUBSCRIPT SEVEN SUBSCRIPT EIGHT SUBSCRIPT NINE
   - The 10 Unicode characters named: LATIN CAPITAL LETTER A WITH MACRON LATIN SMALL LETTER A WITH MACRON LATIN CAPITAL LETTER C WITH CARON LATIN SMALL LETTER C WITH CARON LATIN CAPITAL LIGATURE OE LATIN SMALL LIGATURE OE LATIN CAPITAL LETTER U WITH RING ABOVE LATIN SMALL LETTER U WITH RING ABOVE LATIN CAPITAL LETTER R WITH LINE BELOW LATIN SMALL LETTER R WITH LINE BELOW

   subject to the further constraints that a Method Name:

a) Must contain at least one character of Unicode general category Lu, Ll, or Nd; and

b) May neither begin nor end with a Space character, nor may it contain within it two consecutive Space characters.

4. The above 172 recognised characters are listed in a text file here[1]. Information about the format of this file is provided further below.

5. Method Name comparison: Two Method Names are considered the same if they would be reduced to the same sequence of characters by the following process:

   a) The sequence of characters is converted to Unicode Normalization Form KD (NFKD, Normalization Form Compatibility Decomposition);

   b) All characters now appearing in the sequence that are not allowed in a Method Name, as per 3 above, are removed;

   c) All characters for which the UCD defines a lowercase mapping (per field 13 of UnicodeData.txt – see 2. above) are converted to that lowercase character;

   d) The following additional conversions are made: 'ß' (U+00DF) to the two character sequence 'ss' 'æ' (U+00E6) to the two character sequence 'ae' 'ð' (U+00F0) to 'd' 'ø' (U+00F8) to 'o' 'þ' (U+00FE) to the two character sequence 'th' 'œ' (U+0153) to the two character sequence 'oe'

   e) If the name is now one of 'white hall', 'christ church', 'potter hanworth' or 'up avon' then no further changes are made. Otherwise, each character for which the Unicode general category is not either Ll or Nd is removed.

Further explanation:

For item e. above, method pairs Whitehall and White Hall, Christchurch and Christ Church, Potter Hanworth and Potterhanworth, and Upavon and Up Avon were all named prior to the implementation of this Appendix B. Spaces are therefore not removed in the method name comparison process for the four method names listed in bullet 5, whereas all other spaces are removed. The latter prevents (e.g.) London No. 3 and London No.3 being used as distinct method names.

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6. Notes:

   a) The normalization to NFKD followed by deletion of unrecognised characters eliminates diacritics, brings the superscript and subscript numerals to the baseline, and replaces '™' with the two character sequence 'TM';

   b) Punctuation, symbols and spaces are ignored for Method Name comparisons. Thus 'London No. 3' is the same as 'London No3'. Less obviously, '$E=mc^2$' is the same as '$e \& MC_2$'. Given how rare, and potentially troublesome, punctuation and symbols are in Method Names, this seems a small price to pay for reducing the likelihood of Method misidentification.

   c) The text file listing the 172 recognised characters for Method Names (see 4. above) has the following fields: Field 0: Unicode id of the character (hexadecimal) Field 1: Unicode character Field 2: Unicode general category of the character Field 3: Unicode character name Field 4: The character's Unicode block Field 5: Unicode id(s) that result from applying the Method Name comparison process above Field 6: Unicode character(s) that result from applying the Method Name comparison process above Field 7: Unicode general category(s) that result from applying the Method Name comparison process above If more than one character results from applying the Method Name comparison process above (e.g. ™ becomes tm), then fields 5 to 7 will contain data for each of these characters, delimited by a space. If the character is one that is eliminated by applying the Method Name comparison process above, then fields 5 to 7 will be empty.

7. Additional background on Method Names and Method Name syntax is available here[2] in an article

[1] https://framework.cccbr.org.uk/edition3/syntax/FrameworkRecognisedChars.txt
[2] https://framework.cccbr.org.uk/edition3/images/edition3/syntax/method-name-syntax.html

written by Don Morrison.

Appendix C. Leadhead Codes

A. Leadhead Grouping

1. Methods that have a first leadhead that is the same as one of the leadheads found in the Plain Course of Plain Bob or Grandsire have been assigned a code according to the order in which the leadheads occur in its Plain Course. They are a useful shorthand for communicating the Lead order of a Method. Originally lowercase letters were ascribed and these were later extended with numbers to cover higher stages. In the Framework the codes associated with the letters p, q, r and s have been renumbered to include the leadheads previously omitted before the Differential classes were added. Methods with Plain Bob leadheads are split into different leadhead groups according to the place notation (where n is the Stage) immediately before the leadhead as follows:

   - Those with Stages and a lead end place notation of have codes a-f
   - Those with Stages and a lead end place notation of have codes g-m
   - Those with Stages and a lead end place notation of have codes p-q
   - Those with Stages and a lead end place notation of have codes r-s

   Methods with Grandsire leadheads whose hunt bells have the same path are split into different leadhead groups according to the place notation (where n is the Stage) immediately after the leadhead as follows:

   - Those with Stages and a place notation of following the leadhead have codes a-f
   - Those with Stages and a place notation of following the leadhead have codes g-m
   - Those with Stages and a place notation of following the leadhead have codes p-q
   - Those with Stages and a place notation of following the leadhead have codes r-s

   Any methods not falling in the above groupings are not given a leadhead code even if they have Plain Bob or Grandsire leadheads.

B. Plain Bob Leadhead Codes for Even Stages

LH Code		Minimus	Minor	Major	Royal	Maximus	Fourteen	Sixteen
PN12	PN1n							
a	g	1342	135264	13527486	1352749608	13527496E8T0	13527496E8A0BT	13527496E8A0CTDB
b	h		156342	15738264	1573920486	157392E4T608	157392E4A6B8T0	157392E4A6C8D0BT
c	j			17856342	1795038264	1795E3T20486	1795E3A2B4T608	1795E3A2C4D6B8T0
c1	j1				1907856342	19E7T5038264	19E7A5B3T20486	19E7A5C3D2B4T608
c2	j2					1ET907856342	1EA9B7T5038264	1EA9C7D5B3T20486
c3	j3						1ABET907856342	1ACED9B7T5038264
c4	j4							1CDABET907856342
d4	k4							1DBCTA0E89674523
d3	k3						1BTA0E89674523	1BTD0C8A6E492735
d2	k2					1T0E89674523	1T0B8A6E492735	1T0B8D6C4A2E3957
d1	k1				1089674523	108T6E492735	108T6B4A2E3957	108T6B4D2C3A5E79
d	k			18674523	1860492735	18604T2E3957	18604T2B3A5E79	18604T2B3D5C7A9E
e	l		164523	16482735	1648203957	1648203T5E79	1648203T5B7A9E	1648203T5B7D9CEA
f	m	1423	142635	14263857	1426385079	142638507T9E	142638507T9BEA	142638507T9BEDAC

C. Plain Bob Leadhead Codes for Odd Stages

LH Code		Doubles	Triples	Caters	Cinques	Sextuples	Septuples	Octuples
PN12n	PN1							
p	r	13524	1352746	135274968	13527496E80	13527496E8A0T	13527496E8A0CTB	13527496E8A0CTFBD

p1	r1	15432	1573624	157392846	157392E4068	157392E4A6T80	157392E4A6C8B0T	157392E4A6C8F0DTB
p2	r2		1765432	179583624	1795E302846	1795E3A2T4068	1795E3A2C4B6T80	1795E3A2C4F6D8B0T
p3	r3			198765432	19E70583624	19E7A5T302846	19E7A5C3B2T4068	19E7A5C3F2D4B6T80
p4	r4				1E098765432	1EA9T70583624	1EA9C7B5T302846	1EA9C7F5D3B2T4068
p5	r5					1ATE098765432	1ACEB9T70583624	1ACEF9D7B5T302846
p6	r6						1CBATE098765432	1CFADEB9T70583624
p7	r7							1FDCBATE098765432
q6	s6							1DBFTC0A8E6947253
q5	s5						1BTC0A8E6947253	1BTD0F8C6A4E29375
q4	s4					1T0A8E6947253	1T0B8C6A4E29375	1T0B8D6F4C2A3E597
q3	s3				108E6947253	108T6A4E29375	108T6B4C2A3E597	108T6B4D2F3C5A7E9
q2	s2			186947253	18604E29375	18604T2A3E597	18604T2B3C5A7E9	18604T2B3D5F7C9AE
q1	s1		1647253	164829375	1648203E597	1648203T5A7E9	1648203T5B7C9AE	1648203T5B7D9FECA
q	s	14253	1426375	142638597	142638507E9	142638507T9AE	142638507T9BECA	142638507T9BEDAFC

