



## Computer Audio Design

### Windows Software Modifications

#### V2.2 December 2013

The previous Windows 7 document was a total of 49 pages. Well happily, things have moved on since then! I have written programs/scripts that manages to do almost all of the optimization for you. It takes about 45 seconds for the program to run.

In the previous version of this document I was using Windows 8 and I have now moved on to Windows 8.1 We feel that the sound quality of Windows 8 and Windows 8.1 is superior enough over Windows 7 to warrant the effort of upgrading. The differences between Windows 8 and Windows 8.1 are actually quite significant as far as the scripts are concerned. The scripts for the two operating systems are very different. This manual will work with either Windows 8 or Windows 8.1, but it is crucial that you use the correct scripts that correspond to your operating system. They are ***not*** interchangeable.

I believe that a computer being used for audio should just be used for that - not email, not web surfing, etc. You need to think that your computer is an "audio component" and you want to strip everything off of it that is not necessary for audio use. CAD believes that the fewer *unnecessary* processes that are running on the computer, the better the sound quality will be. I have personally spent close to a couple years working in this area and am convinced of this. What has taken quite a bit of effort is determining which processes are and are not necessary for audio. This white paper is designed for people that use their computer just for audio use and nothing else. If you intend to use your computer for audio **and** email/surfing/etc. this paper is **not** designed for you.

I cannot over stress how important it is create a *System Image* and *System Repair Disk* and manually set a *restore point* before you run the CAD Windows Optimization Scripts. I have included instructions on how to perform these operations.

I must state that you try these modifications and use the optimization scripts at **entirely your own risk!** CAD holds no responsibility. I am simply writing down what I personally have found helps and what CAD uses for all our demo work and shows.

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Updates from V2.1 to 2.2 - Moved from Window 8 to Windows 8.1. Significant changes to scripts. You **cannot** interchange the Windows 8 and Windows 8.1 scripts.

Updates from V2.0 to 2.1 - Included Desktop Killer script

Updates from V1.1 to V2.0 - Moved to Windows 8 and have automated most of the manual tasks.

Updates from V1.0 to V1.1 - added instructions for creating a System Image, System Repair disk and how to set a Restore Point. Added new section on *Shutting down additional processes & drivers using the registry editor*.

## Section 1 - Hardware and setup

### DIY CD Ripping

Very simple, use dBPoweramp. I have tried everything and in my opinion it is easy to use, gives great rips and retrieves the best metadata of all available rippers. The batch mode can save you a massive amount of time.

<http://www.dbpoweramp.com>

dBPoweramp is also extremely useful for changing the format of your entire music collection from one format to another using the "Batch Converter". You can also change the bit rate using what is known as "dither" and upsampled or downsample your music. Highly recommended.

## Music Format

Disk Storage is very inexpensive today. There is no reason to listen to your music even in a lossless compression such as FLAC. FLAC is similar to a Windows ZIP file. The music is compressed but you can uncompress it and no data is lost. That is great, but we want the computer doing as little as possible while playing music. The computer has to do more processing or "work" playing a FLAC than it does with an AIFF or WAV. If you have a high resolution audio system CAD believes that the extra computer processing needed for FLAC compared to WAV/AIFF is audible. I cannot hear a difference between AIFF and WAV. AIFF is basically similar to WAV but has built in metadata storage. You can get metadata storage to work with WAV, but AIFF is just easier. For that reason I recommend AIFF.

## Hard Drive Technology

If your current operating system hard drive uses a standard spindle HDD, then replacing it with a Solid State Drive will improve the sound quality. Unfortunately this is a reasonably difficult procedure and is beyond what many people would be willing to do. But if you are up for it you will find a big sound quality improvement! I feel this is due to the read rates of the new SSDs being so much higher than any HDD. My current favourite is the Samsung 840 Pro or the Intel 520 series. Since this drive is only for your operating system and playback software and **not** for storing your music collection a 64GB is plenty big enough.

**NEVER** store your music on the same drive as your operating system. Your operating system drive is continually being accessed by the operating system. If you put your music collection on the same drive then your computer will be accessing the drive for two key processes simultaneously and I believe the sound quality suffers.

Does a SSD for music storage sound better than standard spindle hard drives? The simple answer is yes. But until just very recently the cost versus sound quality gain did not make sense to me. You can now get 240GB SSD for less than £150 in the UK. At that price point it is starting to make sense.

If you are using a 7200rpm HDD for your music collection storage here is a tip that will cost you next to nothing and will improve sound quality quite a bit. Place your hard drive on a hard surface like glass or stone and listen to your favourite track. Now find something soft, like a new sponge. Place the hard drive on that and listen again. A HDD that is spinning around at 7200 rpm is just like a turntable. It will vibrate. Trying to reduce or absorb that vibration improves sound quality. Please try it!

When you purchase an external drive get one that uses an external power supply. The external hard drives that do not have a power supply use the power that is coming through the USB cable. The power in a USB cable comes from the computer and is typically of **very** poor quality (lots of noise). It is possible to purchase external "linear" power supplies to provide power to your external drives. More about this below.

## Interface to external Drive(s)

If you are using a USB DAC it is generally best to not use a USB connected hard drive for your music collection. It is best to try to limit the activity on the USB bus to only your DAC. I have found that many of the laptops now days have both a USB2.0 and USB3.0 connections. In that case you can use the USB2.0 for your DAC and the USB3.0 for your external hard drive and they will be on different controllers - but unfortunately not always... Either way always use the USB3.0 on your laptop for your music drive and use the USB2.0 for the 1543 DAC.

If you are using a desktop then use the SATA connections on your motherboard for your music storage drives.

## The computer itself

Laptop versus desktop? Laptops are designed to cram as much hardware into a small space as possible. Because of that I feel a desktop arrangement is the best. It is also easier to modify and upgrade a desktop than a laptop. That is not to say you cannot get amazing sound quality from a laptop. I use laptops for demonstration work when I am travelling and am more than please with the sound quality I get.

We won the best sound at the 2013 Bristol, UK Sound & Vision show using a £450 laptop.

Many people feel you can get by with a low powered CPU and not much memory for an audio computer - I disagree. My recommendation is to try to get an Intel Ivy Bridge i7 or the new Haswell i7 quad core CPU and 8GB of reasonably high speed / low latency RAM. People use to think you need much larger amounts of memory. That is not the case, 8MB is plenty. What is important is the *latency* of the RAM. Generally as the speed of RAM increases the latency increases. High speed RAM that has low latency will cost quite a bit more than high speed RAM with higher latency. Try to buy the lowest Latency RAM possible.

