

## General Optimization Tips

If you are still using 40 wire cables, change them immediately, even if you're running UDMA33. 80 wire ATA cables are required for UDMA66 or UDMA100 operation, and highly recommended even for slower modes

IRQ 9 is the optimal IRQ to use; using another is fine even IRQ 7 for your audio card is fine so long as it is not shared with another device. Modern motherboards are now using IRQ9 for ACPI functions and I would not recommend using it anymore. If you see "SCI IRQ used by ACPI bus" using an IRQ do not let the Audio card share with this IRQ. You will find that it will always take IRQ 9. Use IRQ 10 in these boards.

USB really chews CPU cycles and should be disabled if its not being used, this will free up an IRQ. USB allows mass IRQ sharing which will increase the CPU load. Stay away from USB keyboards and mice.

If you are not using any devices on your USB, serial, or parallel ports in your setup, go to the BIOS and disable them. If you don't currently use them, closing them down will reduce additional IRQ assignment and unnecessary accessing by the system buss. In many cases, this is an easy way to resolve IRQ conflicts.

The easiest way to change an IRQ is to install the card into another PCI slot

If you own a promise/fastrack controller then:

- Only connect one drive per channel and don't use Maxtor drives...have had known compatibility problems in the past.
- Use identical drives if setting up your computer in RAID. Don't mix and match drives.
- Get the utility software from the vendor and disable any PCI BUS MASTERING/ Utilization options or lower it half way or more.

Setup your slower/smaller hard drive as primary master and put your CD-ROM as the primary slave.

The faster and larger of the two drives you should put as the secondary master and have NOTHING as secondary slave.

If your motherboard has only two IDE connectors, you would normally connect the system drive to the primary IDE and the audio drive to the secondary IDE. Set each drive's jumpers to be the master. Configure the CD-ROM or CD-RW as the slave, and make sure to connect it to the same IDE buss as the system drive. This insures an uninterrupted data flow to and from your more critical audio drive.

If your motherboard has a separate ATA controller and two extra connectors for UDMA master/slave, your setup is that much more simplified, as well as allowing for more physical drives.

Next check that the drive is set for its fastest transfer rate in the bios or during startup (sometimes CTRL+H with highpoint controllers. Some hard drives require the mode to be set via a utility in dos mode. Refer to the drives web site for this and more info. If using ATA66/100 drives you must use an 80 pin cable to connect it for the faster modes. Using a ATA100 drive on a ATA33 channel will not reduce it's SUSTAINED TRANSFER rate which is what counts...It will only reduce the BURST rate which the drive can only sustain under perfect conditions and even then only for a very short space of time.

Don't partition this drive unless you must...remember the larger the partition the less it will become fragmented...Also use the first partition to record to as this will be the fastest part of the drive..

When formatting the drive use this command "format X: /z:64" This will reduce the capacity of the drive only if small files are kept on it. Since you are recording large files on it, it wont reduce the size at all and will give you a boost in performance. Any time you format a disk or partition with FAT32, be sure to use the /z:64 switch (format [drive]: /z:64) to get 32K cluster sizes. This is critical to getting the best performance from the disk.

Make sure all drives and partitions are fat32. Never record audio files on the same partition as the swap file / virtual memory

Some people make a partition for their swap file that way it never becomes fragmented.. To make a partition FAT32 that partition must be a certain size and that's a lot of space for a swap file. I prefer the c: making it a permanent swap file after defragging C, very important to defrag first. Alternatively you can delete the swap file every time your computer starts with a command in your autoexec file so that windows rebuild the swap file unfragmented.

#### Ways to Work With / Around Latency

1. Monitor the input not the return as it is usually done in analog recordings, e.g. reel to reel tape machines have 3 heads and the play head is first then the erase then the record head. To over come the "tape delay" which can be used as an effect, the tape machine sends the signal straight out without going onto tape. (monitor "input 1/2" not "waveout 1/2")
2. Increase the sample rate.
3. You can play with the "DMA buffer" or "DMA transfer buffer" but this can decrease the quality of your recordings if the computer hits 100% usage or a device sends a IRQ request (this is very often with high end graphics cards see above). Just because you have a P3 833 or faster doesn't mean your video card or other high CPU intensive cards aren't slowing the system down.

