# Type 2 Liverpool Ringing Simulator

# 04 – Configuring Beltower Guide



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# **Document History**

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# **Documentation Map**



Figure 1 – Documentation Map

# **About This Guide**

The Type 2 Liverpool Ringing Simulator allows sensors, attached to one or more real tower bells or teaching dumb bells, to be connected to a computer Simulator Software Package such as Abel<sup>2</sup>, Beltower<sup>3</sup> or Virtual Belfry<sup>4</sup>. This allows you to extend and augment the teaching and practice opportunities in your tower.

This brief **Configuring Beltower Guide** shows you how to configure the Beltower Simulator Software Package to work with the Type 2 Liverpool Ringing Simulator.

Other project guides are available for the Abel and Virtual Belfry packages.

#### **First Steps**

This guide begins from the point that you have completed building and installing your Type 2 Liverpool Simulator hardware, and are now ready to configure Beltower to work with the simulator.

For guidance on building and installing the Type 2 Liverpool Simulator, please refer to the **Build &** Installation Guide. For detailed technical information, see also the **Technical Reference Guide**.

If you want to use multiple PCs concurrently, please refer the *Multi-PC Guide* for information on building either the Second PC module or the Basic Serial Splitter module. The Second PC module allows two PCs to be used concurrently, the Basic Serial Splitter up to a maximum of 16.

#### **Next Steps**

This is not a detailed guide to using Beltower. Please refer to the Beltower documentation and help for more information on the usage and configuration of the application.

This is also not a guide to using a simulator in teaching and practice. For guidance in this area the ART<sup>5</sup> publication *Teaching with Simulators* is recommended, available from the ART shop<sup>6</sup>.

<sup>&</sup>lt;sup>2</sup> <u>https://www.abelsim.co.uk/</u>

<sup>&</sup>lt;sup>3</sup> <u>https://www.beltower.co.uk/</u>

<sup>&</sup>lt;sup>4</sup> <u>https://www.belfryware.com/</u>

<sup>&</sup>lt;sup>5</sup> Association of Ringing Teachers

<sup>&</sup>lt;sup>6</sup> <u>https://shop.bellringing.org</u>

## **Beltower Copyrights & Licensing**

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Please ensure your copy of Beltower is properly licensed.

Beltower can be ordered from <a href="https://www.beltower.co.uk/">https://www.beltower.co.uk/</a>.

#### **Sensors Configuration**

Configuration of the Beltower Simulator Software Package to use the Simulator Interface should also only need to be done once. All settings are saved in the Beltower configuration file. This example is based on Beltower 2022 (12.82), screens and options may differ slightly in other versions.

To configure Beltower to use the Simulator Interface, carry out the following steps. This manual described the minimum necessary to configure Beltower to use the Simulator Interface, for full details on the overall configuration and features of Beltower please refer to the product documentation.

• Start Beltower on the Simulator PC, and if prompted select Advanced Mode.



Figure 2 – Beltower – Mode Selection

• From the *Settings...* menu select *Sensors* (or press F12).

ons	Setti	ings Window Help		
B		Animation	F9	
		Display	Alt+F10	
		Changes Colours	Alt+F11	
		Bell Sounds, Swing Time & Odd Striking	F11	
		Voiced Calls	Ctrl+F11	
		Sensors	F12	
		Preferences	Ctrl+F12	

Figure 3 – Beltower – Settings Menu

• In the *Input Mode* dropdown, select *Serial interface*, and in the *Input* dropdown select the correct serial interface COM port number for the Simulator Interface. Note that Beltower requires the serial COM port number to be between 1 and 32 (for versions prior to Beltower 2016 the upper limit was 8). Refer to the *Technical Reference Guide* for instructions on reconfiguring port numbers.

Serial interface       Input Mode       Serial Interface: Bagley       Master         Sensor       nput Pin       Delay       Refresh delays from       Box       File         Bell 2       COM1       400       400       Ignore Eirst Signal       Debounce time       100         Bell 3       Apply delays in       400       400       Act on Pin High       High/Low Transitions       Imput Mode       Series Comment       100         Bell 5       Bell 6       Apply delays in       400       400       Act on Pin High       High/Low Transitions       Imput Comment       Imput Tenor Ab3       Imput Mode       Series Comment       Imput Tenor Ab3       Imput Mode       Imput Mode       Series Comment       Imput Mode       Series Comment       Imput Mode       Imput Mode       Imput Mode       Imput Mode       Imput Mode       Imput Mode       Impu	A BELTOWER - Sensors Settings				
Sensor       nput       Pin       Delay         Bell 1       COM1       400       400         Bell 2       Bell 3       400       400         Bell 3       Bell 4       400       400         Bell 5       Bell 5       Bell 5       Bell 6         Bell 6       Apply delays in       400       400         Bell 7       Beltower (*)       410       400         Bell 8       Beltower (*)       410       400         Bell 9       MBI box (*)       410       400         Bell 10       Bell 0       400       400         Bell 10       400       400       400         Bell 10       Bell 0       400       400         Bell 10       Bell 0       400       400         Bell 10       Bob       5       5         100       400       400       10         Bob       Single       0	Serial interfac	ce 🗸 🔽	Input Mode Serial Interface: Bagley 🗖 Master 🥅		
Extreme Bounds Auto-Stand (+/-Call) after 4 strokes	Sensor pp Bell 1 Bell 2 Bell 3 Bell 4 Bell 5 Bell 7 Bell 8 Bell 7 Bell 8 Bell 9 Bell 9 Bell 0 Bell E Bell A Bell A Bell A Bell A Bell C Bell D Bob Single Omit	ut Pin Delay CDM1 ▼ 400 400 400 400 400 400 400 400	Refresh delays from       Box       File         Ignore Eirst Signal       Debounce time       100         Act on Pin High       High/Low Transitions       1         Test Sensor       MIDI Input Tenor Ab3        1         Call Switch also does:       Start/Stop Call Changes       none       ▼         End Ringing (Stand)       none       ▼       1         Downwards       none       ▼       1         Go method       Another call switch       3       1		
ThatsAll Rnd/Rst Ok Cancel <u>H</u> elp	Extreme Rounds ThatsAll Rnd/Rst		Aut <u>o</u> -Stand (+/-Call) after 4 💌 strokes		

