Audio Delay Help

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Part I

1 Introduction

Audio Delay is program that can delay audio being played on your computer for a certain period of time. This is useful in situation where you want to synchronize audio with another media source. For example, people often like to listen to local radio play-by-play broadcasts of a sporting event while watching the video on TV. This used to be easy because the radio and TV were broadcast without any sort of delay. However, now with satellite feeds and digital broadcasts, the video may be delayed by as much as 10 to 15 seconds.
Radio is seldom delayed, so you hear the result of the play long before you see it, which is very distracting and ruins the enjoyment of the game.

The Audio Delay program allows you to feed your radio's audio through your computer and introduce a variable delay of from 0.1 seconds to several minutes. This makes it easy synchronize the radio audio and the Television video.

1.1 System Requirements

The Audio Delay program will work on any PC with modern sound card that has a Line Input for recording. The program also requires Windows XP, Vista, Windows 7 or Windows 8. It may work on earlier version of Windows, but it has not best tested on this operating systems.

1.2 Connecting An Input

The first step to using the Audio Delay is to connect device to the input of your computer. Typically this will be a radio. The radio must have an ear phone jack like the one shown to the right.

The next step is to connect the radio to your computer. Since desktop and laptop computers are different, the instructions are broken out separately:

Connecting a Desktop Computer.
Connecting a Laptop Computer.

1.2.1   Connecting a Desktop Computer

Computer Inputs. Desktop computers usually have several connectors on the back of the case that are inputs and outputs to the computers sound card. To use the Audio Delay program, you must bring audio signal from an external radio into these inputs. Normally, you will connect the radio to the computer through the Line-In input. To determine which inputs are Line-In inputs, refer to your computers manual, or search the online documentation for your computer or your computer's sound card. The connectors are usually color-coded to help you identify the correct the connector.

Adapters. Once you have identified the proper input port, you will also need a cable and potentially one or more adapters that will convert from the ear phone jack that plugs into the radio to the jacks that connect to the sound card. The basic problem is that jacks come in different sizes and types and the sound card and the radio rarely have the same type. As a result, you must find a cable and/or adapters that will plug into both the sound card and the radio.

The most important aspect of the jacks is whether there is stereo or monaural Most computer jacks are stereo and most radio earphone jacks are monaural.

 As a result, you usually have to find a cable that has a stereo jack on one end and monaural jack on the other. If you can't find a cable that satisfies this requirement, you can usually use an adapter on one end of the cable that will convert it to the type and size you need.

You can tell stereo jacks from monaural jack by carefully examining the tip of the jack and counting the number of conductors. Stereo jacks will have three; monaural jacks will have two. The drawing to the right illustrates what stereo and monaural jacks look like and how to tell them apart.
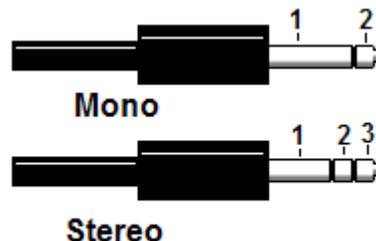
Warning: Be careful and make sure the plugs for any adaptor you use match the radio and computer you are using. For example, miniature plugs like these can be either monaural or stereo. AM Radio outputs tend to monaural, but computer inputs tend to be stereo. If you plug a stereo jack into a mono socket, it may short out part of the circuitry and do damage to your Computer or your Radio. Radio Shack generally has adaptors that can convert stereo to monaural, as well adaptors to convert between different sizes.

The final step is to make sure the input is configured as a "Line-In" input. On a desktop computer, at least one of the inputs is normally configured a Line-In input. If one of the inputs isn't configured as a Line-In Input, you will need to reconfigure it. This is usually done with a special utility program that is installed on your computer along with the sound card. The image below shows the typical configuration utility for the RealTek sound card.

As you can see, the bottom pink connector shows a microphone symbol just to the right, indicating that it is not configured as "Line-In' input

To change the configuration, you can click on the microphone and the program will display the configuration window shown to the right. The "Mic In" option is checked, which shows that the input to be configured for a microphone.

Checking the "Line In" option and pressing OK, will change the input from a Mic-In to Line-In. As you can see, the icon next to the pink plug as changed from a Microphone Symbol to a Line-In symbol.