D. Grandsire Leadhead Codes for Odd Stages

LH Code		Doubles	Triples	Caters	Cinques	Sextuples	Septuples	Octuples
PN3	PNn							
a	g	12534	1253746	125374968	12537496E80	12537496E8A0T	12537496E8A0CTB	12537496E8A0CTFBD
b	h		1275634	127593846	127593E4068	127593E4A6T80	127593E4A6C8B0T	127593E4A6C8F0DTB
c	j			129785634	1297E503846	1297E5A3T4068	1297E5A3C4B6T80	1297E5A3C4F6D8B0T
c1	j1				12E90785634	12E9A7T503846	12E9A7C5B3T4068	12E9A7C5F3D4B6T80
c2	j2					12AET90785634	12AEC9B7T503846	12AEC9F7D5B3T4068
c3	j3						12CABET90785634	12CAFED9B7T503846
c4	j4							12FCDABET90785634
d4	k4							12DFBCTA0E8967453
d3	k3						12BCTA0E8967453	12BDTF0C8A6E49375
d2	k2					12TA0E8967453	12TB0C8A6E49375	12TB0D8F6C4A3E597
d1	k1				120E8967453	120T8A6E49375	120T8B6C4A3E597	120T8B6D4F3C5A7E9
d	k			128967453	12806E49375	12806T4A3E597	12806T4B3C5A7E9	12806T4B3D5F7C9AE
e	l		1267453	126849375	1268403E597	1268403T5A7E9	1268403T5B7C9AE	1268403T5B7D9FECA
f	m	12453	1246375	124638597	124638507E9	124638507T9AE	124638507T9BECA	124638507T9BEDAFC

E. Grandsire Leadhead Codes for Even Stages

LH Code		Minimus	Minor	Major	Royal	Maximus	Fourteen	Sixteen
PN3n	PN-							
p	r		125364	12537486	1253749608	12537496E8T0	12537496E8A0BT	12537496E8A0CTDB
p1	r1			12758364	1275930486	127593E4T608	127593E4A6B8T0	127593E4A6C8D0BT
p2	r2				1297058364	1297E5T30486	1297E5A3B4T608	1297E5A3C4D6B8T0
p3	r3					12E9T7058364	12E9A7B5T30486	12E9A7C5D3B4T608
p4	r4						12AEB9T7058364	12AEC9D7B5T30486
p5	r5							12CADEB9T7058364
q6	s6							12DCBATE09876543
q5	s5						12BATE09876543	12BDTC0A8E694735
q4	s4					12TE09876543	12TB0A8E694735	12TB0D8C6A4E3957
q3	s3				1209876543	120T8E694735	120T8B6A4E3957	120T8B6D4C3A5E79
q2	s2			12876543	1280694735	12806T4E3957	12806T4B3A5E79	12806T4B3D5C7A9E
q1	s1		126543	12684735	1268403957	1268403T5E79	1268403T5B7A9E	1268403T5B7D9CEA
q	s	1243	124635	12463857	1246385079	124638507T9E	124638507T9BEA	124638507T9BEDAC

F. Alternative Leadhead Code System

1. As an alternative to the letter codes shown above, Methods with Plain Bob Leadheads can be coded according to the number of Plain Leads of Plain Bob that it takes to reach the same Leadhead as it does with one Plain Lead of the Method in question. **Example 1:** The first Leadhead of Cambridge Surprise Major is 15738264. This same Leadhead would be reached by ringing two Plain Leads of Plain Bob Major. Cambridge Surprise Major is therefore referred to as a ”+2” Method. **Example 2:** The first Leadhead of London Surprise Minor is 142635. This same Leadhead would be reached by ringing four Plain Leads of Plain Bob Minor. Going forward for four Plain Leads of Plain Bob Minor reaches the same Leadhead as going backwards for one Plain Lead, so London Surprise Minor is referred to as a ”-1” method. Pluses are used up to and including the halfway point of a Plain Course of Plain Bob, and minuses are used after the halfway point of the Plain Course. So in Minor, the codes would range from -2 to +2, in Triples the codes would range from -2 to +3, in Major the codes would range from -3 to +3, and so on. For Plain Bob Leadhead Methods where nth’s Place rather than 2nd’s Place is made at the Leadend Change (where n is the Stage), the letter ’n’ is added to the code. **Example 3:** The first Leadhead of Bristol Surprise Major is 14263857 and Bristol S Major is an 8th’s Place Leadend Method. Bristol S Major is therefore referred to as a ”-1n” Method. Methods that have one Plain Lead in their Plain Course are referred to as ”+0” Methods. Note that this alternative Leadhead code system is usually only used for Plain Bob Leadhead Methods with even Stages, and not for Plain Bob Leadhead Methods with odd Stages, nor for Grandsire Leadhead Methods.
2. The following tables show the mapping between the codes shown in Appendix C.B above and the alternative Leadhead codes:

Appendix C.B code	Alternative Leadhead code
a	+1
b	+2
c	+3
c1	+4
c2	+5
c3	+6
c4	+7
d4	-7
d3	-6
d2	-5
d1	-4
d	-3
e	-2
f	-1

Appendix C.B code	Alternative Leadhead code
g	+1n
h	+2n
j	+3n
j1	+4n
j2	+5n
j3	+6n
j4	+7n
k4	-7n
k3	-6n
k2	-5n
k1	-4n
k	-3n
l	-2n
m	-1n

Appendix D. Extension Processes

A. Definitions

1. Plain Bob Leadheads

A Method is said to have Plain Bob Leadheads if it can be Rotated (if needed) to start from a Change such that the treble leads at the Leadends and Leadheads, and the Leadends and Leadheads of the Method's Plain Course all occur in a Plain Course of the Method Plain Bob at the same Stage.

Example:

The following table shows the Leadends and Leadheads for Norwich Surprise Minor[3] and Plain Bob Minor[4]. It can be seen that the two columns contain the same Rows, albeit in a different order. Norwich Suprise Minor is therefore said to have Plain Bob Leadheads.

2. Coursing

Two Hunt Bells are said to Course if they follow the same Path, and one Hunt Bell rings in the same Places as the other Hunt Bell at an interval of two Rows apart.

Example:

In the Method Grandsire Doubles[5], the treble and the 2nd Course in the Plain Course (when the initial Row is Rounds). The same is true for Grandsire at all other Stages.

3. Mode

The Mode of an Extension Process specifies which Places remain static, and which Places expand.

Further explanation:

Mode m means that all Places up to and including Place m remain static, and all Places above Place m expand.

E.g. an Extension Process might operate by copying 4 Changes and inserting them into a Method's sequence of Changes immediately following these copied 4 Changes.

Assume the 4 Changes to be copied are x12x36.

If the Mode used is 1, the resulting sequence is x12x36x14x58. I.e. the 1 in 12 remains static, but all Places higher than 1 expand (i.e. increase) by 2 Places in the inserted section.

If the Mode used is 2, the resulting sequence is x12x36x12x58. I.e. the 12 remains static, but all Places higher than 2 expand by 2 Places in the inserted section.

If the Mode used is 3, the resulting sequence is x12x36x12x38. I.e. the 12 and the 3 in 36 remain static, and all Places higher than 3 expand by 2 Places in the inserted section.

