

COMPOSING FOR THE AUSTRALIAN CARILLONS

Contents

INTRODUCTION.....	2
INSTRUMENT RANGE	3
PRACTICALITIES AND PHYSICAL CONSTRAINTS.....	4
BASICS FOR COMPOSING	4
HOW MANY NOTES?	4
BELL PARTIALS.....	5
CHORDS AND ARPEGGIOS.....	5
BALANCE.....	7

INTRODUCTION

According to the accepted international definition, the Carillon is: **A musical instrument which consists of at least 23 fixed carillon bells (almost two octaves) arranged in a chromatic series and played from a keyboard that permits control of expression through variation of touch.**

Under this definition, there are currently two carillons in Australia: the University of Sydney War Memorial Carillon (1928) and the National Carillon in Canberra (1970). The two instruments are closely related, both having magnificent English cast bells and a very similar range (see below). English bells typically have a long decay and a very sonorous, rich tone. This contrasts with the bells of European founders, which are generally much lighter and with shorter decay. While the bells of the two instruments are similar, the environments in which they are played are quite different. Each site creates a unique musical experience for the listener. The War Memorial Carillon is very much part of University life, situated in the clock tower above the University quadrangle which gathers and retains the sound. The National Carillon is situated on Aspen Island in Lake Burley Griffin, a location which allows the listener to experience the sound of bells floating out over the water.

The carillon is the largest of all concert instruments; the biggest instruments comprise over 70 bells and weigh in excess of 90 tonnes. The two Australian carillons are moderately large with 54 bells (Sydney) and 55 bells (Canberra) and a total bell weight of over 22 tonnes. While it is played from a direct, mechanical-action keyboard with attached pedal (reminiscent of an organ, see the photo below), it should be remembered that the carillon is, first and foremost, a percussion instrument. The carillon has an exceptionally wide dynamic range which, in the hands of a competent carillonist, allows for musical expression to rival any other acoustic instrument.



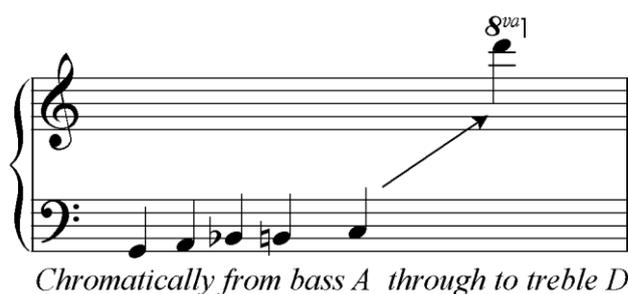
Practice Instrument at Canberra showing the keyboard and foot pedals.

INSTRUMENT RANGE

Carillons are typically transposing instruments like the clarinet or French horn, but there is no standard transposition interval. The National Carillon in Canberra transposes down one semitone: (pitched in B). In other words, a written C will sound as a concert pitch B. The University of Sydney War Memorial Carillon transposes up one semitone (pitched in C#). A played C will sound as a concert pitch C#. As with other transposing instruments, you should write conforming to the carillon's pitch; the ranges set out below reflect this convention.

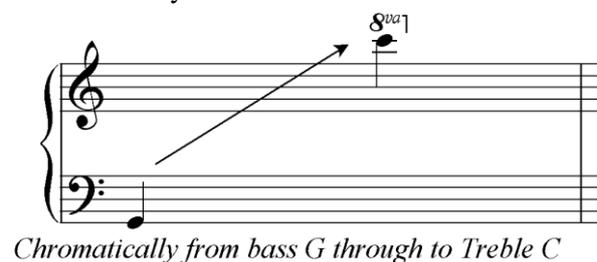
Keyboard range of National Carillon, Canberra

55 bells - please note there is no bass G# (see below)