## WIN 2000 specific

Set the minimum virtual memory size so that the swap file should never need to grow. 256 MB should be the smallest value you should set, but 384 to 512 MB is better. The maximum size should be set at a large value, for example 1024 or even more. There is not harm in having a large maximum value setting, just don't overfill your hard disk or the swapfile may be prone to fragmentation. If you wish you can set both values to the same large value, say 512 or 1024 MB, and Windows will never resize your swap file

A good basic rule of thumb is to set Virtual Memory at about 1.5 to 2 times the amount of RAM in your computer, up to 512 MB. (If you've got 512 MB RAM, set Virtual Memory to 512.) Enter the same value in Minimum and Maximum fields.

Disable Visual Effects! Go to Control Panel > Display > Effects Tab and disable "Use transition effects..." It's also a good idea to disable "Show window contents while dragging." Or better, download and install the latest version of TweakUI from Microsoft, and disable every kind of visual effects and animations.

Disable all the system sounds. Go to Control Panel > Sounds and Multimedia and select "No Sounds".

Disable web contents in folders Control Panel > Display > Web.

Avoid desktop background and themes and screen savers. Use instead the power saving modes for the monitor (Control Panel > Power Options).

If you do not need 24/32 bit color, use 16 bit color. Screen redraws and updates take usually less CPU time in this mode and your applications should look just fine with 16 bit color

You need to have DMA enabled for all of your drives, especially your audio disks. Device Manager > IDE ATA / ATAPI Controllers > Primary (and Secondary) Controller > Advanced Settings Tab. It only allows setting "PIO only" or "DMA if possible" for each device, and indicates the currently active mode and Device Type to "Auto Detection". It does not show the actual PIO or DMA speed.

Disk performance statistics can be disabled: type "diskperf -n" at a command prompt. They will remain disabled after subsequent boots. To re-enable, type "diskperf -y". Disabling disk statistics may improve the file I/O efficiency a bit. Windows defaults to continual logging of Input and Output data to your hard drive.

Do Not Touch Default Priority Settings

Use WDM Drivers for audio cards.

If your DAW app supports it, use WDM Kernel Streaming drivers (Sonar).

Windows defaults to write-behind caching, holding data in a memory buffer before writing it to disk. Disabling this function will increase your system performance by writing data immediately to disk. To disable this function, right click on My Computer and choose Properties, or open Control Panel and select System. Select the Hardware tab and click the Device Manager button. Click the "plus" sign next to Disk Drives and select a drive. Choose Properties and uncheck "Write Cache Enabled". Repeat for all drives in your system.

Open Control Panel > Power Management > Power Options > Home/Office Desk and set Turn off hard disks to Never.

### **Disable Unused Services**

Control Panel > Administrative Tools > Services. Look for any unneeded service with automatic startup type, and change it to manual. With this setting, the service will not start automatically at Windows startup, but can be started if needed.

Typical services that might not be necessary:

- Distributed Link Tracking Client (networking, tracks file transfers across NTFS volumes for computers in NT domains)
- DNS Client
- IPSEC Policy Agent (networking, to manage IP security)
- Remote Registry Service
- Task Scheduler

Be sure to keep these:

- Cryptographic services
- DHCP Client (unless the computer has no internet connection)
- DNS Client (unless the computer has no internet connection)
- Event log
- IPSEC Services (unless the computer has no internet connection)
- Network connections (unless the computer has no internet connection)
- Network location awareness (unless the computer has no internet connection)
- Plug and play
- Portable media serial number (if you use Cubase, Logic or any other app which requires a copy-protection key)
- TCP/IP Net BIOS helper (unless the computer has no internet connection)

### **Default playback device / Microsoft GS Synthesizer**

The Microsoft GS Synthesizer always uses the default playback device that has been selected under *Control Panel > Sounds/Multimedia > Audio > Preferred Playback Device*. If you select *ADSP24 Ext. Audio Device 1/2* as default device (channel 1/2 of the external box if you use a DSP24 or DSP24 MK II, the RCA output if you use a DSP24 Value or the monitor output if you use a DSP24 ADAT card), the Microsoft GS Synthesizer will have a conflict with the ASIO driver of your DSP24 series card. Because of that, we strongly recommend to use the Internal Mixer audio device instead. Please select *ADSP24 Int. Audio Device* as preferred playback device.

To avoid conflicts with the Microsoft GS Synthesizer, you can also make sure that your audio application does not use the corresponding MIDI output device. For example, if you use Cubase VST by Steinberg, disable the MIDI device in the *Setup MME* software that is accessible from your Start Menu.

