### Guidance when recording bells for striking analysis Ian McCallion October 2012

#### Equipment

Recorder. Use a portable digital recorder, or computer and appropriate software.

Microphone. If recording from the bell chamber, use at least a medium quality dynamic cardioid microphone capable of recording very loud sounds without distortion. If recording from somewhere where the sounds is not excessively loud, eg the stairwell leading up to the bells, an electret microphone such as usually supplied with (or built in to) portable digital recorders can be used.

Ensure your microphone is compatible with your recorder. A dynamic microphone cannot be plugged into most laptops without a special audio interface, but can be plugged into some (but not all) portable digital recorders.

If using an electret or other high impedance microphone you cannot use long lengths of cable between the microphone and recorder.

#### Microphone placement

HawkEar works best with a recording that is, in the jargon of the recording industry, dry, which means that the sound arrives directly at the microphone from the sound source, with no intermediate surfaces and no echos or reverberation from the walls floors and ceilings. Hence the ideal position for the microphone in almost all cases is high up above the bells in the bell chamber, pointing downwards, and at a point where the mouth of all bells when “up” are visible. If that can be achieved and there is still choice in the microphone position then place it where the sound is best balanced. Hawkear can normally cope if the sound level difference between bells is within 10dB.

There may be lots of practical reasons why the microphone cannot be positioned as described above, but if so all is not necessarily lost. Positioning in a stairwell or in an intermediate chamber will have a reasonable chance of success if all the bells are clearly audible, none of the bells “shout” and there is little extraneous noise such as rope clatter. Positioning the microphone in the ringing chamber is a poor third-best and probably will not work.

#### Recorder settings

* 44100 sample rate (CD quality)
* Mono
* Preferably WAV format and submit WAV for analysis. However if sending files via the internet then MP3 is acceptable
* Recording level. Some recorders will have the ability to set the recording level automatically, but do not use this. If your recorder only has automatic level control it will be unsuitable for making recordings for HawkEar. Set the recording level during the sound test as described below and do not alter it afterwards.

#### Sound test

The purpose of the sound test is to enable you to set the recorder’s recording level correctly. It is a very important step and should be done even if it means not ringing one of the bells during the test.

While the bells are ringing adjust the recording level control of the recorder until the peak sound level is about 20dB below clipping level. If you do not know how to do this on your recorder the following may help:

* Your recorder will have a recording level indicator which moves up and down as the sound level changes.
* Clipping level will be the maximum level on this indicator.
* There will probably be a mark or colour change about 2/3 of the way along the scale representing the suggested level to record at.
* The best level for HawkEar will be about half way towards this level. If in doubt lower the recording level - lower is almost always better than higher.

Once the level has been set do not change it. If possible make a note of the level so that you can skip the sound test during your next visit.

#### Recording the Training Data

It is essential to supply a training recording consisting of one whole pull of each bell, in the order treble to tenor. It is very important to leave a few seconds between each bell to ensure that the sound of one bell has completely died away before ringing the next. Start again if someone pulls off too early, however if someone fails to set their bell it is not necessary to start again; HawkEar can cope.

#### Recording Touches

Start the recording at least two seconds **before** the bells start and end it at least two seconds **after** they finish. **Any recording that does not start with silence followed by rounds cannot be used.**

**Preparing Recordings for transcription**

You can edit the recording to remove unnecessary silence before and after the ringing (don’t forget to leave 2 seconds of silence though), but avoid making any other changes.