## DC Power Supplies

Most external drives use some type of power supply. The ones that come with hard drives are low cost "switch mode" wall mount power supplies. The wall adapter will tell you the output voltage and current. Try to find a "Linear" power supply with the same output voltage and at least as much current. The voltage needs to be exactly the same but the current output can be equal or greater. Switch mode power supplies have much more noise in the higher frequencies than linear power supplies. I have done quite a bit of work comparing switch mode versus linear power supplies for external hard drives. I find that I prefer the sound quality using linear power supplies. This is a very positive upgrade and the cost is quite reasonable.

There are companies now offering linear power supplies to replace the switch mode power supplies that come with small desktops and laptops. There is a great deal of discussion on the forums about this due to the fact that all motherboards use switch mode technology in them. The main questions being: "Why would a linear power supply make a difference if the motherboard is then using switch mode technology?" I am doing some work in this area at the moment and should have some results soon, but the preliminary results are telling me a linear power supply can also help small desktops and laptops.

## Section 2 Software Modifications

### Remove Anti Virus & other programs

This is a personal choice and you need to understand the risks before you do this! To be safe with no antivirus you should *not* be connected to the internet *nor* your local area network. If you have your audio computer on your local network and another computer on the same network gets infected, your audio computer could get infected also. Your audio computer should not be used for "surfing" the net, for email or downloading things from questionable locations on the internet. Certain (most?) anti-virus programs can be what is called "resource hogs" - they use up large amounts of computer resources in the back ground. Unfortunately I have found that the sound quality suffers when antivirus software is being used. CAD do not use any on our audio computers, but obviously, if you intend to maintain a connection to the internet and do not have any antivirus protection, you are taking a risk.

For uninstalling any software (including antivirus), from your computer the Windows Uninstall program is not the best and I recommend you to use this:

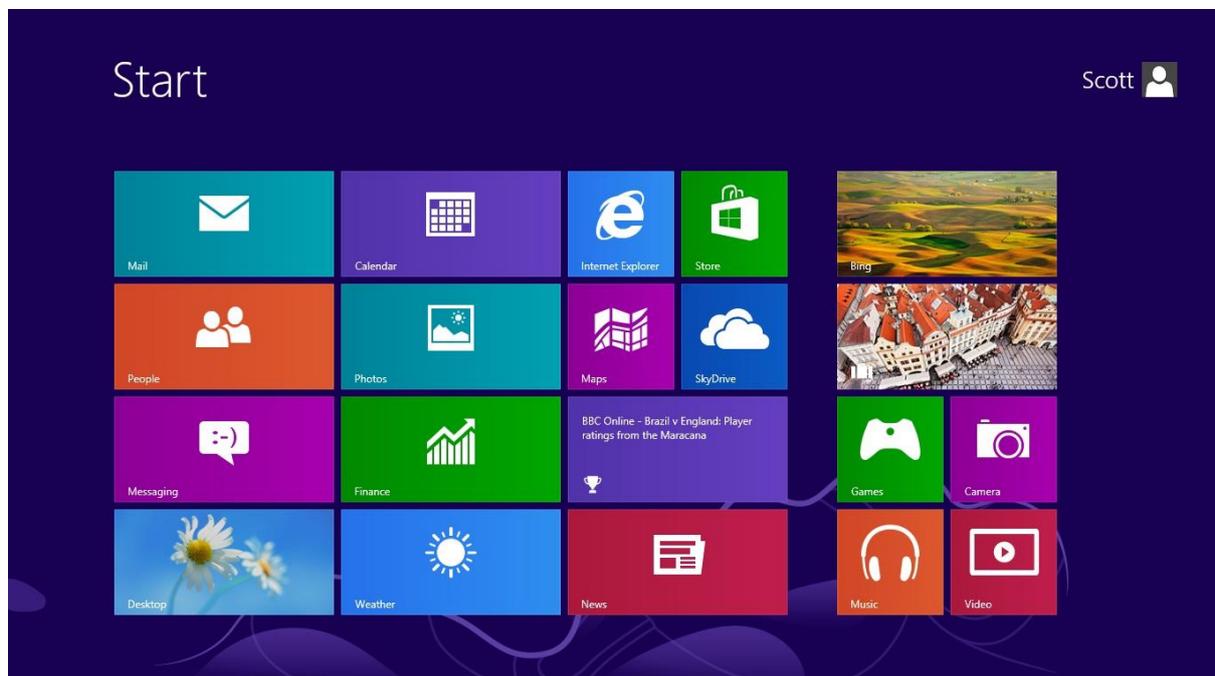
<http://www.revouninstaller.com>

They have a free version and it does a more thorough job of cleaning out the registry and hidden files than Windows does. Set the uninstall to "Advanced".

I would also recommend to uninstall any other software that is on your computer with Revo. Most (all?) computer manufacturers install software that will use up computers resources. I delete anything that has the computers manufactures name on it. Your audio computer should have as few programs on it as possible. No email, Microsoft Office, etc.

### Clean up Windows 8.1 Start Screen

The typical fresh install of Windows 8.1 Start screen looks something like this:



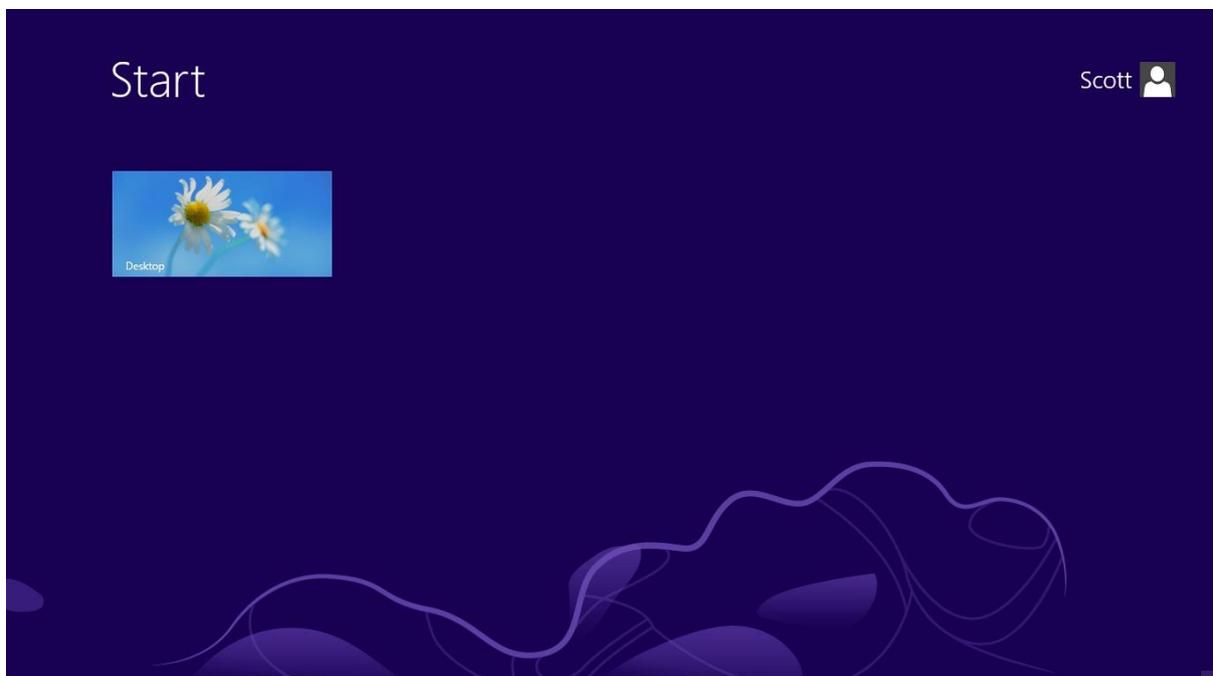
For an audio computer we want to uninstall as many of these as possible. To do this right click on an icon and you should see something like this:



Now click on the *Uninstall* button in the bottom left hand side of the screen. Use the Windows key:



to switch back and forth between windows. You should be able to uninstall everything except the Desktop, Internet Explorer and Store. If you want you can Now right click on Explorer & Store and *Unpin from Start*, but keep the Desktop Icon. Your Start screen should now look something like this:



You may already have installed JRiver & JPLAY. If not, I ***strongly*** recommend that you do the appropriate "Windows recommended Audio Playback setup" article on our website before you continue this paper.

### Turn off write-cache buffer flushing & Enable Write caching:

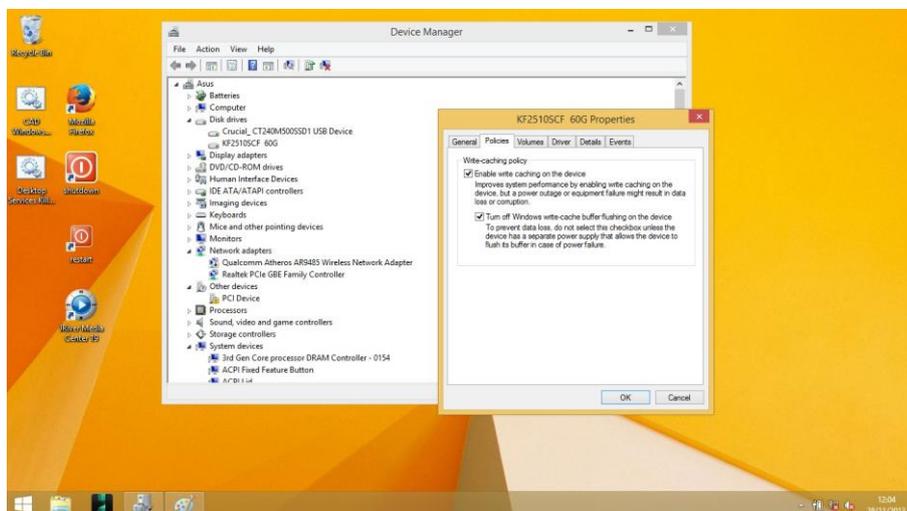
This modification is to increase the data transfer speed of your Hard Drive. The only device that I have read you should not turn of write-cache buffer flushing on is Intel SSDs. Intel recommends against disabling write-cache buffer flushing on its SSDs.

Plug in your external music storage drive drive(s).

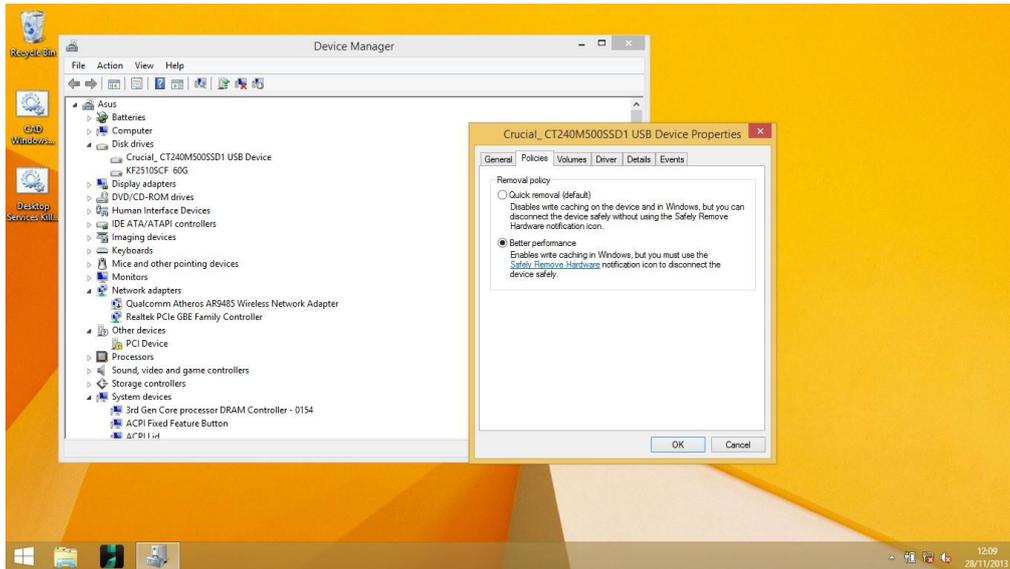
Go to: Search and type in: *Device manager* --> disk drives --> Go to the Policies tab and check the boxes for *Better Performance*, *Enable write caching* and *Turn off Windows write-cache buffer flushing*

Depending on the Hard Drive interface you may see different options, such as:

- 1) *Enable write caching*
- 2) *Turn off Windows write-cache buffer flushing*



Or Choose "*Better Performance*" as shown here:



Once you do this you should no longer just unplug your hard drive when it is powered up. You must go into explorer and right click the hard drive and click on: *Eject* You will then get a message that pops up in the lower right corner of your desktop telling you it is now safe to unplug the hard drive.