## Win 2000 ACPI ISSUES from Steinberg

### Preparations:

A sure sign that you should get rid of ACPI is that several devices connected to the PCI bus are sharing one IRQ. Mostly, this is IRQ 9. If you use Windows 2000, you will more than likely have this problem, as Windows 2000 with activated ACPI seems, for some unknown reason, to believe that sharing IRQs in this way is useful. Normally this should not be a problem, but IRQ sharing does not give good performance. Although the computer does not crash, and everything functions in principle, the performance is significantly worse. It is possible that you may experience dropouts when using audio cards and USB/MIDI simultaneously, even when you have selected the highest possible latency in your ASIO driver. All additional transfers through the PCI bus (e.g. copying of data over a network card) result in the audio performance of your computer collapsing totally, regardless of how fast your computer may be. Many improvements in this respect found their way into Windows XP, and although IRQ sharing is not a problem most of the time, ACPI can still cause a variety of problems under Windows XP. If your motherboard offers APIC, then you can, in most cases, leave the ACPI mode installed.

### Checking IRQ allocation:

1. Go to the Start menu and click on "Run".
2. Now enter "msinfo32". This starts the system information program. On the left hand side you can see a 'tree' view, similar to those used in the Explorer.
3. Click on the left on "Hardware Resources" and then on "IRQs". On the right hand side, there should appear a list of your devices with the respective IRQ to which it has been assigned.
4. Check if devices (especially your audio card) share an IRQ with other devices, as with Windows 2000.
5. If this is the case, then you should deactivate ACPI.

### Motherboards with extended Interrupt Controllers (APIC)

Some of the new motherboards (e.g. Intel P4/AMD Athlon XP) offer a so-called extended Interrupt Controller, which allows the addressing of 23 IRQs instead of the normal number of 15. Please note that this functionality is only available if your system is running in ACPI mode. If this is deactivated, only the normal 15 IRQs are available.

### ACPI & Notebooks

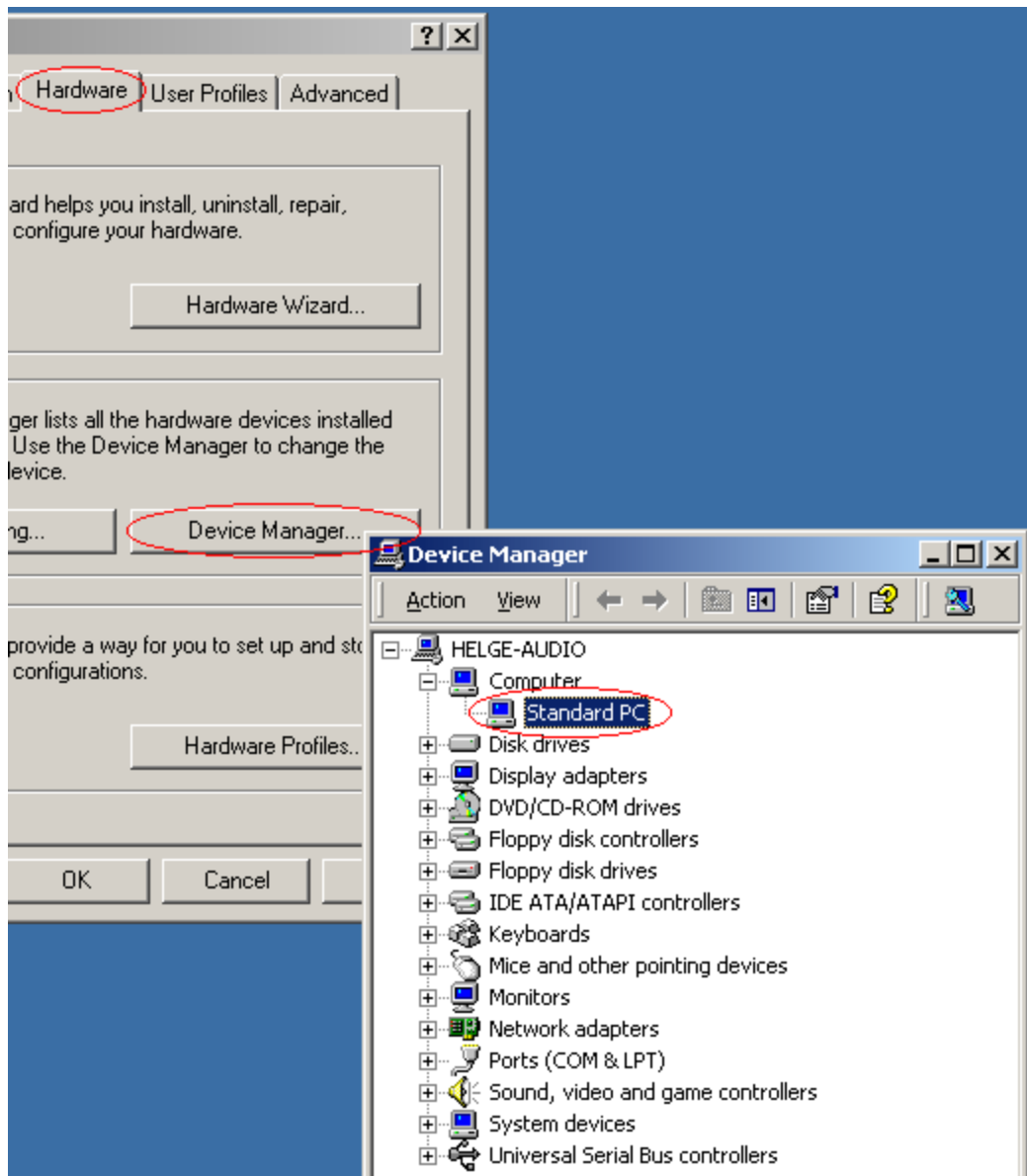
Notebook users please note: deactivating ACPI on notebooks is not recommended, as this deactivates the mechanisms designed to save power usage. This can lead to, for example, reduced battery performance. Other problems may also occur. This does not apply to desktop PCs; ACPI can be deactivated without risk.