Figure 4 – Beltower – Serial Input Mode

• Ensure that the *Apply delays in Beltower* radio button is selected, and that both the *Bagley* and *Master* check boxes are not ticked.

Figure 5 – Beltower – Sensor Settings

• Double-click each delay timer value to show the up and down buttons.

BELTOWER - Sensors	s Settings
Serial interface	▼ Input Mode Serial Interface: Bagley  Master
<u>S</u> ensor <u>I</u> nput Pin Bell 1 COM1 ▼	Delay 380 → Refresh delays from Box File
Bell 2 /	400 400 Ignore First Signal

Figure 6 – Beltower – Editing Delays

• Set the delay for each bell to an appropriate value, so that the simulated bell sounds as closely as possible to the same time as the real bell (this is best done with the real bell unsilenced. Note that in Beltower the delay values are specified in 1/1000ths of a second (milliseconds), in increments of 10ms. Refer to the notes on Delay Time Calibration later in this guide.

A BELTOWER - Sensors Settings				
Serial interface	Input Mode Serial Interface: Bagley 🥅 Master 🥅			
Sensor     Input     Pin     Delay       Bell 1     COM1     ◀00       Bell 2     COM1     ◀00       Bell 3     Apply delays in     400       Bell 6     Apply delays in     400       Bell 7     Beltower     ↓10       Bell 9     MBI box     ✔10       Bell 0     Beltower     ↓10       Bell 1     Beltower     ↓10       Bell 2     MBI box     ↓10       Bell 1     Bell 0     ↓00       Bell 2     MBI box     ↓10       Bell 3     ↓10     ↓10       Bell 4     ↓10     ↓10       Bell 5     ↓10     ↓10       Bell 6     ↓10     ↓10       Bell 7     ↓10     ↓10       Bell 8     ↓10     ↓10       Bell 9     ↓10     ↓10       Bell 1     ↓10     ↓10       Bell 2     ↓10     ↓10       Bell 0     ↓10     ↓10       Bob     ↓10     ↓10       Single     ↓10     ↓10       Bob     ↓10	Refresh delays from       Box       File         Ignore Eirst Signal       Debounce time       100         Act on Pin High       High/Low Transitions       Image: Call Switch also does:         Test Sensor       MIDI Input Tenor       Ab3          Call Switch also does:       Start/Stop Call Changes       none         End Ringing (Stand)       none       Image: Call Switch         Downwards       none       Image: Call Switch         Go method       Another call switch         Auto-Call Go       after       strokes         Ok       Cancel       Help			

Figure 7 – Beltower – Sensor Delays

- Click OK in the Sensor Settings window to close the window.
- Save the new options by selecting *Save Selections* from the *File* menu. If the options have changed, Beltower will also prompt for this when the program is closed.
- Activating the sensor configuration is done in one of two different ways, depending on whether Beltower is being used in *Basic* or *Advanced* mode.

• In *Basic* mode, select one of the *Tower Bell Sensor(s)* options from the dropdown shown when the application starts.



Figure 8 – Beltower – Basic Mode

• When Beltower is running in *Basic* mode, the sensor configuration can be activated by selecting *Ring Options...* from the *Options* menu (or press F8), then selecting *Tower Bell Sensor(s)* from the *Timing Options* dropdown and clicking the *Initialize* button.

A BELTOWER - Ring Options		<b>X</b>
Start Seq'nce 1234567890ETABCD	<u>F</u> ree-Strike Initiali <u>z</u> e 🔽	Call Look To + Stand 🔽
Bingers' Bells 1234567890ETABCD	Highlight Input Place 🔽	Auto. <u>G</u> o 🗖 after 8 🖃 strokes
Multi-Keys JFKD	Op <u>e</u> n Hand Stroke Leads 🛛 🔽	Auto, That's All On Return 💌
Bell Sensors 1234567890ETDCBA	Ring Speed 63	Auto-Stand 🗖 after 4 👻 strokes
I iming Options Tower Bell Sensor(s	) 💽 –	Show
Info.		Ok Cancel <u>H</u> elp

Figure 9 – Beltower – Basic Mode Options

• When Beltower is running in *Advanced* mode, the sensor configuration can be activated by selecting *Ring Options...* from the *Options* menu (or press F8), then checking the *External Sensors* radio button, and clicking the *Initialize* button.