Note that some Extension Processes operate separately on below-the-treble Places and above-the-treble Places. When Mode is used with above-the-treble Places, it may operate with respect to the highest Place (i.e. the Method's Stage) rather than Place 1. Examples of this are included in Extension Process 3 below.

[3] https://complib.org/method/14317
[4] https://complib.org/method/11349
[5] https://complib.org/method/10587

B. General

1. Below are the Extension Processes that are currently recognised by the Central Council for extending Methods to higher Stages.
2. Only one Extension Process may be used to extend any one Method to a given Stage – Extension Processes may not be combined.

Further explanation:

While Extension Processes may not be combined to extend any one Method to a given Stage, different Extension Processes may be used to extend a single Method to different Stages. E.g. St Simon's Bob Doubles is extended to Triples, Caters, Cinques, etc, using Extension Process 3 below. St Simon's Bob Doubles is also extended to St Simon's Bob Minor using Extension Process 2 below (and St Simon's Bob Major is obtained from St Simon's Bob Triples using Extension Process 2, etc).

1. Extension Process 1

Process 1 keeps the Length of the Plain Lead constant. The resulting Extension is two Stages higher than the Parent Method.

1. Prerequisites The prerequisites for this Extension Process are as follows:
    1. The Parent Method is a Method with no Hunt Bells, or a Hunter (including a Differential Hunter) with a Hunt Bell that has a Little Path.
    2. The Parent Method does not use Jump Changes.
2. Steps The steps to implement this Extension Process are shown using the following example where Little Bob Minor[6] is the Parent Method:

Minor

pn	<=m	>m
x		
16	1	6
x		
14	14	
x		
16	1	6
x		
12	12	

Major

pn	<=m	>m
x		
18	1	8
x		
14	14	
x		
18	1	8
x		
12	12	

Royal

pn	<=m	>m
x		
10	1	0
x		
14	14	
x		
10	1	0
x		
12	12	

Maximus

pn	<=m	>m
x		
1T	1	T
x		
14	14	
x		
1T	1	T
x		
12	12	

    1. Select a Mode m to be used, where m is greater than or equal to 1, and less than the Stage of the Parent Method. In the example above, the selected Mode is 4.
    2. Divide the place notation (shown in column pn) of the Parent Method into Places Made up to and including the Mode, and Places Made above the Mode. These Places are entered in the columns headed <=m and >m respectively.
    3. To obtain the first Extension (which is two Stages higher = Major), leave the Places in column <=m unchanged, and increase the Places in column >m by 2. See the box for Major above.
    4. Then recombine the Places in column <=m and column >m to obtain the place notation for the Extension to Major.
    5. The above can be repeated to obtain additional Extensions in steps of 2 Stages, as shown above for Royal and Maximus.
3. Requirements An Extension produced using Extension Process 1 is only valid if:
    1. The Extension has the same Symmetry (see Section 4.B) as the Parent Method.

[6] https://complib.org/method/11932

2. The Extension has the same number of Hunt Bells as the Parent Method, unless the Parent Method only has Hunt Bells and has no Working Bells, in which case the Extension also only has Hunt Bells.
3. The Extension has the same number of Cycles of Working Bells as the Parent Method.
4. If the Parent Method comprises two or more Cycles of Working Bells of equal size, the Extension has this same feature.
5. If the Parent Method has Plain Bob Leadheads, the Extension also has Plain Bob Leadheads. If the Parent Method does not have Plain Bob Leadheads, the Extension also does not have Plain Bob Leadheads.
6. The Extension Construction used, when applied to the Parent Method in question, creates an Extension Path containing a minimum of 3 Methods (including the Parent Method) with Stages that are less than or equal to Stage 24.

4. Extension Construction
    1. The Extension Construction for referring to this Extension Process is 'EP1-m', where EP1 refers to Extension Process 1, and m is the Mode. So Little Bob Minor is extended using Extension Construction EP1-4.
    2. When two or more Modes produce the same Extension, the lowest Mode is designated as the Mode used. For example, Extension Constructions EP1-4 and EP1-5 both give the same Extensions for Little Bob Minor. EP1-4 is therefore designated as the Extension Construction used.

2. Extension Process 2

Extension Process 2 extends a Parent Method that has one Hunt Bell by adding a second Hunt Bell. Both Hunt Bells in the Extension hunt one Place further from the lead than the Hunt Bell does in the Parent Method, and the Hunt Bells Course in the Extension. The resulting Extension is one Stage higher than the Parent Method, and the Length of the Plain Lead is increased by 2 Changes.

1. Prerequisites The prerequisites for this Extension Process are as follows:
    1. The Parent Method is a Hunter with a single Hunt Bell. The Hunt Bell follows a plain hunting Path (i.e. the Path consists of Hunting up to nth's Place, Making nth's, Hunting down to mth's Place, Making mth's). The plain hunting Path may be a Little Path or a non-Little Path.
    2. No Places are Made above the Hunt Bell Place that transitions the Hunt Bell from Hunting up to Hunting down.
    3. No places are Made below the Hunt Bell Place that transitions the Hunt Bell from Hunting down to Hunting up.
    4. The Parent Method does not use Jump Changes.
2. Steps The steps to implement this Extension Process are shown using the following example where St Simon's Bob Doubles[7] is the Parent Method:

[7] https://complib.org/method/10560

Doubles

pn	B	H	A
5			5
1	1		
5			5
3	3		
5		5	
3	3		
5			5
1	1		
5			5
125		1	25

Minor

pn	B	H	A
16		1	6
x			
16	1		6
x			
36	3	6	
x			
36	3	6	
x			
16	1		6
x			
16		1	6
36			36

1. Rotate the Parent Method (if necessary) so that the lower Place of the Hunt Bell is the Lead End Change.
2. Divide the place notation (shown in column pn) of the Parent Method into Places Made below the Hunt Bell, Places Made by the Hunt Bell, and Places Made above the Hunt Bell. These Places are entered in the columns headed B, H and A respectively.
3. Start by copying all the Places Made in the Parent Method (split into columns B, H and A) to the same Changes in the Extension.
4. Place Made below the Hunt Bell are left unchanged in the Extension. See the four Places in column B in the example above (highlighted in green).
5. Insert a new Change at the start of the Plain Lead and another new Change at the end of the Plain Lead.
6. Move the upper Place for the Hunt Bell one Place higher, and also move it one Change earlier in the Plain Lead. So 5 in the Parent Method in column H becomes 6 in the Extension one Change earlier (highlighted in ligher blue).
7. Add Places for the additional Hunt Bell two changes after the Places for the original Hunt Bell. See the added 1 and 6 in column H in the example above (highlighted in darker blue), noting that the additional 1 has wrapped around to be the first Change of the Plain Lead.
8. Move the Places above the Hunt Bells that are Made before the Hunt Bells reach their higher Places one Place higher, and also move them one Change earlier in the Plain Lead. So 5 and 5 in the Parent Method in column A become 6 and 6 in the Extension one Change earlier (highlighted in lighter pink).
9. Move the Places above the Hunt Bells that are Made after the Hunt Bells reach their higher Places one Place higher, and also move them one Change later in the Plain Lead. So 5, 5 and 25 in the Parent Method in column A become 6, 6 and 36 in the Extension one Change later (highlighted in darker pink).
10. Then recombine the Places in columns B, H and A to obtain the place notation for the Extension to Minor.
11. Rotate the new Method if required to give the desired Extension.

