

Latency measurements

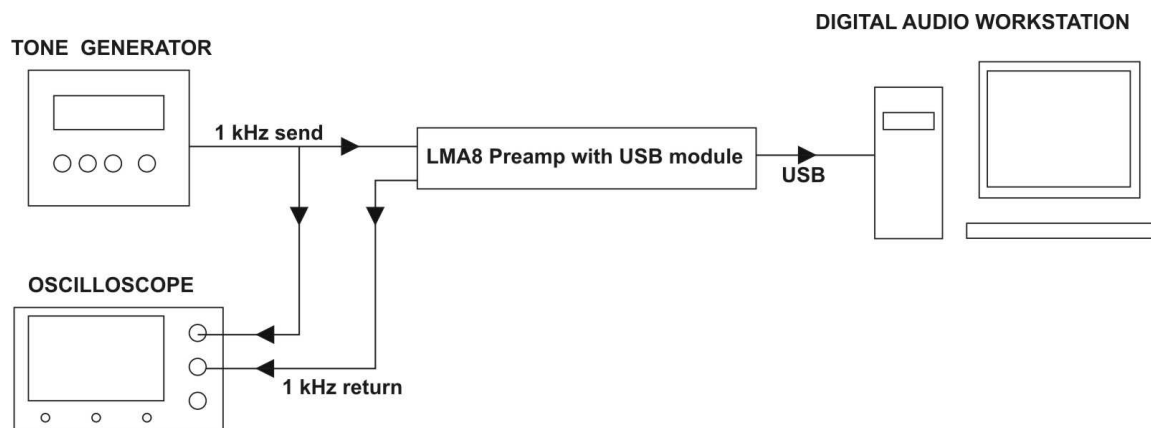
In the modern audio/video studio environment, most DAW software report the latency in a misleading manner, by only including the latency generated by the audio buffer. They do not include the latency in the physical interface, in the computer hardware or in the DAW software.

Thus the user is fooled to believe that the latency is lower, than the actual latency in the total system. The best way to get to the bottom of this, is to perform a “Real World” round trip measurement directly on the equipment.

Round trip measurement on LMA8 preamp with USB module:

A 1 kHz tone burst was sent from a Tektronix AFG1062 Function Generator to the LMA8 and compared to the 1 kHz tone burst returned from the LMA8, after the signal has been processed through the DAW. The time difference (latency) was displayed on a Tektronix TDS2024B Oscilloscope.

The buffer was set to the minimum size where no audible and measurable artifact or distortion could be identified.



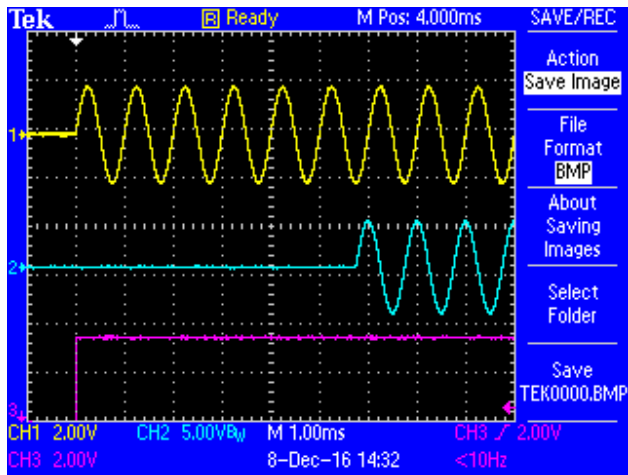
The 1st test was performed on a Mac Mini i7, 2.3 GHz, OSX 10.9.5. ProTools Native 11. Mac systems have native support for USB streaming audio, so no drivers were installed

The 2nd test was performed on a PC i7, 3.3 GHz, Windows 7. Ableton live 8.2.2.

Windows systems lack support for USB streaming audio, so the Rostec USB system driver were installed, and the ASIO4ALL driver was used from inside the DAW while running Ableton Live.

Additional test were performed on Studio One, Logic 10.6.0 and Tracks Live on the Mac system at 48 kHz.

Below are the oscilloscope snapshots of the measurements on the Mac system. Mac and Windows systems showed identical latencies when the Rostec driver was installed in Windows 7. However, buffer size 32 was not available under Windows.



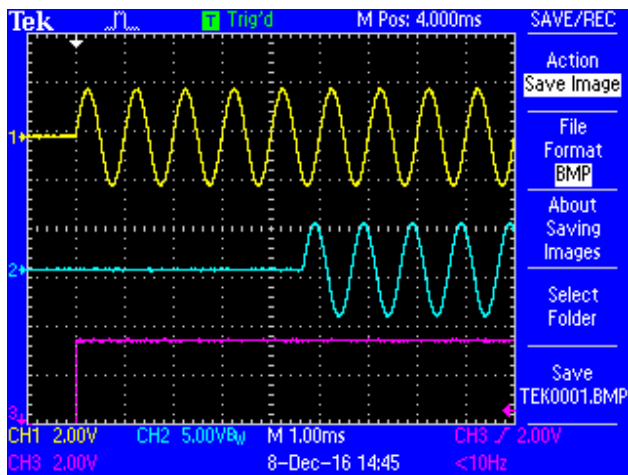
**Sample rate 48 kHz
Buffer size 32 (picture)**

Total round trip latency:

- Mac. ProTools, 5.7 msec
- Mac. Studio One, 6.4 msec
- Mac. Logic 10, 6.0 msec
- Mac. Tracks Live 5.7 msec

Sample rate 48 kHz
Buffer size 64

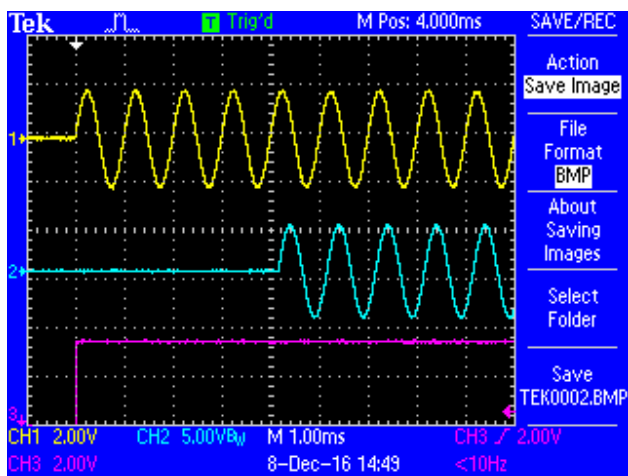
- Mac. ProTools, 7.0 msec
- Windows. Ableton Live, 7.0 msec
- Mac. Studio One, 7.7 msec
- Mac. Logic 10, 7.3 msec
- Mac. Tracks Live 7.0 msec



**Sample rate 96 kHz
Buffer size 64**

Total round trip latency:

- Mac. ProTools, 4.6 msec
- Windows. Ableton Live, 4.6 msec



**Sample rate 192 kHz
Buffer size 128**

Total round trip latency:

- Mac. ProTools, 4.2 msec
- Windows. Ableton Live, 4.2 msec

Notes:

At 192 kHz sample rate, ProTools would not allow a buffer size smaller than 128, which resulted in 4.2 msec latency.

Surprisingly, Tracks Live (for Mac) and Ableton Live (for Windows) would allow a buffer size of 64 at 192 kHz, which resulted in 3.8 msec latency for both systems.

There were no artifact or distortion when this were tested, but it may be cutting it too close. Computer system are, by nature, not deterministic, but rather running multiplexing tasks all the time. Intermittent routine maintenance tasks, performed by the operation system, may create clicks or gabs in the audio signal at this setting.