Not all computers use Realtek sound ICs, so you may find different sound setup programs on your computer. Even computers that do use Realtek sound ICs, may have a different setup program from the one pictured here, so it may take some exploration to find the controls that set the sound ports.

Generally speaking, you need to use the setup program for the sound card or sound chip, and not the Windows sound-configuration programs. The Windows programs usually don't allow you to control low-level options like sound port assignments.

1.2.2 Connecting A Laptop Computer

To use the Audio Delay program, you must bring audio signal from an external radio into these inputs. Normally, you will connect the radio to the computer through the Line-In inputs. However, Laptop computers are different from Desktop computers in that they have fewer inputs. A desktop computer will usually have a dedicated "Line-In" input that is ideally suited to receiving the signals

from radios. If your laptop has a dedicated "Line-In" input, you should use it and skip to Step-II below.

I. Microphone Jack. If your laptop has a microphone jack, you may be able to use it in place of a Line-In input, but the process is a little more complicated. Microphone jacks are designed to pickup the very weak signals produced by microphones. These signal are in the range of 0.01 volts. The signal coming of a radio maybe around 1 volt, or about 100 times bigger. As a result, if you plug the radio directly into the microphone jack, the signal will be very distorted with only the softest sounds intelligible.

There are several ways to solve the problem depending on the computer you are using.

1. Reconfigure the Microphone to be Line-In. Most modern sound card can be configured so the jack on the back perform different functions. The sound cards normally come with a utility that allows you to configure the sound card. You need to configure the sound card so it has a "Line-In" input. The image below shows the typical configuration utility for the RealTek sound card.

As you can see, the bottom pink connector shows a microphone symbol just to the right. This means the input is configured to accept microphone voltage levels.

To change the configuration, you can click on the microphone and the program will display the configuration window shown to the right. The "Mic In" option is checked, which is what sets the input to be configured for a microphone.

Checking the "Line In" option and pressing OK, will change the input from a Mic-In to Line-In. As you can see, the icon next to the pink plug as changed from a Microphone Symbol to a Line-In symbol.

Not all laptops use Realtek sound ICs, so you may find different sound setup programs on your computer. Even laptops that do use Realtek sound ICs, may have a different setup program from the one pictured here, so it may take some exploration to find the controls that set the sound ports.

Generally speaking, you need to use the setup program for the

sound card or sound chip, and not the Windows configuration programs. The Windows configuration programs usually don't allow you to control low-level options like sound port assignments.

2. Reduce the Signal Level. If you can't find a way to configure your microphone input to be a Line-In input, another option is reduce the signal level. One way to do this is with an adaptor that contains an attenuator. The picture to the right shows an attenuator will reduce the signal level enough to make Line-Level signals work with a microphone input. Here is one that is available off the web:

Line to Microphone Attenuation Cable

Warning: Be careful and make sure the plugs for any adaptor you use match the radio and computer you are using. For example, miniature plugs like these can be either monaural or stereo. AM Radio outputs tend to monaural, but computer inputs tend to be stereo. If you plug a stereo jack into a mono socket, it may short out part of the circuitry and do damage to your Computer or your Radio. Radio Shack generally has adaptors that can convert stereo to monaural, as well adaptors to convert between different sizes.

If you are handy and know to build simple electronic projects, you can make your own attenuator. Here are some web site with instructions and circuits. You can usually buy all the part at Radio Shack or in the worst case, from Digikey. Here are some links to circuits that will attenuate a line-level signals for a microphone.

Line level signal to microphone input adapter

Line level signal to microphone input adapter

3. Turn Down The Volume. If all the above suggestions fail, you may be able to plug the radio directly into the microphone jack and then use very low volume levels. This will require that you turn volume down to very near the off-position. This can be quite tricky to do because very small changes in the position of the volume control can make big changes to the volume. Some radios just won't let you get the volume low enough to work.

II. Cables and Adaptors. You will also need a cable that will connect between the radio and your computer. If you are lucky, the radio and the computer will have the same kind of connector so you can just use a cable with identical jacks on each end. Most of the time this will not be true so you will need different jacks on each end of the cable or adaptors that will convert one type of jack to another.