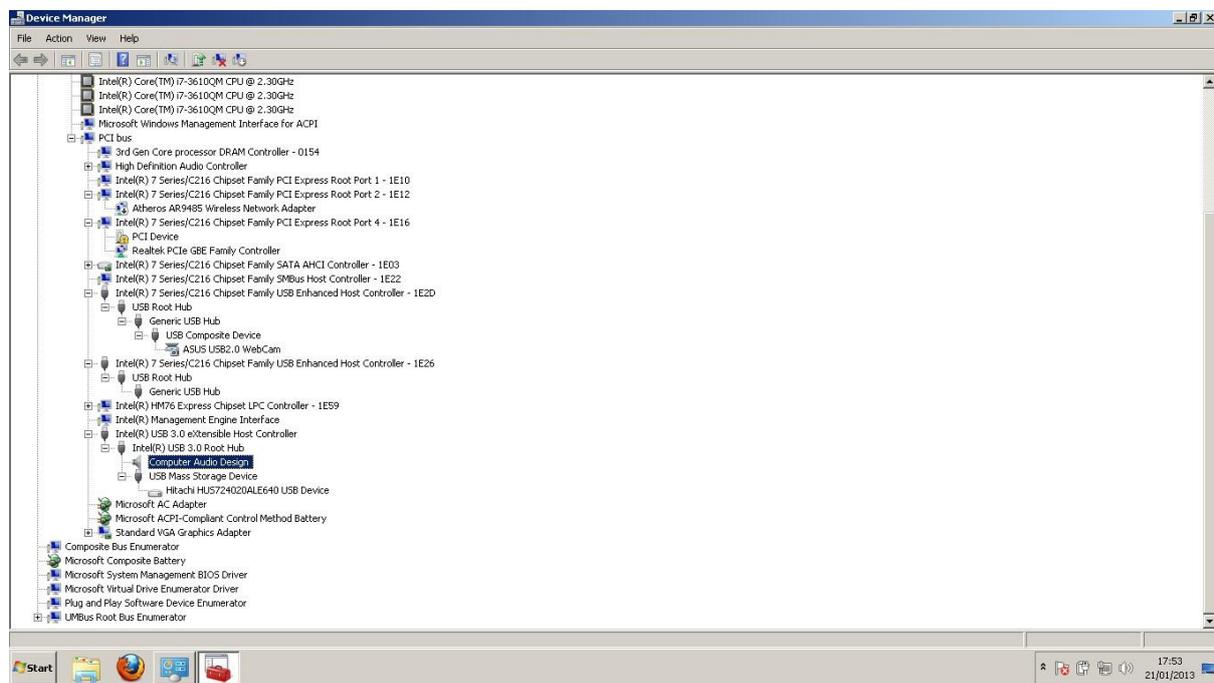
Repeat this process for all storage drives and your Operating System drive on your audio computer.

## Which USB connector should I plug my DAC to?

You want to use the connector that has the minimum number of other devices on that bus - preferably none. To find this out plug in your USB DAC and go to:

Search and type: *Device Manager*

Double click on that and then go to: view --> devices by connection You should see this:



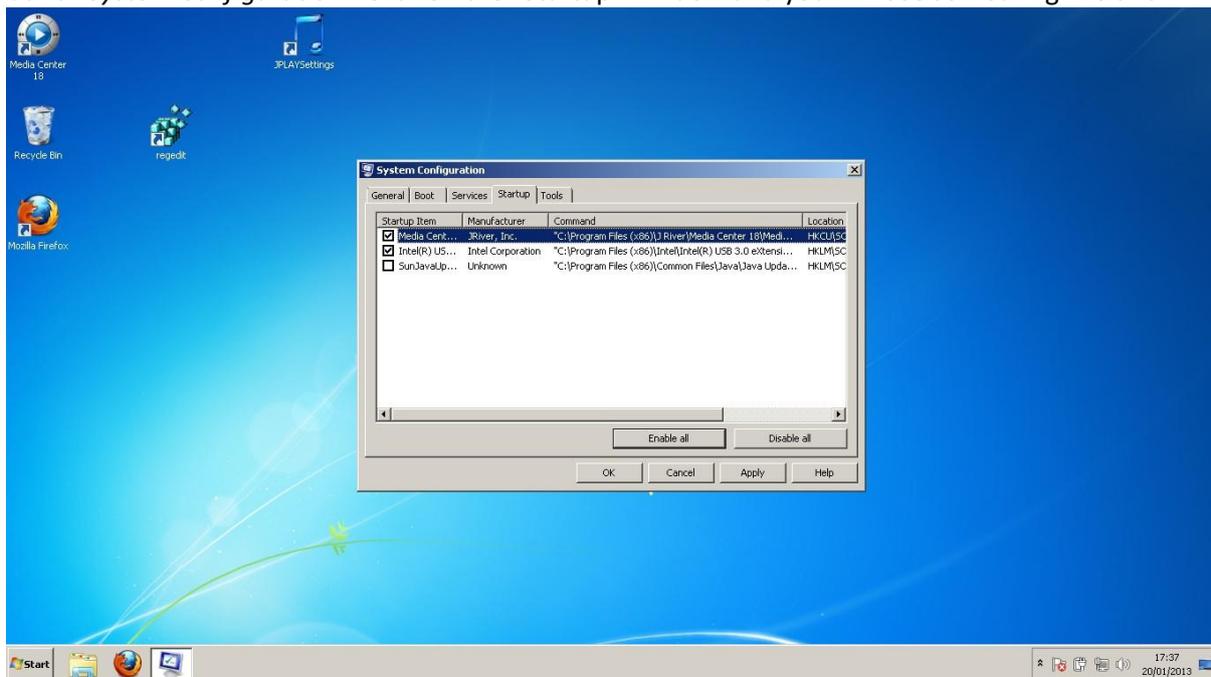
Go through and open up ALL of the USB controllers under the *PCI BUS*. In this example you can see that the Computer Audio Design DAC is installed in the Intel(R) USB 3.0 eXtensible Host Controller. Unfortunately so is an Hitachi USB Device (an external hard drive).

But notice that 1st Intel(R) 7 Series USB Enhanced Controller has the Asus USB2.0 Webcam on it and the 2nd Intel(R) USB Enhanced Controller has nothing on it. By moving my DAC USB cable around I can *try* to use one of the other USB hosts. Unfortunately, with the computer in this example this was not possible. But every computer is different, so try this for yourself.

## Stopping unnecessary software from auto-starting at computer boot up

Your computer may have software that automatically starts up when it is turned on.

To stop these programs from running the best method is to uninstall them from your computer using Revo as discussed earlier. If that is not possible go to: Search and type in: *msconfig*. This will launch *System Configuration*. Click on the "Startup" window and you will see something like this:



Go through all your startup programs and if possible uninstall them with Revo. If that is not possible then uncheck the programs that are not necessary. For an audio computer most programs on this list are typically not needed to run on startup. On our audio computers (that run JRiver music server & JPLAY), there are no programs listed in the startup window.