A BELTOWER - Ring Options			
Start Segince 1234567890ETABCD	<u>F</u> ree-Strike Initiali <u>z</u> e		Call Look To + Stand 🛛 🔽
Ringers' Bells 1234567890ETABCD	Highlight Input Place		Auto. 🙆 🗖 after 🎖 💌 strokes
Multi-Keys JFKD	Op <u>e</u> n Hand Stroke Leads	$\overline{[ \forall ]}$	Auto. That's All 🛛 On Return 💌
Bell Sensors 1234567890ETDCBA	Ring Speed 6	3	Auto-Stand 🔲 after 🛛 🖵 strokes
	)	•	- Hide - Show Always 🔲 -
Hand Bells	Sho <u>w</u> Animation		Bells Input
Strike On Input 🔽	A <u>u</u> to- Strike + Animate	$\overline{\lor}$	Key 0 % before striking
Input <u>M</u> ode	Co-operative Timing		Animate on Input 📃
C Place keys	Co-operative Speed	$\square$	Hand/Back Alternate 🔽
O Y Key on-time	Calls Input+Display On Time		Target Place 🔽
<ul> <li>External Sensors</li> </ul>	Call Splice at Any Row 🛛 🗖		Display Changes At Key-in 🗖
Key Up/Down Transitions 🗖	Voice Calls 265 % be	efore	Wait for Correct Input
Wizard Info.			Ok Cancel <u>H</u> elp

Figure 10 – Beltower – Advanced Mode Options

• Beltower should now be configured to use the Simulator Interface. Test each bell in turn and check that the simulated bells are correctly mapped to the real bells.

## **Delay Timer Calibration**

For accurate simulation of the real bells, the simulator requires that the delay timer for each bell is set so that the delay applied after Simulator Interface sends the strike signal to the Simulator (at exactly the point at which the real bell passes through bottom dead centre of its swing) results in the simulator sounding at the same time that the open bell would have struck. This delay time is specific to each bell, but for most bells is somewhere around 0.5s (or 500 milliseconds).

The simplest method of setting the timer values is to ring each bell open alongside the simulator.

- Start the Beltower on the Simulator PC.
- Ring each bell in turn, open, and compare the sound of the bell and the simulated sound from the simulator.
- If the real bell sounds before the simulator, reduce that bell's delay timer value.
- If the simulator sounds before the real bell, increase that bell's delay timer value.
- Repeat this process until the sound of the real bell and the sound from the simulator are as close to coincident as possible.
- Repeat for each of the other bells in turn.

Tip: A useful starting point for delay timer values is to measure the period of oscillation of the bell for small swings and set the timer to ¼ of that value. Then fine tune the value as described above.

# **Using Multiple PCs**

If you want to use multiple PCs concurrently, please refer the *Multi-PC Guide* for information on building either the Second PC module or the Basic Serial Splitter module. The Second PC module allows two PCs to be used concurrently, the Basic Serial Splitter up to a maximum of 16.

A Multi-PC configuration typically allows more than one ringer (with headphones) to use the simulator with a simulated band at the same time, each ringing a different physical bell.

#### Second PC Module & Basic Serial Splitter Module

From the point of view of Beltower, all PCs connected using either the Second PC module or the Basic Serial Splitter module behave in a similar manner. All PCs receive all the sensor signals from the Simulator Interface module, all the time.

Each copy of Beltower must be configured to respond to the desired bell or bells and filter out the unwanted signals. This can be done by selecting the bell(s) required in the *Bell Sensors* field in the *Ring Options* dialogue.

	R - Ring Options		
Start Seq'n <u>c</u> e	1234567890ETABCD	<u>F</u> ree-Strike Initialize	Call Look To + Stand 🛛 🔽
<u>R</u> ingers' Bells	1234567890ETABCD	Highlight Input Place 🔽	Auto, <u>G</u> o 🔲 after 8 🖃 strokes
Multi-Ke <u>v</u> s	JFKD	Op <u>e</u> n Hand Stroke Leads 🛛 🔽	Auto, That's All 🛛 On Return 💌
Bell Se <u>n</u> sors	1234567890ETDCBA	Ring Speed 63	Auto-Stand 🗖 after 4 💌 strokes
<u>I</u> iming Optio	ns Tower Bell Sensor(s	- 	Show
	Info.		Ok Cancel <u>H</u> elp

Figure 11 – Beltower – Ring Options (Bell Sensors)

#### **Configuring the Interface**

When multiple PCs are connected, only one PC can be used to configure the Simulator Interface using a terminal emulator (as described in the *Build & Installation Guide* and the *Multi-PC Guide*).

The PC used for Interface configuration depends on the hardware in use. This is covered in the *Multi-PC Guide*.