Pay particular attention to whether the jacks are stereo or monaural. Most computer jacks are stereo and some radio earphone jacks are monaural. For example, if the radio has a mono-head phone jack, you will need to get a mono adaptor; if it is stereo, you will need a stereo adapter like the one shown to the right.

You can tell stereo jacks from monaural jack by carefully examining the tip of the jack and counting the number of conductors. Stereo jacks will have three; monaural jacks will have two.

Mono

Stereo

Warning: Be careful and make sure the plugs for any adaptor you use match the radio and computer you are using. For example, miniature plugs like these can be either monaural or stereo. AM Radio outputs tend to monaural, but computer inputs tend to be stereo. If you plug a stereo jack into a mono socket, it may short out part of the circuitry and do damage to your Computer or your Radio. Radio Shack generally has adaptors that can convert stereo to monaural, as well adaptors to convert between different sizes.

1.3 Configure Your Computer

You now need to configure your computer so it is getting sound from the radio and outputting the sound from the "Wave" device. Most of the configuration can be done directly for Audio Delay.

Press the "Choose Input/Output" in the Audio Delay program. This will take you to Audio Setup dialogs for Windows. The process is a little different for Windows XP, Vista and Windows-7. Here are detailed instructions for each operating system:

1. Windows XP.
2. Vista/Window-7
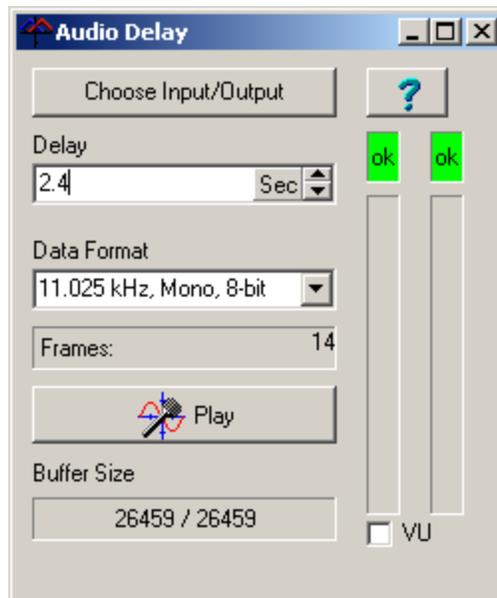
In some instances, you may also need to configure advanced option that are only accessible from Sound Card Utilities.

1.3.1 XP Configuration

You will need to configure both input and the output channels of your sound card. Here are detailed instructions for doing both:

Configuring Inputs Under XP.
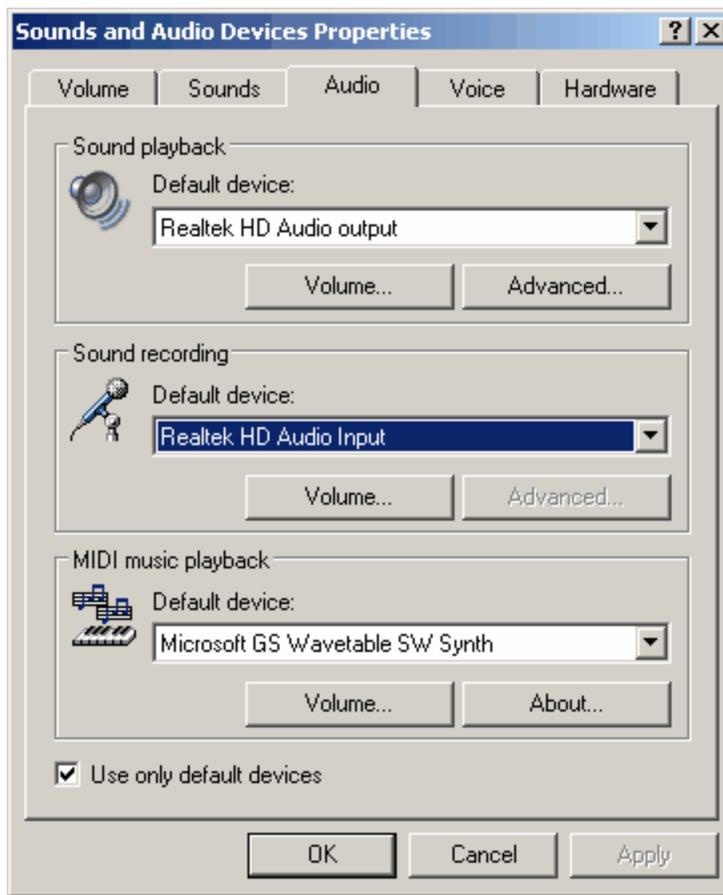Configuring Outputs Under XP.