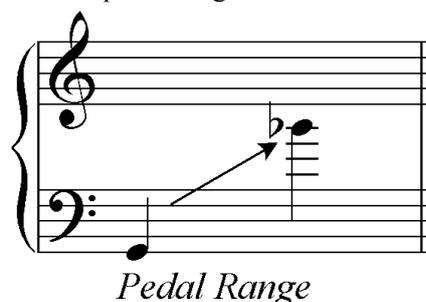
Keyboard range of University of Sydney War Memorial Carillon

54 bells - totally chromatic



All of the notes in these ranges are available on the manual keyboard (played with hands). The pedal board duplicates the lower half of the range: these bells may be played with either the hands or feet. Since more force is required to sound the lower bells (heavier clappers than smaller bells), these are more easily played using the pedals. As a result, the hands generally play from middle C upward.

The bass pedal range is from G to B \flat - middle line treble stave (Canberra has no low G#).



PRACTICALITIES AND PHYSICAL CONSTRAINTS

The physical distance between the lowest and highest notes on the keyboard is such that it is not feasible to ask the performer to play a chord which encompasses the entire range. Similarly, it would be a struggle to play an interval of more than two octaves on the pedal board.

The manual keys or ‘batons’ of the carillon are connected via a system of wires and cranks to the clappers inside the bells. The larger the bell, the heavier the clapper, and the longer the time needed to depress the baton fully. This means that fast filigree work can really only be managed effectively on the mid-range and higher treble bells which have keys with lighter resistance and which move easily.

Carillon music is generally written on two staves. The bass staff represents the part taken by pedals (played with feet). The treble staff represents the batons on the manual keyboard (played with hands).

BASICS FOR COMPOSING

The challenge of playing and composing for the carillon is that once a bell is rung, the sound cannot be stopped. No damping is possible and the hum tone resonates for an extended period, with the length of the decay depending on the size of the bell and dynamic level played. Therefore, careful attention to overall texture is important, allowing a listener to hear melodies and harmonies which are significant while ‘blocking’ out the sonic overlaps. Conversely, one may use the wash of harmonic resonance either to create tension or as a sonic backdrop. The instrument needs to ‘breathe’; highly chromatic harmonies can often collide and create a confusion of sound that the listener cannot unravel. For the same reason, it is important to understand the harmonic tuning of a bell’s overtones, discussed further below.

HOW MANY NOTES?

The bulk of carillon playing occurs with the hands on the manual keyboard.

1. The carillonist generally plays one note at a time in succession, each hand alternating – particularly in fast passages. The predominant hand position is the loosely-clenched fist, used to hit the batons like a percussion mallet. The carillon is very agile in the higher register.
2. In slower passages, the hands may be opened to play two or more notes simultaneously. The widest interval for each hand is a perfect fourth - although this can be challenging for players with smaller hands, particularly if it involves one “white” note & one “black” note.
3. Smaller intervals and clusters may be played with the same open-hand position, bearing in mind the risk of acoustic overload if the texture is too dense.
4. Tremolando – Once the bell is struck, its sound dies away gradually in a natural diminuendo. One useful expressive technique is the fast alternation of repeated notes, called *tremolando*. A group of 2-4 notes (possibly clusters) is struck together, followed instantly by continuation of the same tones in quick, fluttering repetitions. With *tremolando*, dynamic contours using crescendos & diminuendos can be achieved; also, *tremolando* can artificially extend decay time and intensity, including fade outs lasting longer than the normal decay time of singly struck bells.
5. Trills, mordents etc are all well executed on the instrument.

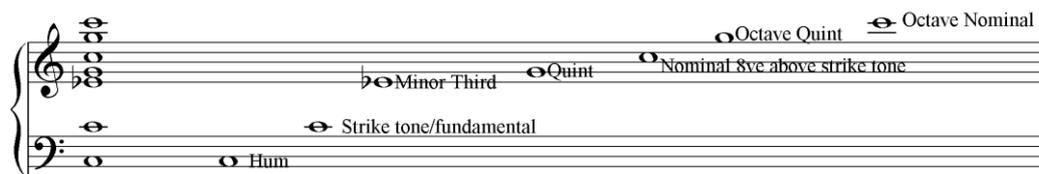
The lower bells are heavier and are played with the feet. Because these have progressively heavier clappers toward the bass register, longer decay (hum) and without dampers, bass bells ring longer than bells in the treble range.

