Bells above

Photography by Alan Knowles
Design by Marcus Thomas

# The artist's eye

"Alan Knowles' personal mission to photograph the National War Memorial Carillon Restoration arose from his admiration for 'eccentric polymath' Timothy Hurd who found himself composing thousands of precision parts for his ailing instrument instead of music. A desire to reveal the inner workings of the 'inscrutable grey tower of Te Aro' also informed his work. Listeners may hear the bells ring out around the city, but rarely can they see them in their vertiginous home.

Knowles takes us to the heart of the Carillon, his lens illuminating the invisible: the beauty of repetition, the dance of form, and hands that make the metal sing."

**Dr Sydney J. Shep**
Associate Professor & Printer, Wai-te-ata Press,
Victoria University of Wellington

Bells above

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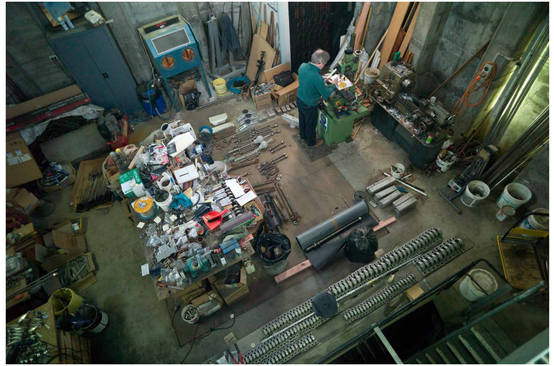
# Making the parts

There are about 650 carillons in the world. Unlike conventional instruments such as the violin, piano or clarinet, carillons are not standardised but custom-made to match specific settings, be they in a tower or smaller mobile instruments.



Organised chaos in the maintenance workshop on level 2 of the tower. "The job will be done when we run out of parts" – Timothy Hurd.


**Clockwise from top left:** Machining one of 131 headbolts. Some of the 252 shaft collar retaining pins handmade by Hurd. Smoothing the rough edges. An order for 316 marine-grade stainless steel. Fitting a plastic sleeve to a head bolt. Making plastic sleeves.
**Left:** Drilling stainless steel plate is exacting and exhausting.

Cutting a new rubber gasket for a bell mounting.

# Installation

The 74 bells of the Carillon are bolted rigidly to massive steel frameworks in the upper and lower belfries high in the tower. More than 15,000 structural and mechanical parts made from wood, metal, engineering plastics and rubber must be carefully fitted in place and adjusted to make the Carillon work smoothly. Despite weighing 170 tonnes, the simple, direct mechanical action permits exquisitely sensitive and refined control of the sound.


Tensioning the huge counter-spring for bell *Hope - Tinmarsh*.

Preparing mounts for controls and return springs.

Fitting a new cross-pin to a clapper shank and its crown staple support block.

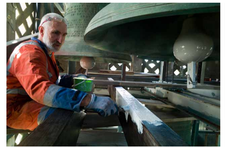
To hang a bell correctly, it is raised to its structural steel beam on long threaded rods. Once the bell is in place, the raising rods are removed, one by one, and replaced with new stainless steel support bolts.

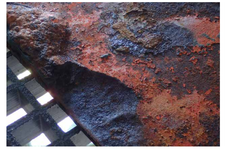
# Rust remediation

"Rust never sleeps." As the tower design must be open to let the music out, the Carillon is continually exposed to Wellington's brutal marine climate, with its legendary winds and driving rain. The result is non-stop corrosion. Two years of work was needed to address all of the severe rust problems.

As this large bell is lowered, the extent of rust decay becomes apparent.

An angle bracket, due for replacement.





**Clockwise from top left:** Applying anti-corrosion treatment. The old and the new. Epoxy paint being mixed. A bell head plate showing the extent of rust erosion.

Bells above

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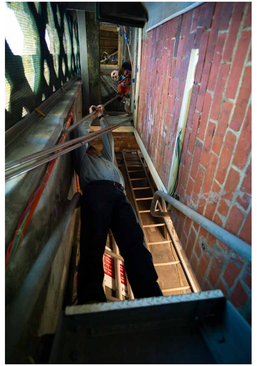
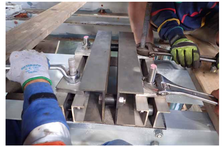
Design by Marcus Thomas

# Rehanging the bells

Re-assembling the Carillon needs to be done carefully, as bell metal (copper-tin bronze) is brittle and easily damaged. In order to fix long-standing maintenance issues and install thousands of new parts, the bells first had to be removed from the frames. 'Rehanging' refers to putting the bells back in place, involving much heavy lifting. Cramped working conditions: it pays to be a contortionist.



Long stainless transmission bars, cleaned and re-polished, are passed up the narrow stairways to the upper belfry.



**Clockwise from top left:** Tweaking tightness of a new centre bolt. Lock nuts are installed for safety and security. Fitting up a clapper and crown staple to a five tonne bell. Replacing the raising rods with new support bolts.

***Far right:***
Norman Williams (in orange) and Vincent Blane from Fletcher Construction check the striking position on five tonne bell.

Bells above

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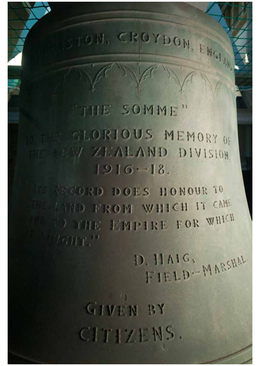
Design by Marcus Thomas

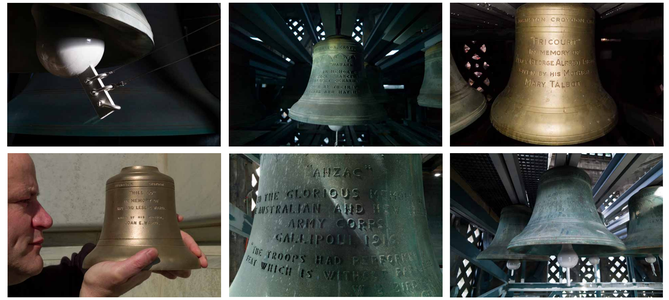
# Singing bronze

A carillon can be no better than its bells and their musical tone. Each bell in the instrument is carefully cast at the bell foundry and tuned with itself and with every other bell in the instrument. Starting with a thick casting, metal is removed on the inner surface to tune between three and 14 different partial tones. The secret is to know exactly when to stop, for once metal is removed it cannot be put back on. Wellington's Carillon is renowned for its extraordinarily heavy bells, their superior casting quality and tonal purity.

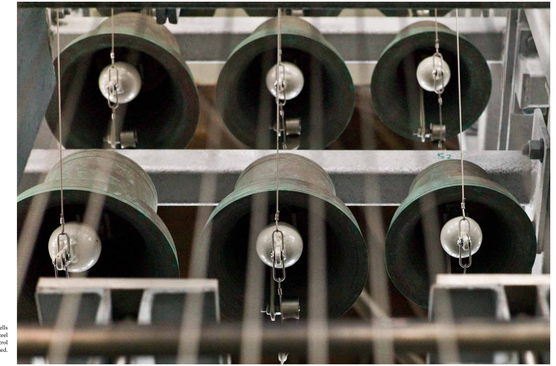
National War Memorial Curator, Paul Riley, and the 12.5 tonne Bourdon: *Peace – Rangimarie.*




*The Somme.*




Information Officer, Chris Leach with one of the original dedicated and inscribed bells from 1929.



Small treble bells re-hung in a new steel frame with control cables attached.

Bells above

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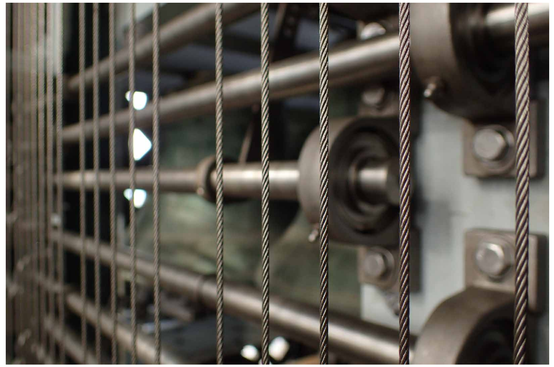
Design by Marcus Thomas

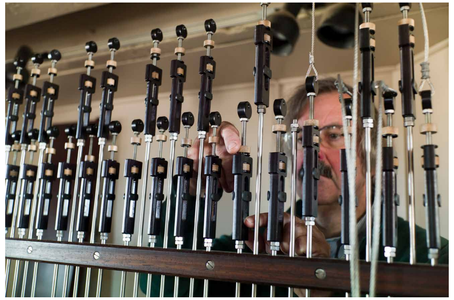
# The controls

The connections between keys and clappers, the transmission system, are made with marine grade stainless steel cables of varying gauge. The flexibility of the cables ensures a subtle playing touch and freeness of sound when played. Nearly two kilometres of cable are installed in this exceptionally large Carillon.



Control cables from the clavier.

**Clockwise from top left:** Clappers connected to control cables and return springs. Clavier coupling rods and stainless steel flexures. Return springs for the small bells. Crimping the cable connections



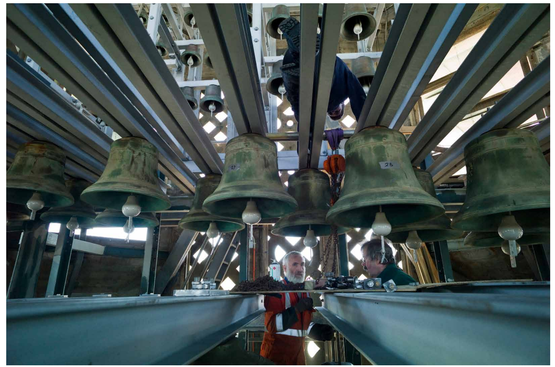
Precision hand-made turnbuckles on the clavier (keyboard) allow exact adjustment of clapper strike.

Transmission bars mounted in their bearings in the upper belfry.

# Frames & structure

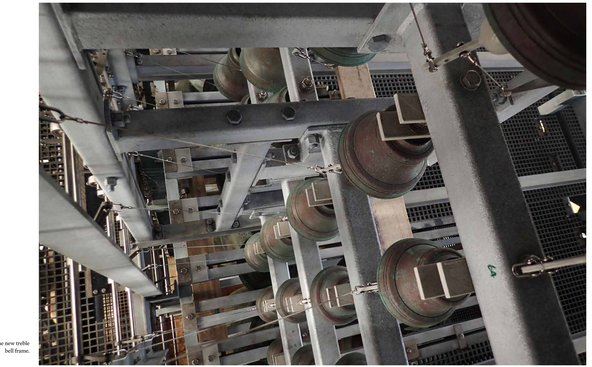
Unlike peal bells which are rung with wheels and ropes, a carillon's bells do not swing. Only the clappers inside move to contact the bell lips and produce sound. Two enormous steel frames, weighing nearly 100 tonnes in all, support the 74-bell, six-octave instrument.

Bass belfry steelwork, showing the lower tier containing three of the six largest bells.



Mid-range bells and the new steelwork.

*Reo Wairua* with the original beams treated for corrosion.



The new treble bell frame.

# Bells above

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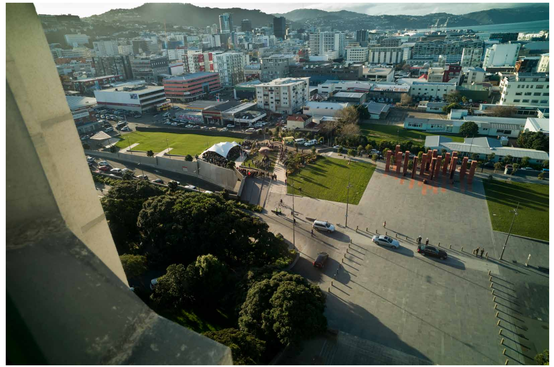
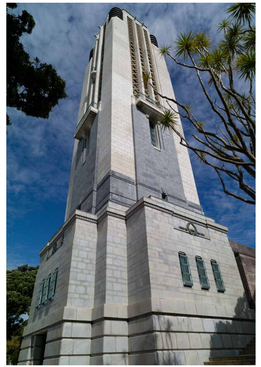
## A room with a view

At 52 metres in height, the Carillon tower commands spectacular views of Wellington city, harbour and surrounding hills. However, it was not designed for general public access. The tiny [1m x 1m] tower lift was an afterthought, installed in 1937, which only begins a third of the way up. Steel stairways and vertical ladders on the west side are steep, narrow and, literally, breath-taking. Windows at the clavier room level provide sight lines to the north and south, but not east or west. The tower is immensely strong and flexible: it moves a lot in gale force winds or an earthquake.



Pukeahu National War Memorial Park, west side.



The Art Deco tower of the National War Memorial was purpose-built to house the Carillon and provide optimum blending of sound and tonal projection for the instrument.

Pukeahu National War Memorial Park, east side.

The Basin Reserve cricket ground and the Mt Victoria Tunnel from the top level of the tower. The mesh is to keep out pigeons (and cricket balls).

Bells above

Photography by Alan Knowles
Design by Marcus Thomas

# Ceremonies

Official commemorations and wreath-laying ceremonies are held almost weekly at the National War Memorial and Tomb of the Unknown Warrior. The Carillon is the voice of the National War Memorial, and its two largest bells are tolled at specific symbolic moments. Distinguished visitors from New Zealand and around the world nearly always visit the National War Memorial. The eternal flame in honour of the war dead 'burns' in the top of the tower.

The Tomb of the Unknown Warrior.

**Clockwise from top left:** Wreaths laid during the annual Vietnam War commemoration. The Last Post is sounded. VIPs sign the Visitors' Register. Youth involvement.

**Right:** The Hall of Memories.

**Far right:** Poppies released at the Battle of Passchendaele commemoration.

Bells above

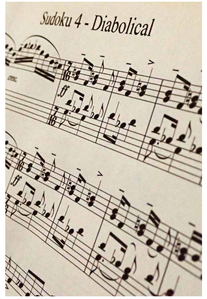
Photography by Alan Knowles
Design by Marcus Thomas

# Carillon music

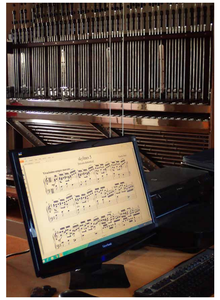
As a public musical instrument, the Carillon must cater to a wide range of musical tastes. This 'Bach to Beatles' approach to programming includes original compositions, transcriptions of Baroque and Classical keyboard and string music, folk and popular melodies and jazz and improvisation as part of the mix.

All it takes is two hands and two feet and years of practice to play the Carillon. As there is no direct contact between player and audience the carillonist never knows who may be listening.

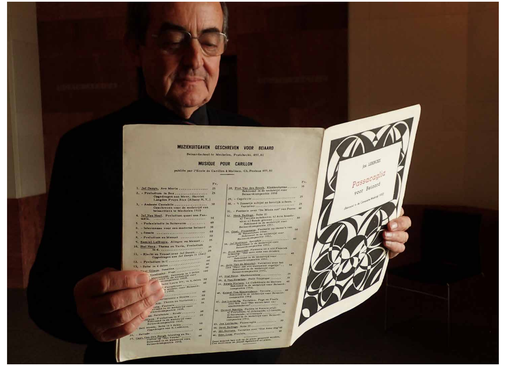

The first carillonist, Gladys Watkins' collections of hand-copied manuscripts from Mechelen, Belgium.



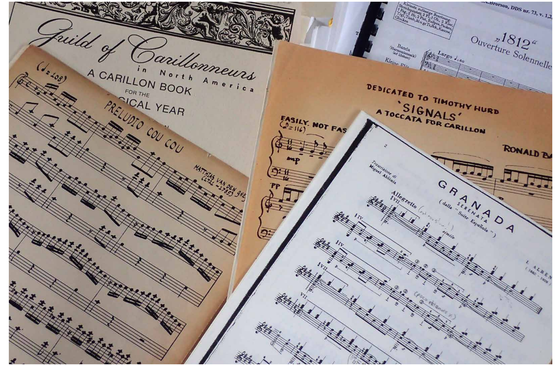

*Sudoku 4 - Diabolical* by Timothy Hurd.



Nowadays, writing music on computer is the norm.




Information officer, John Lanham with a carillon score.



Bells above

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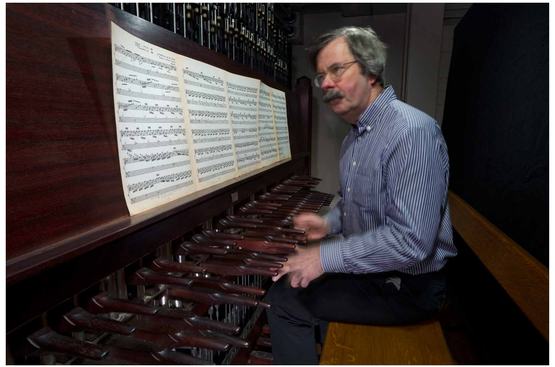
# Clavier room

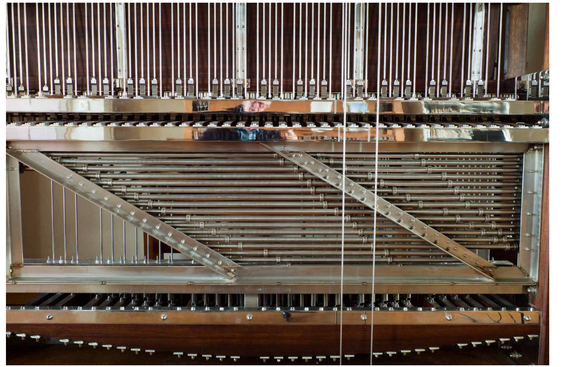
The clavier room, situated above the six largest bells and below the 68 mid-range and treble bells, is where it all happens. The carillonist plays a large mechanical keyboard called a clavier. Keys and pedals are connected through the wires, bearings, rods and cranks to the clappers. As a percussion instrument par excellence, the force and speed used in playing with fists and feet control the musical dynamics and brightness of each bell. The carillonist sits on an adjustable bench and from a central position is able to reach the highest and lowest notes.



National Carillonist, Timothy Hurd, performing a recital at the clavier.

Modern communications.

**Top:** The transmission system.
**Bottom:** The shape of the tower is replicated in the clavier woodwork.



The back side of the clavier, showing keytail pivots and pedal coupler bars.