1.3.1.1 Configure Inputs XP

Setting Up Inputs. The following section gives detailed instructions for setting up inputs for Windows XP inputs:

1. Press the "Choose Input/Output" button in the Audio Delay program.
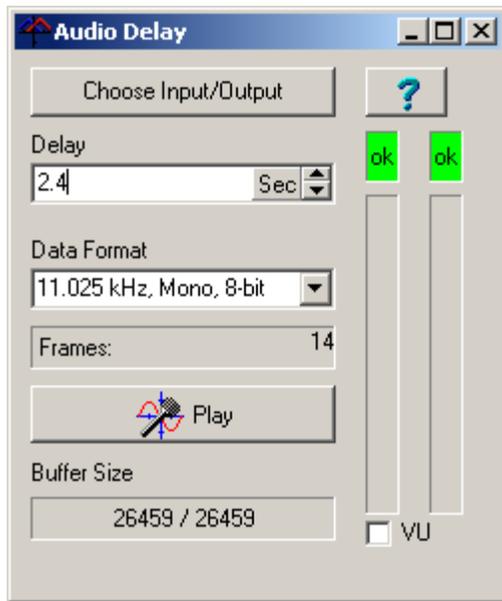
2. This will take you to the "Sounds and Audio Devices Properties" dialog. Choose the "Audio" page from the tabs along the top.

3. In "Sound Recording" section, choose a default device from the list. This will normally be your

sound card. In some instances, like the example above, it doesn't describe the option as a sound card so you may have to refer to your computer documentation to know which device is your sound card.

4. Next press the "Volume" button in the Sound Recording section. This will take you to the "Recording Control."
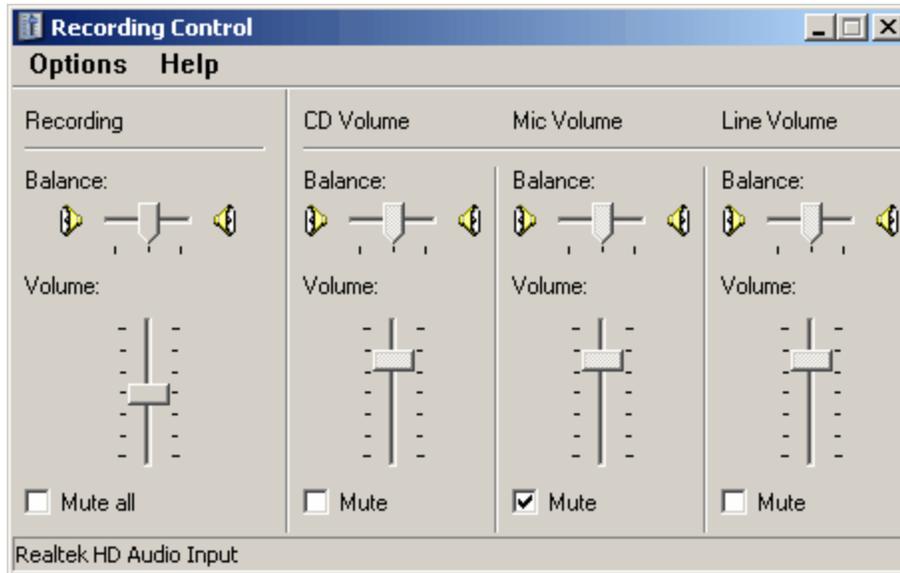
Look at the "Line Volume" option. This option controls the input volume from your radio. Make sure it is not muted and the volume is up at least about half way. You can adjust the volume later if it is too high or low.