3. Extension Construction

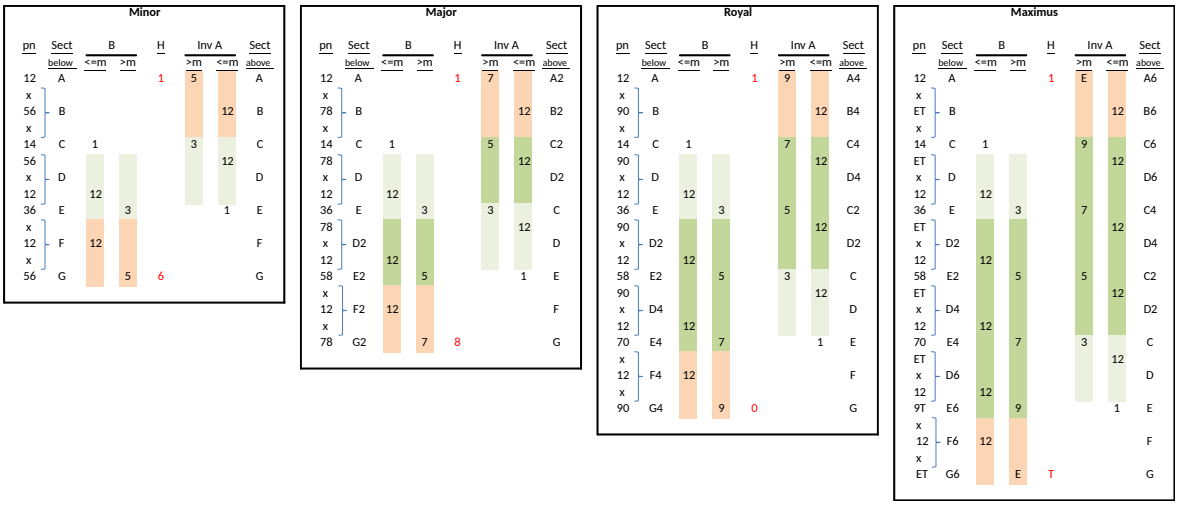
1. The Extension Construction for referring to this Extension Process is 'EP2', where EP2 refers to Extension Process 2. So St Simon's Bob Doubles is extended using Extension Construction EP2. This Extension Process does not use any parameters.

3. Extension Process 3

Extension Process 3 extends a Parent Method by copying and possibly expanding some of its Changes. This Extension Process is designed to extend Parent Methods that are Hunters with a Hunt Bell that has a non-Little Path. The resulting Extension is an even number of Stages higher than the Parent Method.

Extension Process 3 is undoubtedly complex, requiring many steps to implement. However it is the Extension Process that has been used to name the greatest number of Extensions in the Methods Library, and it gives results that often correspond to how a ringer might expect a Method to extend by visual inspection of the Method's blue line.

1. Prerequisites The prerequisites for this Extension Process are as follows:
    1. The Parent Method is a non-Little Plain or Treble Dodging Method, or a non-Little Alliance Method with a Hunt Bell Path formed from these two. This Extension Process may also be applied to some other forms of Hunter with a Hunt Bell that has a non-Little Path.
    2. The Parent Method does not use Jump Changes.
2. Steps The steps to implement this Extension Process are shown using the following example where Milton Surprise Minor[8] is the Parent Method:



    1. Rotate the Parent Method (if necessary) so that the bell in 1st's Place at the initial Row (referred to as the treble for the rest of this section) is a Hunt Bell that has a non-Little Path.
    2. Group the place notation (shown in column pn) into sections depending on the Place of the treble, as follows:
        - A – treble leading
        - B – treble in 1-2
        - C – treble in 2-3
        - D – treble in 3-4 or lying in Singles
        - E – treble in 4-5 or lying in Minimus
        - F – treble in 5-6 or lying in Doubles
        - G – treble in 6-7 or lying in Minor
        - H – treble in 7-8 or lying in Triples
        - I – treble in 8-9 or lying in Major
        - etc.

        The section letters are shown in the example above under the 'Sect below' and 'Sect above'

[8] https://complib.org/method/14931

headings. Note that in the Parent Method these two columns each contain the same section letters – this changes in the Extensions.

3. Select a Mode m to be used above the treble and below the treble. Mode is greater than or equal to 1, and less than the Stage of the Parent Method. In the example above, Mode 2 has been selected for both above and below the treble. However, the Modes can be different above and below.
4. Divide the place notation (shown in column pn) of the Parent Method into Places Made below the treble ('B'), Places Made by the treble ('H' for Hunt Bel), and Places Made above the treble ('A').
5. The Places Made above the treble are then inverted – i.e. they are counted from the back of the Row instead of from the front. For example, 5th's Place in Minor becomes 2nd's Place when counted from the back.
6. Then sub-divide the Places above the treble and below the treble into those that are less than or equal to the Mode, and those greater than the Mode. In the example above, since the Mode selected is 2, Places in 1st's or 2nd's are in one sub-division, and the other Places are in the other sub-division.
7. The resulting Places are then entered into their respective 5 columns as shown above: B (<=m), B (>m), H, Inv A (>m), and Inv A (<=m), where m is the Mode.
8. Select a set of adjacent sections below the treble to copy. There must be an even number of adjacent sections in the set. In the example above, sections D and E have been chosen for copying (shaded in lighter green).
9. Determine the step size. The step size is equal to the number of sections in the set selected for copying. In the example above, since two sections have been selected (D and E), the step size is 2. The step size also determines the number of Stages higher the Extension will be. In the example above with a step size of 2, Minor will be extended to Major.
10. The Places in the selected sections are copied and inserted into the sequence immediately following the selected sections. For Places that are less than or equal to the Mode, no changes are made to these Places during the copying. For Places that are greater than the Mode, these are increased by the step size when copied. In the example above, the inserted sections are shown in darker green. It can be seen that Places 12 remain as 12 in the inserted sections, whereas 3 becomes 5 in the inserted sections.
11. The inserted sections are given the same lettering as the sections they were copied from, but modified to reflect the increase of the Places. So in the Extension to Major, D and E are copied to new sections that are labelled D2 and E2 respectively, where 2 is the step size.
12. Places in the sections following the sections that have been inserted are also increased by the step size if they are greater than the Mode m. In the example above, the sections following the inserted sections are shaded in orange. It can be seen that Places 12 remain 12, whereas 5 becomes 7 in the Extension.
13. The lettering of the sections following the inserted sections is modified to reflect the increase of the Places. In the example above, F and G in the Parent Method become F2 and G2 in the Extension to Major.
14. The process for extending the Places above the treble is the same as below the treble, except that the copying and expanding occurs in the reverse direction (i.e. starting from the half lead and working back towards the start of the lead), and the Mode is counted from the back of the Row instead of from the front. In the example above, sections C and D are selected for copying above the treble. These are inserted earlier in the lead as C2 and D2 respectively. The sections before the inserted sections (A and B) become A2 and B2 respectively in the Extension to Major.
15. Increase the upper Place of the treble by the step size and move it to the new Halflead Change. So 6 in Minor becomes 8 in Major in the example above.
16. Then reinvert the Places in the two Inv A columns, and recombine the Places in all 5 columns to

obtain the place notation for the Extension.

17. Rotate the new Method if required to give the desired Extension.
18. To obtain further Extensions at higher Stages, each higher by the step size, the sections selected for copying can be inserted repeatedly, increasing the Places that are greater than the Mode by the step size for each insertion. In the example above, Royal is obtained by inserting the D, E sections below the treble twice, once as D2, E2, and again as D4, E4. To obtain Maximus, the C, D sections above the treble have been inserted three times, once as C2, D2, once as C4, D4, and again as C6, D6.

3. Requirements An Extension produced using Extension Process 3 is only valid if:
    1. The Extension has the same Symmetry (see Section 4.B) as the Parent Method.
    2. The Extension has the same number of Hunt Bells as the Parent Method, unless the Parent Method only has Hunt Bells and has no Working Bells, in which case the Extension also only has Hunt Bells.
    3. The Extension has the same number of Cycles of Working Bells as the Parent Method.
    4. If the Parent Method comprises two or more Cycles of Working Bells of equal size, the Extension has this same feature.
    5. If the Parent Method has Plain Bob Leadheads, the Extension also has Plain Bob Leadheads. If the Parent Method does not have Plain Bob Leadheads, the Extension also does not have Plain Bob Leadheads.
    6. The Extension Construction used, when applied to the Parent Method in question, creates an Extension Path containing a minimum of 3 Methods (including the Parent Method) with Stages that are less than or equal to Stage 24.
4. Extension Construction
    1. The Extension Construction for referring to this Extension Process is 'EP3-[Mode above the treble][sections copied above the treble]/[Mode below the treble][sections copied below the treble]'.
    2. EP3 refers to Extension Process 3. In the example above, the Mode was 2 both above and below the treble. Sections C and D were copied above the treble, and sections D and E were copied below the treble. The Extension Construction used in the example is therefore EP3-2CD/2DE.
5. Other considerations
    1. The example above uses a set of two adjacent sections to be copied and inserted, giving an Extension that is two Stages higher. Larger sets of sections can be copied and inserted, provided the number of sections is even. For example, sections D, E, F and G could be selected for copying and inserting. Since four sections are involved, the step size is 4, and so the first Extension would be four Stages higher than the Parent Method. D4, E4, F4 and G4 sections would be inserted in the first Extension. In the next Extension (which would be eight Stages higher than the Parent Method), D8, E8, F8 and G8 sections would also be inserted, and so on. Superlative Surprise Major is an example of a Method that extends in steps of 4 Stages. The Extension Construction for Superlative's Extension Process is EP3-3ABCD/3FGHI.
    2. Different size sets of sections may be copied and inserted above and below the treble. For example, sections D, E, F and G could be selected below the treble, and sections A and B could be selected above the treble. In order to extend the Length of the Plain Lead by the same number of Changes above and below the treble, the sections above the treble would need to be copied and inserted twice for every one time the sections below the treble are copied and inserted. The resulting Extension in this example is four Stages higher than the Parent Method. So D4, E4, F4 and G4 sections would be inserted below the treble in the first Extension, and A4, B4, A2 and B2 sections would be inserted above the treble in the first Extension. For example, there is an Extension Process for Cambridge Surprise Major that uses steps of 2 above the treble and steps of 4 below the treble. The Extension Construction for this Extension Process is EP3-1AB/4CDEF.

3. When the same results are obtained by copying different sections, designate the sections closest to the start of the lead as the ones that were copied. This ensures that whatever Stage Method is taken as the Parent Method in a set of Methods that are on the same Extension Path, the same Extension Construction will result. E.g. in the Milton Surprise Minor example above, it can be seen that if sections A and B were copied above the treble instead of sections C and D (while keeping the Mode as 2) the same results would be obtained. Therefore the Extension Construction for Milton Surprise Minor above should be described as EP3-2AB/2DE, rather than EP3-2CD/2DE. (The CD sections above the treble were used in the example above to show what happens to the AB sections above the treble in the Extension.)
4. When two or more different Modes give the same results, designate the Mode used as the lowest one.
5. Finally, the example and descriptions above assume the Parent Method has Palindomic Symmetry about the Leadend Change and the Halflead Change. For non-Palindromic Methods, Extension Process 3 may be applied separately in both halves of the Plain Lead, subject to the following:
6. If the Places Made below the treble are Palindromic, or the Places Made above the treble are Palindromic, then an Extension Construction is selected that retains that symmetry in the Extension.
7. If the Places Made above the treble in the first half of the Plain Lead have Rotational Symmetry with the Places Made below the treble in the second half of the Plain Lead, or the Places Made below the treble in the first half of the Plain Lead have Rotational Symmetry with the Places Made above the treble in the second half of the Plain Lead, then an Extension Construction is selected that retains that symmetry in the Extension.
8. An example of an Extension Construction for a non-Palindromic Method is EP3-1AB/2DE/3JK/2OP. The four copied sections are respectively:
    - Above the treble before the Halflead Change;
    - Below the treble before the Halflead Change;
    - Below the treble after the Halflead Change; and
    - Above the treble after the Halflead Change.

4. Extension Process 4

1. **Introduction** EP4 replaces the former EP1 and EP3 extension processes, and also enables a greater range of extensions beyond those provided by EP1 and EP3. It produces extensions that can both keep the lead length fixed (replacing EP1), and expand the lead length (replacing EP3). EP4 can also contract a parent method to lower stages. In addition, EP4 can produce extensions that are a single stage higher, as well as the more common scenario of producing extensions that are an even number of stages (usually two) higher. There are three variants of EP4: single mode, double mode, and triple mode. These are described below, and examples are provided further below for each one.
    1. In a single mode extension, a method's places are extended together, without any further separation, in a single process.
    2. In a double mode extension, a method's places are separated into below-the-hunt places and above-the hunt places, with each subset extended separately. Double mode extension relies on the hunt bell having a path that can only extend in one way, such as with Plain and Treble Dodging methods.
    3. In a triple mode extension, a method's places are separated into hunt bell places, below-the-hunt places, and above-the hunt places, with each subset extended separately. Triple mode extension is used when it is necessary to specify how hunt bell places extend, such as with certain Alliance and Treble Place methods.

    The ability to use different modes simplifies the extension process for some methods, and supports a wider range of extensions in other cases. The above variants of EP4 are all described below. It will be

seen that EP4 in all variants uses the same core process to generate extensions. In addition to mode, there are two other key parameters to specify when using EP4:

1. Stage increment: This specifies the increase in the stage of the extension versus the parent, and is a positive integer, except that in contraction it is a negative integer.
2. Overlap length: This specifies how the half lead length changes in the extension versus the parent. It can be zero (giving an extension where the lead length doesn't change), or a positive integer. If the overlap length is a positive integer and the stage increment is positive, then the half lead length of the extension (versus the parent) increases by the overlap length. If the overlap length is a positive integer and the stage increment is negative, then contraction is being performed, and the half lead length decreases by the overlap length.

2. **Single Mode, Fixed Lead Length** The diagram below shows EP4 used in single mode with an overlap length of zero to extend Stedman Doubles[9].

EP4: Stedman
Variant: Single mode
Stage increment: 2
Overlap length: 0

	Change	0	1	2	3	4	5	6
1	**Place notation for Doubles**	1	3	1	5	3	1	3
	Extend all places							
	Mode: 3							
2	Extend places above the mode by the stage increment	1	3	1	7	3	1	3
3	**Place notation for Triples (2)**	1	3	1	7	3	1	3

The places in line 1 above either remain unchanged in line 2 if they are less than or equal to the mode, or they increase by the stage increment if they are greater than the mode. Since the mode in this example is 3, the places in line 2 are the same as line 1, except that 5th's place in line 1 becomes 7th's place in line 2. EP4 in single mode with a fixed lead length can be used to extend Principles and Little methods. It can't be used for Hunters with non-Little paths. But note that Principles and Little methods can also be extended on an expanding lead length basis.

3. **Single Mode, Expanding Lead Length** The diagram below shows EP4 used in single mode with an expanding lead length to extend St Clement's College Bob Minor[10].

EP4: St Clement's College Bob
Variant: Single mode
Stage increment: 2
Overlap length: 2

	Change	0	1	2	3	4	5	6	7	8
1	**Place notation for Minor**	12	-	16	-	36	-	36		
	Extend all places									
	Overlap start: 3 Mode: 3									
2	Segment 1	12		16		36				
3	Segment 2					36		36		
4	Connect the two segments	12		16		36		36		36
5	Extend places above the mode by the stage increment	12		18		38		38		38
6	**Place notation for Major (5)**	12	-	18	-	38	-	38	-	38

This example shows how overlapping segments are used to generate extensions. The first step is to list the place notation for a half lead of the method (line 1). By convention, the lead end change is shown first, and is labelled as change 0. The subsequent changes for a half-lead are then shown and are labelled as changes 1 to n, where n is half the lead length. The next step is to separate the place notation into two overlapping segments, as specified by the Overlap start and Overlap length parameters. This gives segments 1 and 2, as shown in lines 2 and 3 above. These two segments are then connected as shown in

[9] https://complib.org/method/27834
[10] https://complib.org/method/11369

line 4. Different extensions can be produced by selecting different overlap start and mode parameters. Finally, the relevant places are extended. Since the mode is 3, the places in line 5 are the same as line 4 if they are 3rd's place or lower, otherwise they are 2 places higher.

