

# Notes to Numbers

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**Abstract** Translating conventional music notation for handbell ringers into the numbered style which is particularly suitable for four-in-hand ringers and for community ringers has been largely undertaken by hand, this resulting in a limited quantity of material being available. The author has used AppleScript in conjunction with a number of other scriptable word processing, music and drawing applications to convert regular musical arrangements into a very readable — and reproducible — numbered score.

The potential for this conversion technique is large, initial efforts being concentrated on reproducing the Ulverscroft Large Print Song Book into numbered music which will make it possible for occupational therapists to include bellringing as a very satisfying pastime for their clients. The music so produced can also be quickly converted to PowerPoint projection, complete with MIDI sound files to enable the participants to have a guiding piece of music to play along with as they are learning to play the music.

## Introduction

Historically, handbells were produced to enable tower bell ringers to practice their craft without the ringers having to climb up to the belltower all the time. While doing so it was found that, with the smaller size of the bells, it was also possible to play “tunes”. Since tower bells were numbered from 0 (the highest bell) to 8 or 10 or 12, depending on how many bells were in the peal, it was quite natural that the music for the handbell tunes should be numbered in a similar way. The art of “four-in-hand” ringing was developed and a team of three or four ringers was able to handle sufficient bells to make renditions of carols and other music a very pleasant experience for both performers and listeners.

Handbells are quite expensive but in the last few years a number of alternatives have been produced which make playing this sort of music more available to the general community. One of these is the “belleplate” — which is able to have interlocked handles in the same manner as handbells, enabling the playing of “four-in-hand” music, which is so suited to numbered music. See figure 1.



*Figure 1 – the interlocked handles of “belleplates” – four plates being able to be played by one ringer*

The cost of these plates is about ten percent the cost of handbells — but the music available is limited.

## Movable Tonic

Bell tunes are essentially solfa-based and are easily played in any key, just by choosing a different set of bells. Figure 2 shows the numbers corresponding to tunes played in the keys of C major and G major,

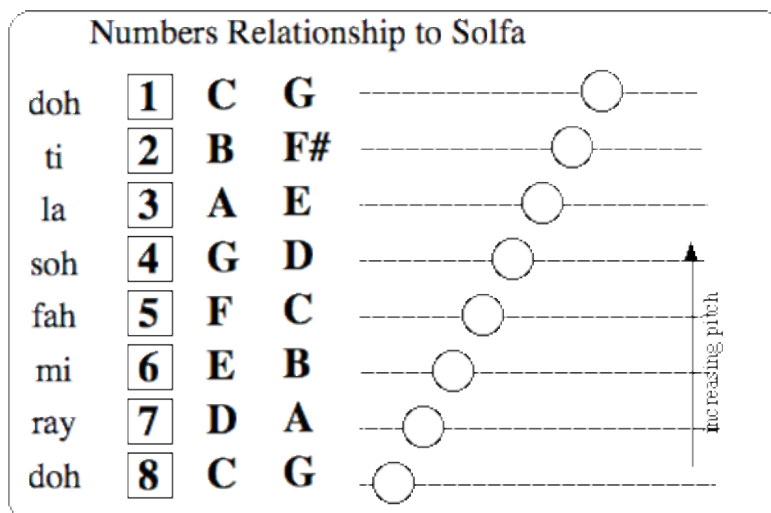


Figure 2: the comparison between the solfa scale, the keys of C major and G major and the numbered scales of bellringing.

For the complete two octave set of bells contained in the regular box of belleplates, a base note of 16 would enable the full range to be covered. If players were using a 3 octave set or a 4 octave set the base note could be increased. Figure 3 shows an appropriate set of bells for the main scale of notes in the 2 octave set. As in regular music “accidentals” are notated by an added sharp (#) or flat (b). In the example given in Figure 3, a C#5 bell would be notated as 13#, an F6 bell would be 3b.

| Key of G Major |     |    |     |   |    |   |
|----------------|-----|----|-----|---|----|---|
| ti             | F#5 | 10 | F#6 | 3 |    |   |
| la             | E5  | 11 | E6  | 4 |    |   |
| soh            | D5  | 12 | D6  | 5 |    |   |
| fah            | C5  | 13 | C6  | 6 |    |   |
| mi             | B4  | 14 | B5  | 7 | B6 | 0 |
| ray            | A4  | 15 | A5  | 8 | A6 | 1 |
| doh            | G4  | 16 | G5  | 9 | G6 | 2 |

Figure 3: A complete 2 octave (plus 2) range of notes requires a base tonic note of 16.

## The Program Suite

The procedures were planned in a series of AppleScripts, shown in Figure 4.

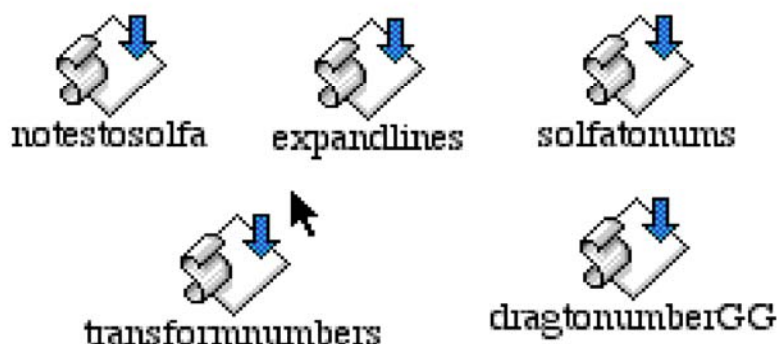


Figure 4 – the Programs in the Suite.