You can also disable startup programs from the *Task Manager*.

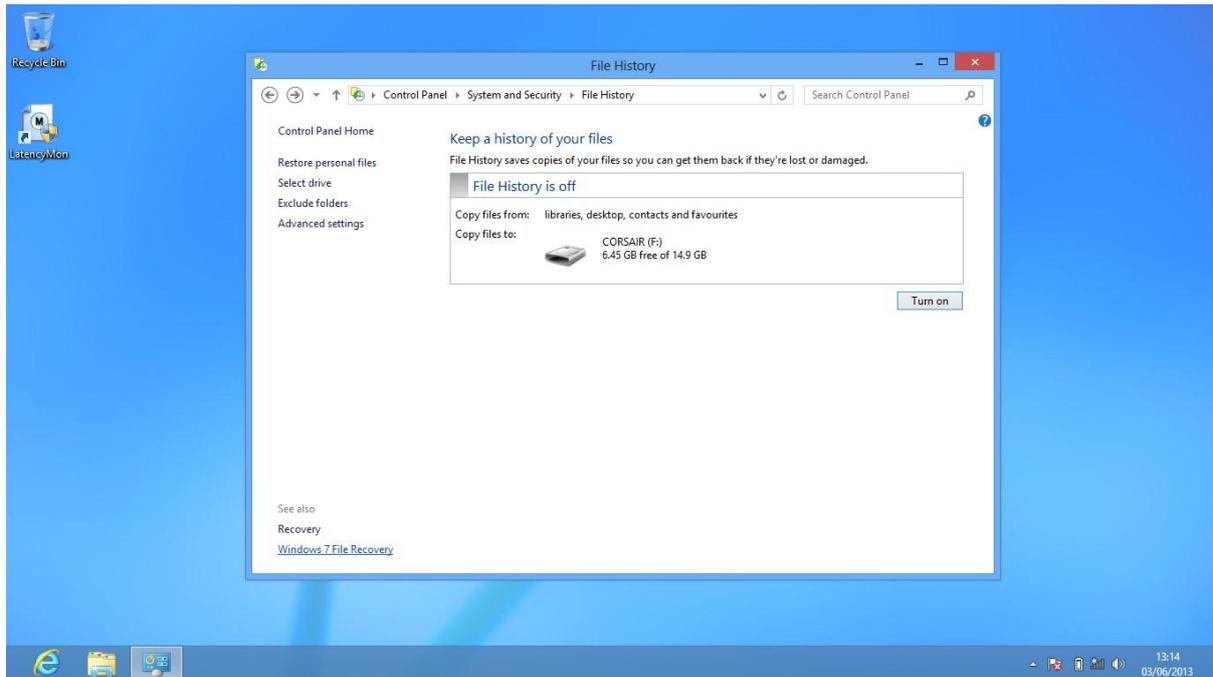
## Backup

Once you are at this point I strongly recommend that you make a "System Image" of your computer. This will ensure that you can easily bring back your computer to the exact state it is at the moment. The System Image is also useful if you decide you want another computer to be set up the same way.

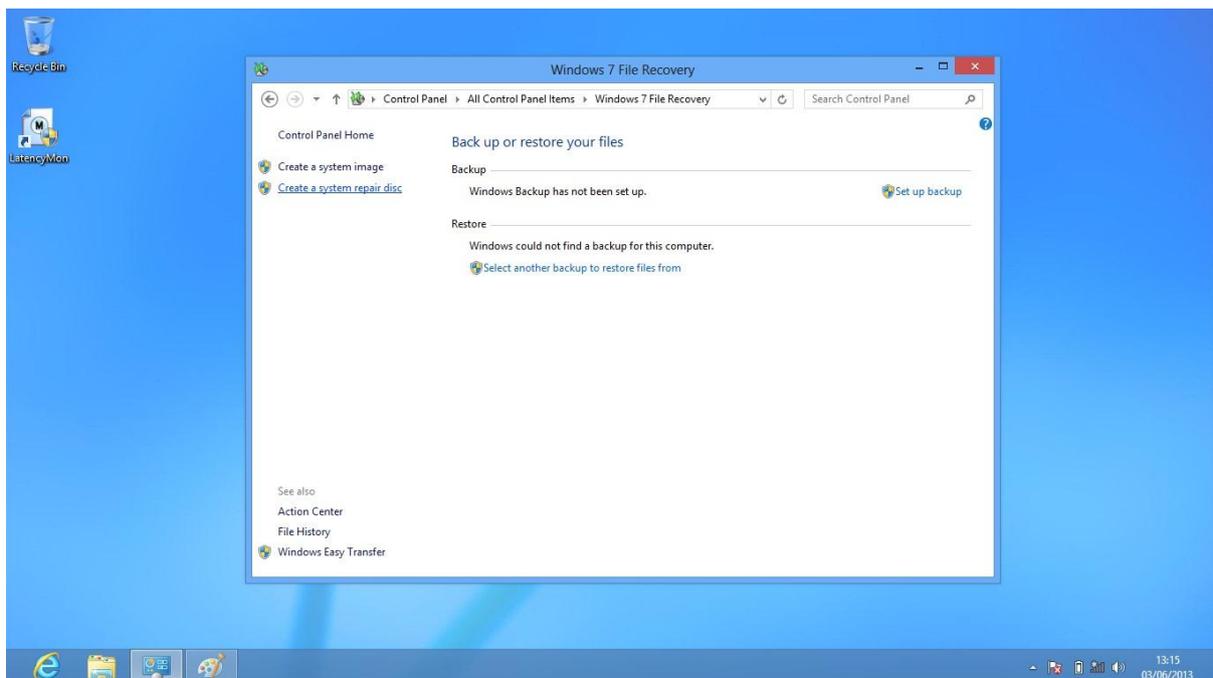
To Make a System image you the easiest way is to attach an external hard drive or larger USB thumb drive to your computer. Assume you need a minimum of about 20GB of space.

Now Go to: Control Panel (category view) --> System and security --> File History

You should see something similar to this:



In the bottom left hand corner click on *Windows 7 File Recovery* and you will see this:



Now click on: *Create a system image*

At this point just follow the directions. This process will now allow you to "rebuild" your current computer configuration even on a different computer. So not matter what happens to your

computer you have a way to get back to the state it was in when you made these backups. Highly recommended!