1. Basses are used primarily for harmonic support or for special effects.
2. Bass bells do not lend themselves to fast passages or rapidly repeated notes.
3. Overlapping, fast changes of harmony in the bass can create a confusing texture.
4. A continuous bass line can become muddy very quickly, capable of overpowering the treble bells and the listener.
5. A single-line, unaccompanied melody can be very beautiful on the carillon, in any range.

BELL PARTIALS

The most characteristic harmonic feature of the carillon is the strong **Minor Third Overtone** in each bell, which reaches maximum intensity not at the striking of the bell but shortly afterward – around half a second later, when the third “blooms”. This minor third overtone is what gives the carillon its particular tonal complexion. Music in minor keys is usually well-suited to the carillon, because inbuilt minor thirds of the bells are reinforced by the harmonic structure of the tonic, dominant and sub-dominant triads.

Partial (overtone) of a tuned bell, taking middle C as the example:



Modern carillons are generally tuned in equal temperament.

The tonal colour of each individual bell depends on the relative strength and duration of each overtone. Bell tuning is an extremely complex science, with the strength of overtones depending upon bell shape & metal composition, clapper material, strike angle and area of contact between bell and clapper. You may wish to look at the following website URL if you are interested in understanding the acoustics of bells more fully.

<http://carillontech.org/timbre.html>

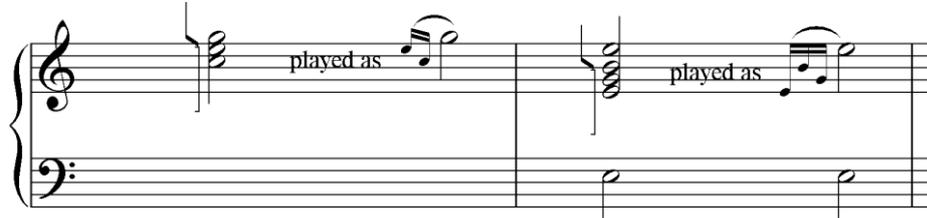
The importance of the minor third overtone does not mean that you must write only in minor keys. However, it does require sensitivity to the potential for unpleasant dissonance. A competent carillonist will try to deal with this when encountering the interval of a major third by highlighting the top note (making it brighter) to compensate for the minor third overtone (partial) of the lower bell. Major tenths can potentially be treated the same way but are particularly dissonant and are really best avoided. Perfect fifths work well; perfect fourths, parallel octaves, octotonic and modal scales are all effective. Not surprisingly, diminished sevenths sound particularly consonant, with the minor thirds all reinforcing one another.

CHORDS AND ARPEGGIOS

Four-part harmonies (i.e. hymn arrangements) generally sound clumsy on the carillon. The texture very quickly becomes far too dense; after all, the carillon already has a full, rich sound. More transparent textures, including arpeggiation of chords, are desirable. Harmonies are then able to accumulate by addition, (spreading the notes out) rather than being ‘stated’ (as a solid, block chord).

There are several arpeggiation techniques available: the most common and their notations are shown below.

Chord examples:



If you choose a chord to be played as above, use a “lightning bolt” symbol to denote this. If the chord spans more than an octave of notes, or is spread over both staves, the carillonist will usually play it as below:



When a normal arpeggio is given, the chord is played as below, using open hands in the treble.



Arpeggio examples:

Because the carillonist will typically be using alternating hands, arpeggio figures are more easily executed when written in a broken chord style. See below:



Traditional arpeggios are used on the carillon but not as easily executed. See below:



