**The Quilcom Christmas Belly**

The original idea was to model a set of wind chimes, but I got a bit carried away and decided to make it more versatile and to give it a seasonal aspect.

Design

There are 2 main sections to the Belly: the sound generator on the right hand side, and the strike section on the left.

The sounds are made with a simple FM synthesiser for the resonators (e.g. bells), a random wind sound generator and a ringing filter for the striker sound. I believe that FM-based modelling gives the best results for bells. The wind intensity can influence the randomness of the strikes, so that stronger gusts and levels will increase the chance of a strike. All 3 sound sources can be mixed as desired and the bells can be made to sound more or less “distant” by controlling the level of ambience.

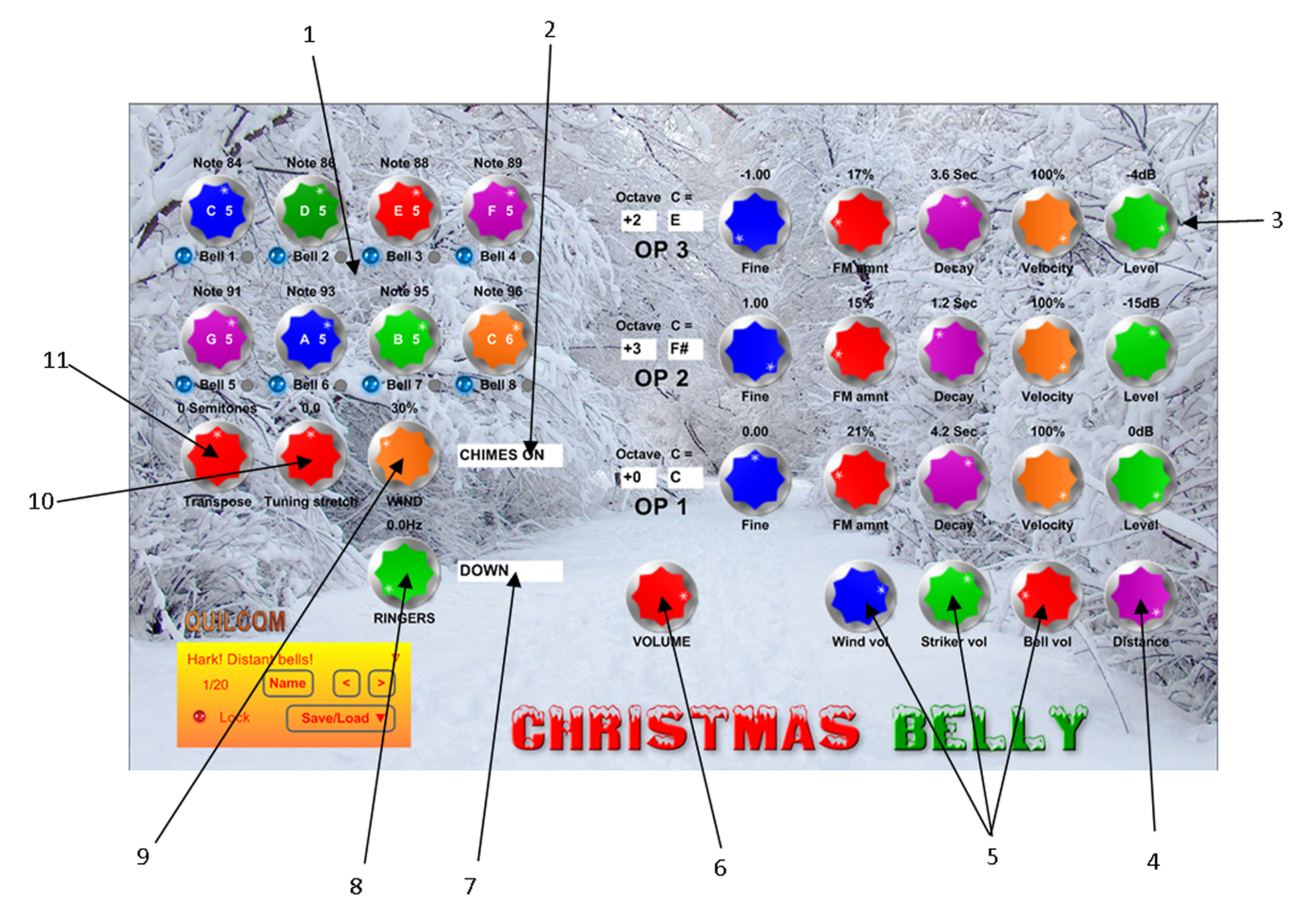
You can have up to 8 bells, individually tuneable and selectable. Once a scale has been set the whole can be shifted up or down by 1 octave in semitones. The scaling can be stretched positive or compressed negatively to give a varying degree of mistuning and scale dissonance.

The Belly has a MIDI input so you can play it as a full instrument, with no restrictions from the striker section.

There are 2 mixable sources for the striking: Wind and Ringers. The Wind adjusts the influence (chance) of a bell striking according to wind amount. The Ringers are the “campanologists”! Here you can select from several basic patterns and adjust their vigour (speed) from zero to crazy.

I’ve made 12 preset sounds (1 for each day of Christmas?) which give an indication of some possibilities, and may be useful as inspirational starting points.

What follows is a more detailed description of the available controls.



1. This section contains the 8 identical Bell settings for on/off and fundamental pitch. The note names reference middle C (note 60) as C3. Clicking on a knob will sound the bell (on mouse-up). The blue LED switches are used to turn the bell on or off. A real wind chime often has fewer than 8 bells. You can operate these in real time from the front panel, to add interest and variation. Control-click any knob to set C4.
2. This toggles the whole striker generator on/off. Since the Belly has a MIDI input you can play the bells from a keyboard, without the limitation of 8 bells and their tunings. But it’s kinda fun to play tunes while the bells are randomly ringing a little! The Belly is set to a maximum of 32 voice polyphony.
3. The bell sounds are created with a very simple 3-operator FM synth (actually it’s phase modulation, as found in the Yamaha scheme). The algorithm is a stack of 3 identical operators. OP3 supplies the signal for OP2 FM input. OP2 supplies signal for OP1 FM input and the output of OP1 is fed back up to OP3 FM input. All the FM signal outputs are pre-fader but influenced by the Velocity knob setting. Unlike the typical Yamaha scheme, each operator’s output can be fed, via a level knob, to the output, so you can get to hear all 3 operators if you want. Each operator can be tuned and detuned of course, and you can set the amount of FM from zero to crazy noise. Since this is a dedicated model, the envelope is limited to a simple pseudo-exponential decay setting but the range can produce a wide variation in result. Each operator has a velocity setting. With this set at 0% the output is at maximum but, as the setting increases, lower velocities produce less output. The velocity setting should be *higher* if you want the wind level to influence volume. Also, since this is an FM system, the incoming velocity can be set to influence the timbre of the bells, so that harder strikes give a more harmonically rich sound.
4. The Distance knob can introduce an ambience which uses a simple stereo delay system.
5. These 3 knobs provide for mixing the 3 sound sources to taste. Note that the Bell vol knob equally affects any MIDI keyboard playing.
6. This is the master volume control for the whole Belly.
7. The popup menu selects from a basic range of patterns for the Ringers.
8. This knob controls the speed of the Ringers. The *apparent* speed will also be influenced by the pattern selected, even though the underlying LFO rate is unchanged. You may notice some variation of timing, which emulates imperfect campanologists!
9. The Wind knob controls the level of influence from the wind sound generator. It actually sets a global chance of any bell being struck. At a setting of zero the wind will sound no bells, and at higher settings more bells will be likely to sound at higher wind levels.
10. Real wind chimes and bells are rarely pitch-perfect. This knob enables you to stretch the tuning. With a positive value the higher notes above C3 become progressively sharper and the lower notes flatter and with negative values the opposite applies. At more extreme settings any scale you set will become unrecognisable. Unless your pitch settings centre around middle C, the whole Belly will change pitch, as well as the intervals.
11. If you set up say a major scale, but then want the whole scale in a different key, you can move the whole range up or down by 1 octave in semitone steps. If you need a bigger range the FM operators can also be tuned accordingly.