### Changing the setting during a fresh install of the operating system

1. Before installation of W2k, you should check the BIOS. The entry 'Plug and Play OS' should be set to 'NO'.
2. When installing W2k, you can select the correct mode without ACPI during the installation of the operating system. This is the safest way of building a stable system. When you are asked for updated SCSI etc. device drivers at a blue screen at the beginning of the installation process, press **F5** (!!!). Shortly after, a list of options will appear where you can select the correct PC mode. Under Windows 2000, *Standard-PC* is recommended in any case.
3. After the operating system has been installed correctly, the PC uses the interrupts allocated in the BIOS. Follow the steps listed under "Checking IRQ allocation" above to check the allocation of IRQs in Windows 2000/XP.

### Changing the mode of an operating system after it has been installed

1. If Windows 2000/XP is already installed, you can retrospectively deactivate ACPI mode. Check the BIOS on your computer: the entry "Plug and Play OS" in your motherboard BIOS should be set to 'NO'.
2. Go to Device Manager (>Control Panel>System>Hardware), click on 'Computer', then double click on 'ACPI-PC'.
3. Continue with 'Driver' and 'Update Driver'. Select 'Display a list of the known drivers for this device', then 'Show all hardware of this device class'. A list is displayed from which you can select the correct PC mode, using the list above in the 'General Notes' section.
4. Windows 2000/XP will reboot and then re-install all hardware components. As a precaution, you should have the appropriate drivers ready for all components. After this the PC will use the BIOS' IRQ assignments. The retrospective reconfiguration of your PC can have unexpected side effects because of the complex device driver management in Windows 2000/XP. If you encounter problems having changed the PC mode retrospectively, you should reinstall the operating system from scratch, and follow the instructions above in the 'Changing the setting during a fresh install of the operating system' section to deactivate ACPI during the install process.
5. After the successful reorganization your device manager should look like this:



6. The PC now uses the interrupts allocated in the system's BIOS. You can check the BIOS IRQ allocation by following the procedure described above in the 'Checking IRQ allocation section.'

When you are using the *Standard-PC* HAL as recommended, you may find that Windows will not turn off the power of your PC when you shutdown the system. To change this, you need to enable Advanced Power Management (APM). Goto *Control Panel > Power Management > Power Options* and enable *APM*. Note that enabling APM requires APM support to be enabled in your mainboard BIOS as well. Some mainboards (like nVidia nForce based solutions) do not support APM.

## Optimize processor scheduling for Windows 2000/XP Audio PCs from Steinberg

To use ASIO at lowest latencies under Windows 2000 single CPU systems, the 'system performance' has to be optimized for background tasks. Go to Control Panel/System/Advanced/Performance Options. Change the default 'Applications' to 'Background tasks'. The lowest usable latency will drop from 23 ms to around 3 ms.