If you are using Windows 8 at the end you will be asked if you want to create a System Repair Disk. Say *yes* and you will have to insert a blank DVD for this to be made.

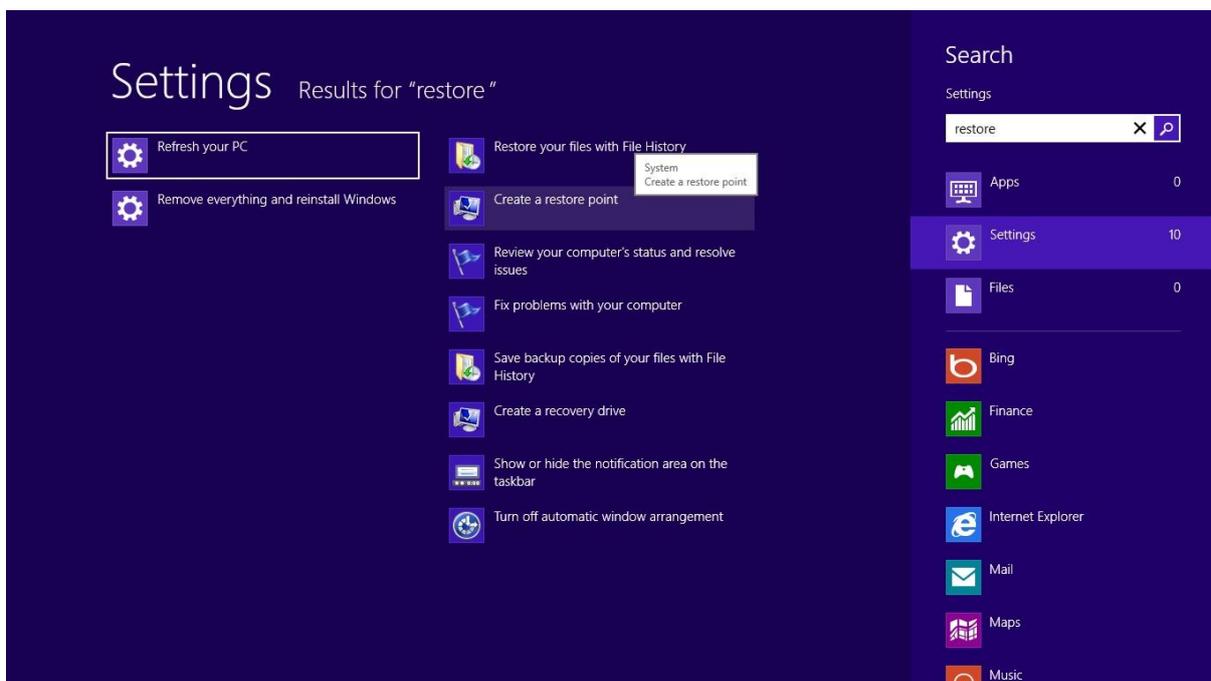
If you are using Windows 8.1 this option is unfortunately no longer offered. If you are using Windows 8.1 please follow these directions on how to create a recovery USB drive:

### [Create Windows 8.1 Recovery USB Drive](#)

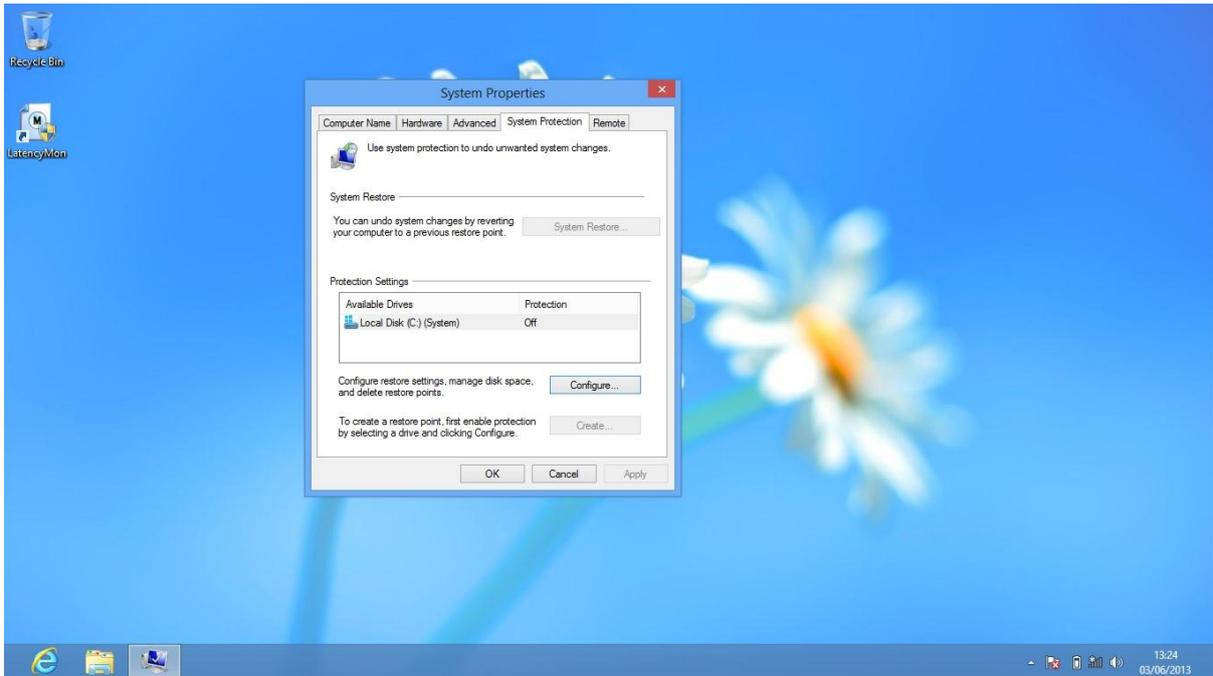
This process also works for Windows 8.

Now make a manual *Restore Point* of your computer. This records the current settings of your computer which you can go back to if something goes wrong.

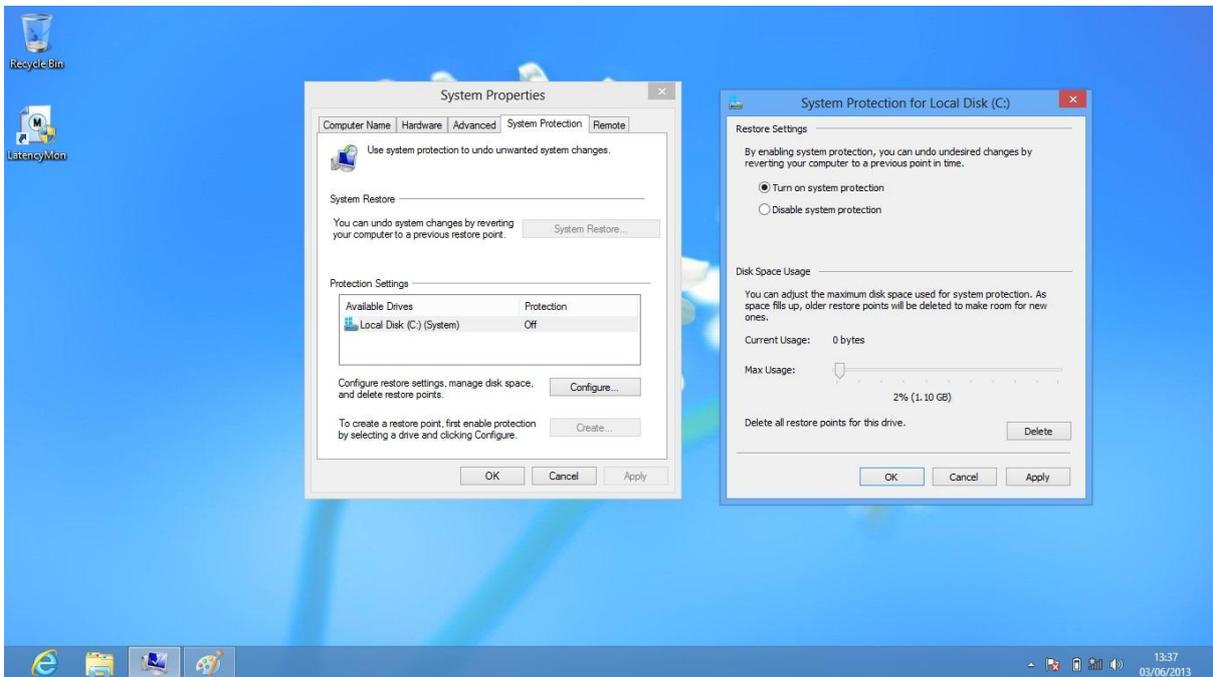
Go to: Search --> type: *restore* Look in the *Settings* Window and you will see this:



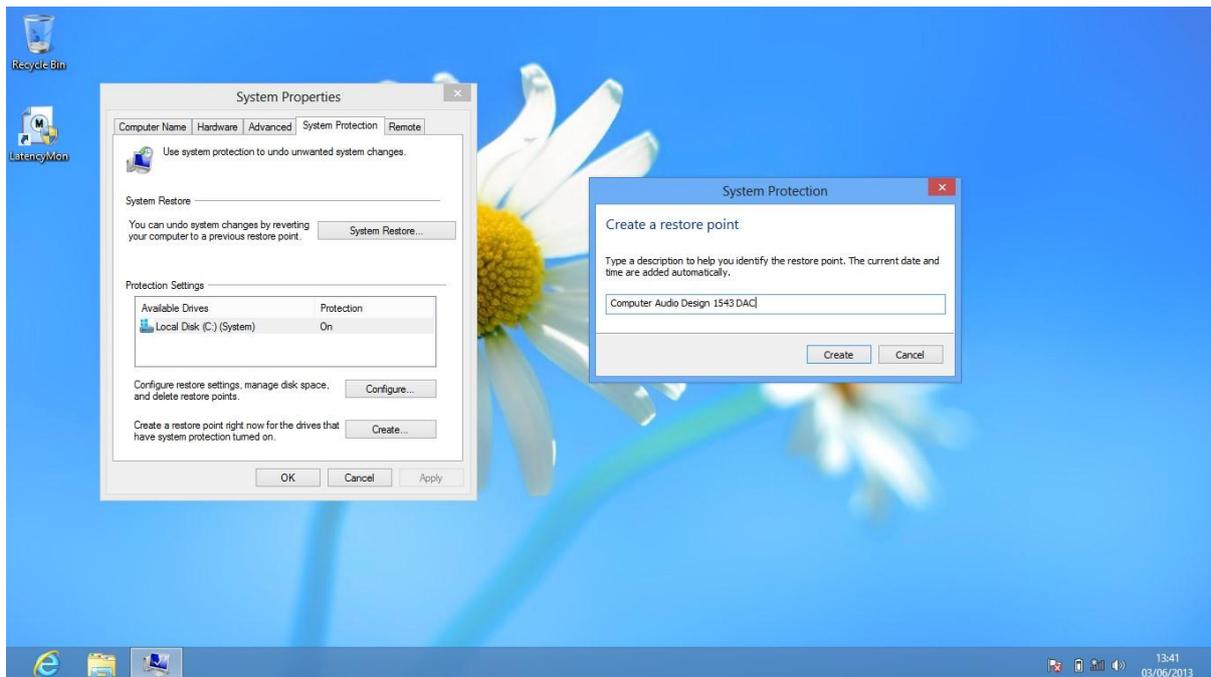
Click on: *Create a restore point*. On the window that pops up look at the section that says *System Protection*:



In the *Protection Settings* box make sure that your Operating System drive (usually C:) is set to ON. If it is set to Off as in the above screen you must turn it on. Follow these steps: Click on *Configure* and you a new windows will open up:



Now click on *Turn on system protection* and move the slider so that you have about 1 to 1.5 GB. Click *Apply* and then *OK*. now click on *Create...* and your screen should look like this:



You can type in any description you want and then click on *Create*. Now if you have an issue with your computer you can typically restore it to the settings that your computer currently has.

Please re-boot your computer now.

Now let's move on to making your computer sound better!

## The Computer Audio Design Windows Optimization Scripts

I have spent over a year working on optimizing Windows 7 and then Windows 8 for audio use. I have written programs or what are called "scripts" that will optimize a Windows 8 and 8.1 computer for best sound quality in about 45 seconds. This has been out in the forums for some time now. Before you use the scripts I would ask that you do the following:

- 1) Live with your present setup for a **least** a couple days before running the script. Make sure it is doing everything you want and no intermittent issues are occurring.
- 2) Complete everything in this paper **and** the "Windows recommended Audio Playback setup" articles on our website first. After the script is run it is difficult or impossible to make changes to certain computer settings. Get everything setup before running the scripts.
- 3) Make a system image and repair disk/USB drive as described in the Backup section. Create a manual restore point right before you run the script. You **must** reboot your computer after making the restore point and **before** running the script.
- 4) You must have all your networking setup before you run the script. Once you run the script the options to make networking changes are generally no longer present, but the settings you make prior still function.

The main scripts disable over 250 services, drivers and programs. There are too many to list here. If you wish to read more about what the script disables you can right click on the file and open it with *notepad* to read the comments.

The script is written with the following parameters:

- An iPad device can be used to control the audio computer
- Router is connected to the computer via hard wired Ethernet
- Wifi on the computer is disabled. Wifi connection is made via the Ethernet connected router.
- Your music collection is stored on an external drive or NAS via Ethernet, preferably with an external or internal drive.
- The computer can be connected to a local area network via Ethernet.

I want to mention something about wi-fi. We all want to use it so we can use an iPad or similar device to playback music. There are 2 reasons CAD never uses the built in wi-fi in a laptop or desktop computer:

1) Sound Quality suffers. The number of services that have to run on the computer for wi-fi to function is large. A large amount of the computers resources are used when wi-fi is on.

2) Robustness improves. What CAD strongly recommends is to connect a wi-fi router with Ethernet cable to your laptop/desktop computer. Use the wi-fi that is running on the external router and disable all wi-fi on your computer. Not only is the sound quality improved but the number of wi-fi issues that you have will drop by 80%.

You can download the CAD Windows 8 and Windows 8.1 Optimization scripts from here:

[http://www.computeraudiodesign.com/computer\\_setup/](http://www.computeraudiodesign.com/computer_setup/)

The scripts can be run from a USB drive or anywhere on your audio computer you want. You must right click on the script and "Run as Administrator" for it to work. There is also another script available that will return all services, drivers and programs that were modified back to their original Windows 8 or 8.1 settings. If you have any issues after running the script you can also restore the computer to the point before you ran it using *system restore*.

### **The Computer Audio Design Desktop Services Killer**

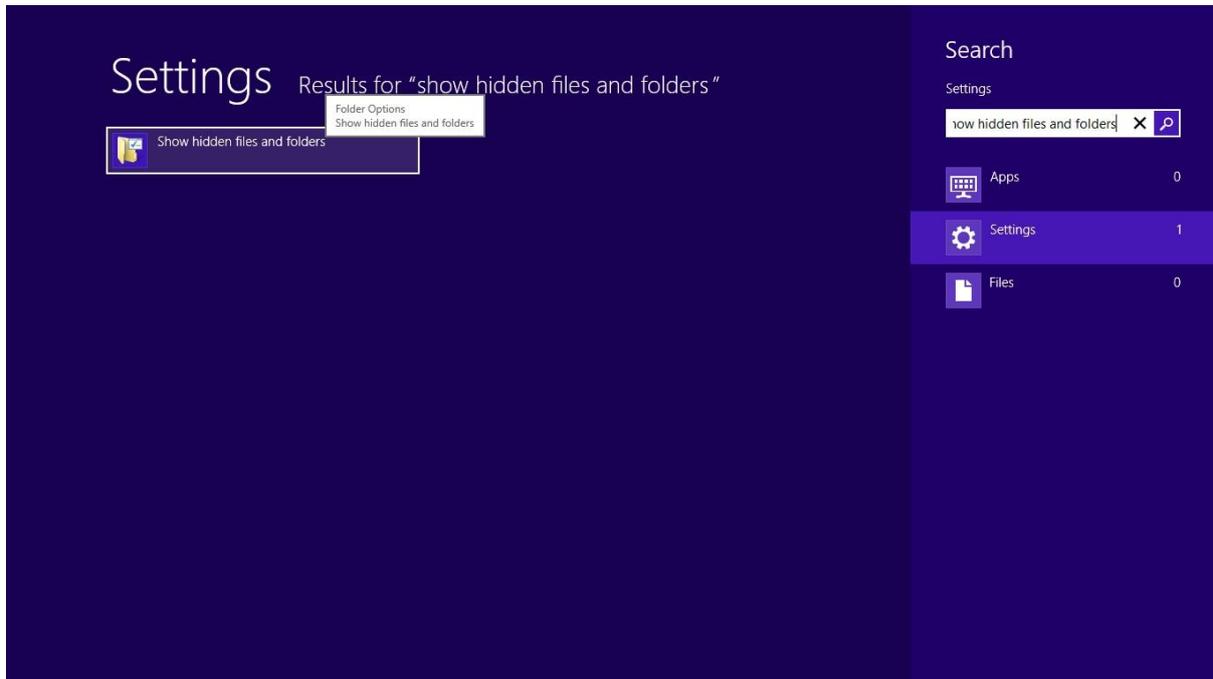
OK, a bit of a silly name! This is another script that shuts down services once your computer is up and running. These are services that are running on your computer that I have had trouble disabling permanently. They are either needed or cause fewer issues if available for boot up. Unlike the Optimization Scrip, this script does not make permanent changes. What this means is that once you reboot your computer you need to run the script again for the services and applications to be stopped. So if you want to try it out just run it from your USB drive, desktop or anywhere.

If you like what it does for the sound quality you can put it in your "autostart" folder. Any program placed in this folder will run when the computer boots up. There are a couple points where the script waits. This is because some of the services are not running immediately at startup. The autostart folder is a "hidden" folder. The folder is located at:

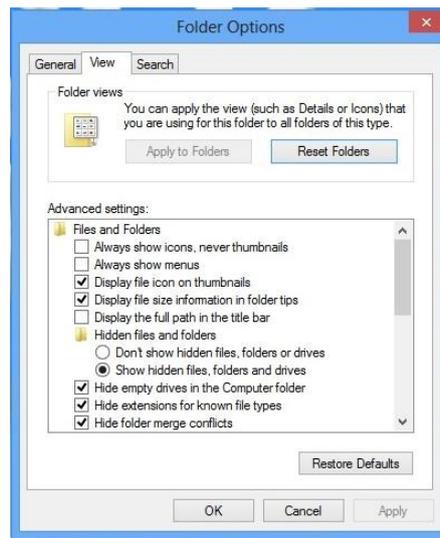
C:\Program Data\Microsoft\Windows\Start Menu\Programs\Startup

Here is how to "unhide" your hidden folders so you can see the startup folder:

Go to: Search --> type: *Show hidden files and folders* You should see something like this:



Click on that and the Window that opens should look like this:



Change the *Hidden files and folders* so that the *Show hidden files, folders and drives* is picked. Click OK and you should now be able to see the startup folder. Copy the *CAD Desktop Killer* script into the folder and now it will run every time the computer is turned on. The scripts can be downloaded from here:

[http://www.computeraudiodesign.com/computer\\_setup](http://www.computeraudiodesign.com/computer_setup)