- NotesToSolfa — takes a piece of music in terms of key notes and translates these to solfa notes.
- ExpandLines — indicates lengthened notes by adding lines after the numbers.
- SolfaToNums — changes the solfa notes to numbers with any desirable base note.
- TransformNumbers — optional “extra” which allows you to shift the numbers up or down, condense its range by shifting octave of some notes or crop notes at top and bottom It also reads out the numbered notes for aural checking.
- DragToNumber — final program produces the layout in Canvas with final printed music.

The Canvas files are in 2 layers, with the bar lines and bar numbers on layer 1 and the notes and dynamics on layer 2. This makes easy copy, paste and scaling for maximising viewing in PowerPoint.

### Preparation of the Input “Score”

For convenience an input document was created in NisusWriter where the music arranger interprets a traditional piece of music one bar at a time in terms of standard notes from the printed music. This could be any word processor, as standard find and replace routines are used to produce a text file input to the NotesToSolfa AppleScript application.

An example is shown of such a file for the first 8 bars of a rather simple arrangement from the Ulverscroft Song Book — an ongoing project of the author.

In the example below the notes played in a chord are separated by commas, the notes which are melody notes are preceded by “/”, individual beats are separated by a semicolon. Note lengths of greater than one beat are indicated by a line extending beyond the note, “n4” causing an extension of 4 beats past the initial ringing of the bell. Shorter notes are registered later in the bar — a “p” or “q” at the end indicates that the note should be played after the

beat, while special “t” and “z” codes indicate the presence of a triplet. A numeric indicator after the initial note indicates the octave of the note but repeated inclusion of octave descriptors is not necessary — so that a scale of single notes from C0 to C1 could read <c0;d;e;f;g;a;b;c1;> rather than <c0;d0;e0;f0;g0;a0;b0;c1;>. The opening line includes “diatonic” or “solfa” or “nums” as it is possible to enter the music directly as numbers rather than converting from diatonic or solfa. The second descriptor, “d3” in Fig 5 shows that the diatonic material has a key of “d” and there are 3 beats in the bar. If the bars are irregular in beats it is possible to enter a “0” for the number of beats — and add barlines manually after the canvas file has been produced.

|             |                                  |
|-------------|----------------------------------|
| diatonic d3 |                                  |
| 1:          | a0n2,d1n2,/f,d2n2;/a1;/f;        |
| 2:          | a0n1,/d1n1,d2n1;;/b0,b1;         |
| 3:          | a0n2,/d1n2,f2n2;;;               |
| 4:          | /a0n2,f1n2,d2n2;;;               |
| 5:          | a0n2,/f1,d2;/a1,f2;/f1p,f2p,a2p; |
| 6:          | a0n2,/d1n1,f2n1;;/b0,d2;         |
| 7:          | g0n5,an5,/cn5,e2n2,gn4;;;        |
| 8:          | c1n1;;;                          |

Figure 5: Example Input File.

## Intermediate Steps

Each of the programs has an input text file and outputs a text file which is the direct input to the next step. It is therefore possible to edit the files under any of the formats and rerun the series without always returning to the first step. However, all programs are also incorporated in one large AppleScript program should it be more convenient to do so.

## Final Step

The drawing program used for the creation of the numbered notation was “Canvas 3.5.5”, as it offered considerable drawing control in its AppleScripting. Canvas 7 had minimal AppleScript and Canvas 8 returned to being very scriptable, but the project had been started before Canvas 8 became available. As it is a major task to rescript it for Canvas 8 and as Canvas 3.5.5 is performing the work very well it has not been considered worthwhile to undertake this task — the author preferring instead to prepare more music in the time available.

The Canvas output corresponding to the input file of the example of Figure 5 is included in Figure 6. The highlighted notes are the melody notes and a solfa reader using 18 or 11 as the solfa note should be able to sing the melody to ensure that it is indeed the first few bars of “After the Ball is Over”.

Because the material is prepared in two layers the example shown in figure 6 has been cut from a pdf file of the printed output and does not indicate the quality of the printed file. Also added to the printed page is a listing of the bells needed for performance.



## Ongoing Development

The Handbell Society of Australasia [1] is keen to develop this project further as a number of its members currently do voluntary work with elderly and disabled groups. The ability of the AppleScripted output to create a new supply of numbered music is being very enthusiastically received by members.

## Other Translation Systems

Currently tune music used by bellringers is that produced by members of the Bedford family, who introduced the art of bellringing to Australians [2]. Indeed the music currently available to society members has all been produced by hand by members of the Bedford clan either in England or in South Australia. The author has been in contact with Philip Bedford about the current development and his response was “Your system of printing does work well. I've found using Excel too slow so I've gone back to handwriting.” He does not know of any other translation systems working other than some attempts at using Excel.

## References

- [1] <http://www.handbells.org.au/>
- [2] <http://www.hrgbsw.freemove.co.uk/teams/bedford.html>