

# Eliminating Clicks and Pops in Windows Systems

Released 000506

Most customers install WaveCenter/PCI or Dakota without any problems, and their systems get good audio performance from the start. However, some people get “clicks and pops” in their audio. These audio artifacts can be due to any of several causes, and this document describes how to diagnose and eliminate such problems.

## Synchronization

The most common cause of glitches in the audio is an incorrect clock source setting. For digital audio recording or playback, it's important to remember that there must be one and only one audio clock master in your digital audio system. For example, if you're using an external multichannel A/D converter (such as Tango24) which is running on its internal clock, then the converter is the audio clock master, and the soundcard must be locked to that master by setting the card's Clock Source to the appropriate setting. If the A/D converter is connected to the card via ADAT lightpipe, then set the Clock Source to “Dig In/Opt A” or “Dig In/ADAT” in the Dakota or WaveCenter/PCI control panel. If the A/D converter is transmitting audio in the SPDIF format, set the card's Clock Source to “Dig In/SPDIF” and make sure that the correct stereo input connector (coax or optical) is selected in the Digital Input section of the control panel.

If both the external A/D converter and the digital soundcard are set to Internal (both are trying to be clock masters), then the recording will contain clicks at regular intervals. Tick ... tick ... tick. The rate of these clicks is determined by how closely matched the internal clocks of the external converter and the soundcard are. When this problem occurs, the SLIP indicator for that input (in the WaveCenter/PCI or Dakota control panel) flashes red at regular intervals. Similar synchronization errors can also occur on playback. For more information about synchronizing digital audio components, please refer to the Synchronization section in the User's Guide for your soundcard.

## Hard drives

If you're using an IDE (ATA, UDMA) drive, and getting clicks and pops, please make sure that DMA is enabled for that drive. Many drives are installed without DMA enabled, which can make a HUGE difference in performance.

1. Navigate to the Device Manager (Start > Settings > Control Panel > System > Device Manager).
2. Click the “+” next to “Disk drives.”
3. Double-click on the listing for your hard drive.
4. Go to the “Settings” tab, and make sure that “DMA” is checked under Options.
5. If you changed the setting, you'll need to reboot the computer for the change to take effect.

Also, we do not recommend trying to record audio to an IDE slave drive. IDE controllers can have one master drive and one slave drive. Many systems have two IDE controllers, each running one master drive. That's fine. But slave drives can be much less responsive and can easily cause audio glitches.

Note that SCSI drives have none of these problems. If you have a SCSI drive, make sure that you're using a good bus-mastering SCSI adapter, such as the Adaptec 2940 U2W. Other adapters, without bus-mastering, do not have sufficient performance and can cause audio problems.

## WinModems and network cards

In general, few problems are caused by modems installed in computer audio systems. However, we've occasionally encountered problems with “WinModem” devices. These modems are usually less expensive than standard modems, but they can consume CPU power, sometimes to the detriment of the digital audio program you're trying to run simultaneously. If you have a WinModem, and you suspect that it's causing problems, you can either power down and remove it temporarily, or disable it in the Device Manager (Start > Settings > Control Panel > System > Device Manager > Modems, then choose “Disable in this hardware profile”).

Only rarely have we encountered audio problems that could be attributed to a network card, but if you're suspicious that your network card is causing glitches, you can temporarily disable it in the Device Manager.

## Video card and hard disk adapter drivers

Your video card and hard disk adapter have drivers (software that supports hardware devices), and those drivers might be hogging the system and causing audio glitches. You can check this by recording while watching the Windows System Monitor follow the soundcard's performance. See "Tuning the System" in the Dakota or WaveCenter/PCI User's Guide for details about using the System Monitor. If you detect non-zero IRQ Misses in the middle of a recording, the most likely cause is a bad driver, and the most likely suspects are the video card and hard disk adapter drivers.

You can run a similar test with patches enabled in the Patchbay but without doing any recording. If all is well, then the hard disk adapter driver is the most likely cause. If you still get IRQ Misses, then the video card driver is the most likely cause. Many of these used to be terrible, but they've improved in recent years. Some, like the Matrox Millennium G400 series, are particularly good for audio workstations.

To resolve the problem, check the manufacturers' web sites to see if there are more recent drivers that can be installed. Many Dakota and WaveCenter/PCI customers have eliminated problems by simply updating the drivers for their video card and/or hard disk adapter. Also, if your video card driver has a "PCI Retries" option (Control Panel > Settings > Display > Settings > Advanced), disable it.

[Note: The User's Guides state that the IRQ Latency parameter is typically less than 5. Since version 2.00 of the Dakota driver, that is no longer true. The IRQ Latency can be over 100 and still be safe.]

## CD-ROM auto-insert notification

Your CPU may be frequently checking the CD-ROM or DVD drive to see if a disk has been inserted. This behavior can easily disrupt your audio, usually on a periodic basis (at intervals of several seconds). See "Tuning the System" in the Dakota or WaveCenter/PCI User's Guide for details about disabling auto-insert notification. If you ever re-install Windows, check the auto-insert setting again — it can be automatically enabled when Windows is installed.

## Hardware buffer size

The Dakota and WaveCenter/PCI cards have a programmable hardware buffer size in the System tab of their control panels. The Buffer Size setting controls how many audio samples are transferred at a time between the card and your computer's motherboard. In general, the default setting (256 samples) is recommended, but sometimes increasing this buffer size will eliminate glitches due to the behavior of another device on the PCI bus. Before changing the Buffer Size setting, you should shut down any open audio applications.

## Software buffer size

Each software application has its own mechanism for adjusting the buffer sizes that the application uses to send and receive blocks of sample data from the audio card's driver. These settings can have a dramatic effect on a variety of factors, such as the maximum number of tracks your system can record/play, and the latency of on-screen fader changes. Using a larger buffer size reduces the likelihood of glitches, and increases the delay between an on-screen change and its audible effect. Consider the recommendations of the audio software manufacturer, and then experiment with these settings. Ultimately, you're looking for a balance between the low latency afforded by a small number of relatively small buffers, and the safety of a large number of large buffers.

## Too many tracks

Depending on the audio application you're using, you may get clicks and pops if you're trying to run more audio tracks than your system can comfortably handle. You can test this by copying a "problem" project and then removing some tracks from the copy. If the reduced project then plays without problems, try defragmenting your hard disk. If the problem persists, make sure you've explored the other points in this document before rushing out to buy a new hard disk or system.