4. **Double Mode** The diagram below shows EP4 used in double mode to extend Cambridge Surprise Minor[11].

EP4: Cambridge Surprise
Variant: Double mode
Stage increment: 2
Overlap length: 4

	Change	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**Place notation for Minor**	12	-	36	-	14	-	12	-	36	-	14	-	56				
	Extend the places below the hunt bell																	
	Overlap start: 5 Mode: 1																	
2	Places below the hunt bell					1		12		3		14		5				
3	Segment 1					1		12		3								
4	Segment 2							12		3		14		5				
5	Extend places above the mode in segment 2 by the stage increment							14		5		16		7				
6	Connect the two segments					1		12		3		14		5		16		7
	Extend the places above the hunt bell																	
	Overlap start: 7 Mode: 1																	
7	Places above the hunt bell	2		36		4				6								
8	Reverse and invert the above					1				3		14		5				
9	Segment 1					1				3		14						
10	Segment 2									3		14		5				
11	Extend places above the mode in segment 2 by the stage increment									5		16		7				
12	Connect the two segments					1				3		14		5		16		7
13	Reverse and invert the above	2		38		4		58		6				8				
14	**Place notation for Major (6 + 13 + hunt bell places)**	12	-	38	-	14	-	1258	-	36	-	14	-	58	-	16	-	78

In a double mode extension, the place notation is separated into places below the hunt bell and places above the hunt bell. Each of these subsets is then processed in a similar manner to the previous example, but with two differences:

1. In a single mode extension, the place notation is extended after the two segments are connected. But in a double mode extension (and also triple mode), only the places in segment 2 are extended. The extension of the places therefore occurs before the two segments are connected, as can be seen in lines 4, 5 and 6 above.
2. When extending the places above the hunt bell, the first step is to reverse and invert the places (see line 8 above). This restates the places on a basis that is equivalent to places below the hunt bell, such that the same process used to extend below-the-hunt places can be used for above-the-hunt places. A final step is then added to reverse and invert the resulting extended places, to convert them back to above-the-hunt places (see line 13).

Double mode is used to extend Hunters where the hunt bell path can only extend in one way, such as with Plain and Treble Dodging methods. This can include Little Plain and Little Treble Dodging methods (the extension will be 'less Little', but will still be Little).

5. **Triple Mode** The diagram below shows EP4 used in triple mode to extend Nightingale Treble Place Minor[12].

[11] https://complib.org/method/14568
[12] https://complib.org/method/29353

EP4: Nightingale Treble Place
Variant: Triple mode
Stage increment: 2
Overlap length: 4

	Change	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**Place notation for Minor**	12	34	-	34	16	34	-	34	16	34	-	34	16				
	Extend the places of the hunt bell																	
	Overlap start: 4 Mode: 1																	
2	Places of the hunt bell	1					3		4					6				
3	Segment 1	1					3		4									
4	Segment 2						3		4					6				
5	Extend places above the mode in segment 2 by the stage increment						5		6					8				
6	Connect the two segments	1					3		4		5		6					8
	Extend the places below the hunt bell																	
	Overlap start: 8 Mode: 1																	
7	Places below the hunt bell					1			3	1	34		34	1				
8	Segment 1					1			3	1	34		34					
9	Segment 2									1	34		34	1				
10	Extend places above the mode in segment 2 by the stage increment									1	56		56	1				
11	Connect the two segments					1			3	1	34		34	1	56		56	1
	Extend the places above the hunt bell																	
	Overlap start: 8 Mode: 1																	
12	Places above the hunt bell	2	34		34	6	4			6								
13	Reverse and invert the above					1			3	1	34		34	5				
14	Segment 1					1			3	1	34		34					
15	Segment 2									1	34		34	5				
16	Extend places above the mode in segment 2 by the stage increment									1	56		56	7				
17	Connect the two segments					1			3	1	34		34	1	56		56	7
18	Reverse and invert the above	2	34		34	8	56		56	8	6			8				
19	**Place notation for Major (6 + 11 + 18)**	12	34	-	34	18	3456	-	3456	18	3456	-	3456	18	56	-	56	18

In a triple mode extension, the place notation is separated into places of the hunt bell, places below the hunt bell, and places above the hunt bell. Each of these subsets is then processed in a similar manner to the previous example. Triple mode is used to extend Hunters where it is necessary to specify how hunt bell places extend, such as with certain Alliance and Treble Place methods. This can include Little methods where the hunt bell path could be extended in more than one way.

6. **Contraction** The diagram below shows EP4 used in double mode to contract Kent Treble Bob Minor[13].

EP4: Kent Treble Bob
Variant: Double mode
Stage increment: -2
Overlap length: 4

	Change	0	1	2	3	4	5	6	7	8	9	10	11	12
1	**Place notation for Minor**	16	34	-	34	16	-	12	-	16	-	12	-	16
	Contract the places below the hunt bell													
	Overlap start: 3 Mode: 2													
2	Places below the hunt bell					1		12		1		12		1
3	Segment 1					1		12						
4	Segment 2									1		12		1
5	Contract places above the mode in segment 2 by the stage increment									1		12		1
6	Overlap the two segments, merging the common changes					1		12		1				
	Contract the places above the hunt bell													
	Overlap start: 1 Mode: 1													
7	Places above the hunt bell	6	34		34	6				6				
8	Reverse and invert the above					1				1	34		34	1
9	Segment 1					1								
10	Segment 2									1	34		34	1
11	Contract places above the mode in segment 2 by the stage increment									1	12		12	1
12	Overlap the two segments, merging the common changes					1	12		12	1				
13	Reverse and invert the above	4	34		34	4								
14	**Place notation for Minimus (6 + 13 + hunt bell places)**	14	34	-	34	14	-	12	-	14				

In most cases, extension works in both directions. E.g. Kent Treble Bob Minor can be extended to Kent Treble Bob Major, and Kent Treble Bob Major can be contracted with the inverse process to obtain Kent Treble Bob Minor. The parent method is usually designated as the version of a method family that has the lowest stage, and then only extensions above that stage need to be considered. However, is some cases a method can be contracted to give a recognizable version of the method at a lower stage, but it can't then be extended back to the original stage. The reason for this is that places can 'cross the mode'. Kent Treble Bob Minimus provides a good example of this. Kent is usually extended above the treble using a mode of 1, as this causes the 3-4 Kent places to remain in 3-4 as the method is extended. However, when Kent is contracted from Minor to Minimus, places made in 6th's become places made in 4th's. But when attempting to re-extend Minimus back to Minor, it isn't possible under EP4 to specify that the 4th's places that are part of the Kent 3-4 places should remain in 4th's, but the other places in 4th's should extend to 6th's. Contraction therefore enables designation of Kent TB Minor as the parent stage, with higher stages

[13] https://complib.org/method/26082

obtained by extension, and one lower stage (Minimus) obtained by contraction. It will be seen from the diagram above that the contraction process is the inverse of the extension process. Crucially, contraction only works if the places that become overlapped are the same in both segments.

7. **Single Stage** The diagram below shows EP4 used with a single stage increment to extend Brampford Speke Bob Minor[14].

EP4: Brampford Speke
Variant: Triple mode
Stage increment: 1
Overlap length: 1

	Change	0	1	2	3	4	5	6	7
1	**Place notation for Minor**	12	56	16	-	16	-	36	
	Extend hunt bell and adjacent places								
	Overlap start: 1 Mode: 1								
2	Internal hunt bell places and adjacent working bell places	2							
3	Segment 1	2							
4	Segment 2								
5	Extend places above the mode in segment 2 by the stage increment								
6	Connect the two segments	2							
	Extend the places below the hunt bell								
	Overlap start: 0 Overlap length: 2 Mode: 3								
7	Internal places below the hunt bell (excluding any in 2 above)							3	
8	Segment 1							3	
9	Segment 2							3	
10	Extend places above the mode in segment 2 by the stage increment							3	
11	Connect the two segments, discarding any places that overflow the half-lead							3	3
	Extend the places above the hunt bell								
	Overlap start: 0 Mode: 1								
12	Internal places above the hunt bell (excluding any in 2 above)		5						
13	Reverse and invert the above						2		
14	Segment 1								
15	Segment 2						2		
16	Extend places above the mode in segment 2 by the stage increment						3		
17	Connect the two segments							3	
18	Reverse and invert the above		5						
19	**Place notation for Triples (6 + 11 + 18 + external places required for hunt bell)**	127	5	1	7	1	7	1	7

[Notes: this process requires a different overlap length for the places below the hunt bell, compared with the overlap length for the places of the hunt bell and the places above the hunt bell. It is also necessary to discard a place that overflows the half-lead. An alternative process that addresses these issues is shown below, but it requires other modifications to the general process. At the moment, the process above also includes places made adjacent to a hunt bell place as part of the process to extend the hunt bell. All to be discussed.]

8. **Single Stage — Alternative Process** The diagram below shows EP4 used with a single stage increment to extend Brampford Speke Bob Minor[15].

[14] https://complib.org/method/11901
[15] https://complib.org/method/11901

EP4: Brampford Speke (Alternative Process)

Variant: Triple mode
Stage increment: 1
Overlap length: 1

	Change			0	1	2	3	4	5	6	7
1	**Place notation for Minor**			12	56	16	-	16	-	36	
	Extend the hunt bell										
	Mode: 1										
2	Hunt bell places and movements			1	1→2	2→3	3→4	4→5	5→6	6	
3	Segment 1	Start: 0	End: 1	1	1→2						
4	Segment 2	Start: 1	End: 6		1→2	2→3	3→4	4→5	5→6	6	
5	Extend movements, and places above the mode in segment 2 by the stage increment				2→3	3→4	4→5	5→6	6→7	7	
6	Connect the two segments			1	1→2	2→3	3→4	4→5	5→6	6→7	7
	Extend internal places below the hunt bell										
	Mode: 3										
7	Internal places below the hunt bell									3	
8	Segment 1	Start: 0	End: 6							3	
9	Segment 2	Start: 5	End: 5								
10	Extend places above the mode in segment 2 by the stage increment										
11	Connect the two segments									3	
	Extend internal places above the hunt bell										
	Mode: 1										
12	Internal places above the hunt bell			2	5						
13	Reverse and invert the above								2	5	
14	Segment 1	Start: 0	End: 0								
15	Segment 2	Start: 0	End: 6						2	5	
16	Extend places above the mode in segment 2 by the stage increment								3	6	
17	Connect the two segments									3	6
18	Reverse and invert the above			2	5						
19	**Place notation for Triples (6 + 11 + 18)**			127	5	1	7	1	7	3	7

Single stage extension requires two modifications to the processes seen previously:

1. Single stage extension is used primarily with Plain methods. In such methods, the presence or absence of external places (in changes where there isn't an internal place) is the result of needing to keep the hunt bell plain hunting. For example, 7th's place at change 1 in Plain Bob Triples is not derived from 6th's place at change 1 in Minor—change 1 in Minor has the cross change. Single stage extension therefore can't be derived solely from operations on the place notation—it is also necessary to extend the movements of the hunt bell. The movement notation a→b is used to mean 'In this change, the hunt bell moves from place a to place b', where a and b are adjacent places. E.g. 1→2 and 5→4. Following on from this, only internal places need to be part of the extension process, as any additional external places needed result from the hunt bell movements.
2. In single stage extension, segment 2 may not continue all the way to the half lead change, and segment 1 may continue past the end of segment 2. Start and end changes for segments 1 and 2 are therefore specified individually, instead of specifying an overlap start. The values chosen for the segment starts and ends must be consistent with the Overlap length parameter.

Using these two modifications, the diagram above shows how hunt bell places and movements, internal places below the hunt bell, and internal places above the hunt bell are each extended.

9. **Additional Considerations** Multiple hunt bells: The examples above are limited to methods with no more than one hunt bell. Methods with multiple coursing hunt bells can be extended in the same way. [Add examples of Grandsire extended in steps of two stages using double mode, and also in steps of one stage using triple mode.] Non palindromic methods: The examples above use palindromic methods. Non-palindromic methods can be extended by applying the processes above separately to each half of the method. The changes of the second half of the method are reversed prior to applying the extension operations, and the resulting extended changes are then re-reversed as the final step. [Add an example of a non-palindromic extension.] Jump changes and dynamic methods: EP4 is not designed to be used with methods containing jump changes, or dynamic methods.
    1. Requirements for extensions to be valid

1. The Extension has the same Symmetry (see Section 4.B) as the Parent Method.
2. The Extension has the same number of Hunt Bells as the Parent Method, unless the Parent Method only has Hunt Bells and has no Working Bells, in which case the Extension also only has Hunt Bells.
3. The Extension has the same number of Cycles of Working Bells as the Parent Method.
4. If the Parent Method comprises two or more Cycles of Working Bells of equal size, the Extension has this same feature.
5. If the Parent Method has Plain Bob Leadheads, the Extension also has Plain Bob Leadheads. If the Parent Method does not have Plain Bob Leadheads, the Extension also does not have Plain Bob Leadheads.
6. The Extension Construction used, when applied to the Parent Method in question, creates an Extension Path containing a minimum of 3 Methods (including the Parent Method) with Stages that are less than or equal to Stage 24.

Standard parameters: When the same results are obtained by using different overlap starts, use the overlap start that is closest to the start of the lead. When the same results are obtained by using different modes, use the lowest mode. EP4 extension construction notation: [To be discussed.]

Appendix E. False Courseheads

1. This appendix shows groupings of false courseheads. It is possible for one course of a method to contain one or more rows that also appear in another course of the same method. For example, the course of Cambridge Surprise Major that starts with 13245678 (which is referred to as this course's coursehead) contains the row 12345678 after the 2nd change of the 5th lead. The course with coursehead 13245678 is therefore false against the plain course. Furthermore, it can be shown that courses that are false against a reference course (which is usually taken to be the plain course) occur in groups that are consistent across methods of the same type, such as methods with Plain Bob leadheads and one hunt bell, where the hunt bells have the same path. The table below shows the falseness groupings of the 120 courses that comprise all the possible orderings of bells 2 to 6. These groupings apply to palindromic methods with an even stage of 8 or higher, with Plain Bob leadheads, and with a single hunt bell that follows a Treble Dodging path. As the table only considers the possible orderings of bells 2 - 6 (the working bells), the remaining bells (the fixed bells) are removed from the table for conciseness. The treble (i.e. the hunt bell) is also removed. For example, coursehead 34265 is referring to 13426578 when considering Major, 1342657890 when considering Royal, and so on. The table below is divided into courseheads that are "in-course" and courseheads that are "out-of-course". In-course courses are those that can be reached with bobs only (place notation 14 or 1[n-2]) when starting from rounds. Out-of-course courses are those that can only be reached with bobs plus an odd number of singles (1234 or 1[n-2][n-1][n]) when starting from rounds. False coursehead groups that are designated below by uppercase letters A to U contain in-course false courseheads, and may also contain out-of-course false courseheads. Groups designated by lowercase letters a to f contain only out-of-course false courseheads. Groups A to U and a to f also include tenors-split members that are not shown in these tables. There are 3 additional groups, X, Y and Z, that only have tenors-split members and do not have any tenors-together members. As these tables only show tenors-together members, groups X, Y and Z show below as not having any members.

2.

Group code	A	B	C	D	E	F	G	H	I	K	L
In-course	23456	24365	25634	32546 46253	32465 43265	45236 32654	56423 63542	53462 63425	54632 65324	65432 53624	26543) L1 42563) L2 36245)
Out-of-course	[None]	25436 32456 23654 43256	42365 34265	53426 63452 24356	25364 24635	26345 24563	[None]	56243 62543 46523 36542	[None]	46352) K1 52346) 64253) 34526) 64325) K2 54362)	[None]

Group code	M	N	O	P	R	S	T	U
In-course	23564 23645 25463 26435	34562 62345 46325 54263	52643 36524 65243 46532	54326) P1 64352) 56342) P2 64523)	45623 56234 35642 62534	52364 34625 64235 45362	24536 25346 36452 43526 62453 26354 53246 24653	34256) U1 42356) 43652) 63254) 52436) 35426) 35264) U2 42635)
Out-of-course	[None]	62435) N1 53264) 43625) 35462) 65234) N2 45632) 52634) 35624)	63524 53642 56432 65423	[None]	[None]	[None]	32564 32645 46235 45263	[None]

Group code	a	b	c	d	e	f
In-course	[None]	[None]	[None]	[None]	[None]	[None]
	23465) a1		35246	34652	36425	54623
			42536	45326	52463	56324
	23546) a2	26534	42653	62354	43562	65342
Out-of-course	26453)	25643	36254	54236	63245	64532

Group code	X	Y	Z
In-course	[None]	[None]	[None]
Out-of-course	[None]	[None]	[None]

3. In Major, groups that include both in-course and out-of-course false courseheads always occur as complete groups. However, in Royal and above, in-course and out-of-course components of a group may occur independently. Therefore in the Methods Library, in-course and out-of-course groups are shown separated by a ”/” for Royal and higher. For example, E/Bc indicates that the in-course false courseheads of group E, and the out-of-course false courseheads of groups B and c apply to the method (Royal or higher) in question. A further consideration in Royal and higher is that certain of the groups defined above, K, L, N, P, U and a, can subdivide. The subdivisions, indicated by K1, K2, L1, L2, N1, N2, P1, P2, U1, U2, and a1, a2 are also shown in the table above. A Royal or higher method might therefore include U1 rather than U before the ”/”, or N2 rather than N after the ”/”.
4. **Example:** Ibstock Surprise Royal has the following in the Methods Library:

	FCHs
Ibstock	L1/BDK1c

   The false courseheads associated with Ibstock are accordingly: In-course: 26543 Out-of-course: 25436, 32456, 23654, 43256, 53426, 63452, 24356, 46352, 52346, 64253, 34526, 35246, 42536, 42653, 36254
5. **Example:** A composition might be advertised as being ’true to BDEKacdefYZ’. A band is considering using this composition to ring Othorpe Surprise Major. The CC Methods Library shows that the false coursehead groups for Othorpe are BDXY. Because Othorpe has group X falseness but the composition does not include X in the list of groups that it is true to, this composition will be false if used with Othorpe.
6. Methods without any in-course false courseheads are referred to as ”cps”, or clear proof scale. However, these methods will usually have out-of-course false courseheads. Bristol Surprise Major is an example of a cps method.
7. A method that is false in the plain course will have false coursehead group A, usually in addition to other groups.

Appendix F. Framework Principles

The Framework has been designed and developed in accordance with the following principles:

1. **Scope**

The scope of the Framework is method ringing (also called scientific ringing). It does not cover call (or called) changes, nor tune ringing. Cylindrical ringing, where a bell can ring twice in some Rows, and not at all in others, is similarly out of scope.

2. **Description not Prescription**

Avoid arbitrary rules and value judgements. Seek to find the logical boundaries that define the limits of method ringing, and ensure the Framework supports everything within these boundaries.

3. **Simple, Generic, Consistent**

The more straightforward the Framework is, the more widely it will be understood across the ringing community and the more accessible it will be to new ringers joining the Exercise. Standardise terms and requirements where this increases simplicity while retaining historical meaning. However, it is also recognised that method ringing has inherent complexity resulting from both its mathematical foundation and its rich history, such that not all complexity can be eliminated.

4. **Define and Explain**

Terms used in the Framework should be clearly defined. Include examples and explanations to assist in the understanding of the Framework. For ease of reference, capitalise terms that are defined in the Framework whenever they are used elsewhere in the Framework.

5. **Continuity**

Most standard Methods and Performances should continue to be described as they have been historically, or with limited alterations where there are clear standardisation or simplification benefits.

6. **Rows**

In method ringing, the same set of bells rings in every Row, with each bell ringing exactly once in every Row.

Not method ringing:

1	2	3	4	5	6
2	1	3	5	4	6
2	3	1	5	6	
3	2	1	6	5	
3	1	2	6	4	5
1	3	2	4	6	5
1	2	3	4	5	6

Not method ringing:

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

Not method ringing:

1	2	3	4	5	6
2	1	3	5	4	2
6	1	5	3	2	4
1	6	5	2	3	1
4	6	2	5	1	3
6	4	2	1	5	6
3	4	1	2	6	5
4	3	1	6	2	4
5	3	6	1	4	2
3	5	6	4	1	3
2	5	4	6	3	1
5	2	4	3	6	5
1	2	3	4	5	6

7. **Places**

In method ringing, each bell rings in a different Place in the Row to every other bell.

Not method ringing:

1	2	3	4	5	6
2	1	3	5	4	6
1	2		3/5		4/6
		1/3/5			2/4/6

where ' / ' indicates bells striking at the same time (i.e. a chord)

8. **Changes**

A Change may be any transformation of one Row to the next. This results in the definition of Jump Changes and Identity Changes in the Framework. The term 'Adjacent Change' has also been introduced to make clear when a Change is not a Jump Change or an Identity Change.

9. **Methods**

In general, Methods are sequences of Changes that have been given names and which are recorded in the Central Council's Methods Library. Any sequence of Changes should be able to be named as a Method.

10. **Truth**

A Block of Rows is True if it comprises 0 to n Extents, plus 1 optional partial Extent. In other words, a Block of Rows is True if either (a) all of its Rows are distinct (only occur once) or (b) when the Block is longer than an Extent, any Rows that remain after removing all Extents are distinct. The location of individual Rows within a Block of Rows does not have any bearing on truth.

Note that the above is subject to (a) treatment of any Cover Bells in the Row (see 11. below), and (b) the related concept of 'Accepted Truth' as defined in the Framework.

11. **Cover Bells**

A Row may include one or more Cover Bells. A Place that is occupied by the same Cover Bell in every Row of a Block (such a Place is referred to in the Framework as a Fixed Place) is excluded when determining truth. Similarly, if Method(s), and/or Method(s) and Call(s), cause a bell to remain in the same Place in every Row of a Block, then this Place is also a Fixed Place and is excluded when determining truth.

12. **Length and Stage**

Ringing of all Lengths on all Stages should be treated alike for simplicity, consistency and permissiveness. Framework definitions should be relevant and applicable to all ringing, not just Peals. For example, the definition of True applies equally to Short Touches, Quarter Peals and Peals, and if 5000 changes is a Peal of Major, then it is also sufficient for a Peal of Minor.

13. **Performance reporting**

Under this permissive Framework, bands decide what they wish to ring, and the onus is on them to determine if a Performance merits publication. The Performance Reporting requirements include disclosures for when the ringing is not covered by the Framework, or when it is covered by the Framework but includes characteristics that differ from established norms (for example, not starting and ending in Rounds). These disclosures can then be used in subsequent analyses of ringing Performances.

Appendix G. Edition 3 Development

A. Team

Edition 3 was developed by the CCCBR Framework Team, which is part of the CCCBR Technical and Taxonomy Workgroup.

The CCCBR Framework team comprises Tim Barnes (team leader), Mark Davies, John Harrison, Graham John, Don Morrison and Philip Saddleton.

B. Objectives

Edition 3 was developed to address:

(a) Suggestions received from members of the ringing community subsequent to the implementation of Edition 2.

(b) Improvements identified by the Framework team.

C. Articles

1. tba

D. Changes

1. tba

Appendix H. Edition 3 Consultation

A. Description

1. The ringing community consultation on Edition 3 opened on tba and ran until tba.

B. Submissions and Responses

1. Submitter #1

tba

tba