If you are missing the line volume option, select the "Options -> Properties" item from the menu bar. This will bring up the Properties window.
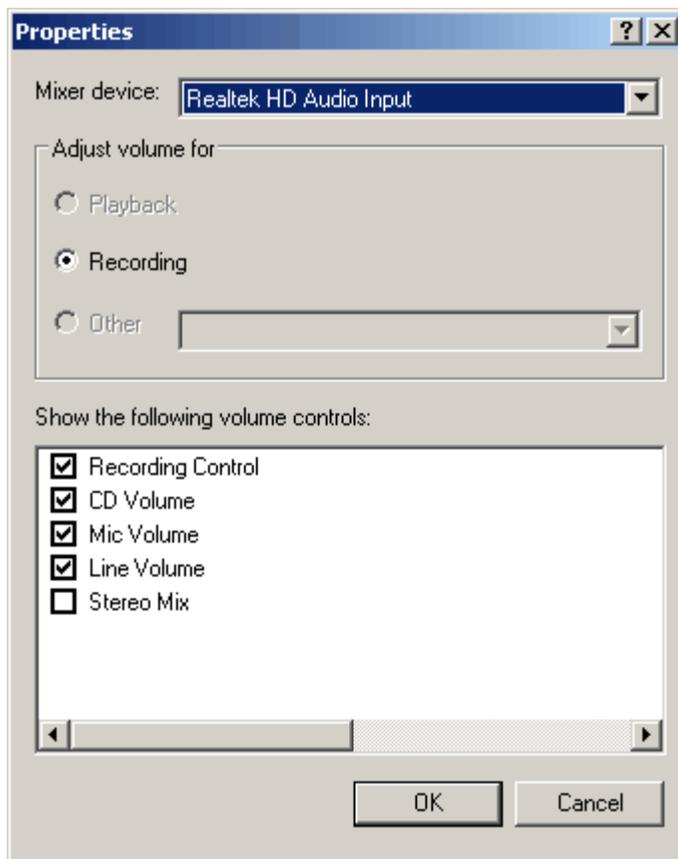
Make sure the Line Volume option is checked and press OK. If you still don't have access to the controls you need, you may have to set things up in the Sound Card Configuration utility that came with you sound card. Click here for general information about Sound Card Configuration Utilities. Also, make sure your hardware inputs and outputs are correctly configured.
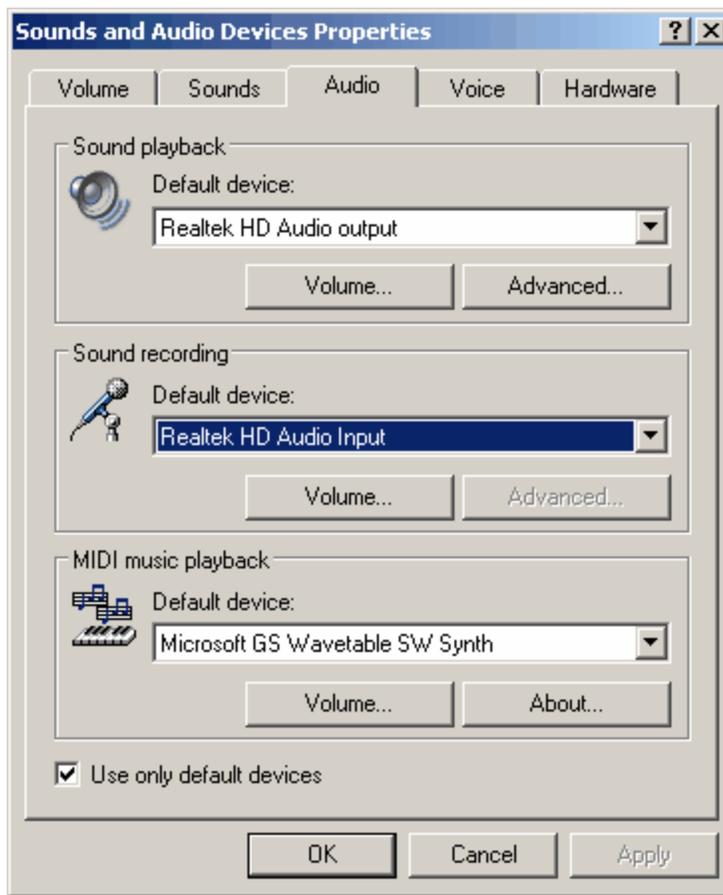
1.3.1.2 Configure Output XP

Setting Up Output. The following section gives detailed instructions for setting up an output for Windows XP outputs:

1. Press the "Choose Input/Output" button in the Audio Delay program.
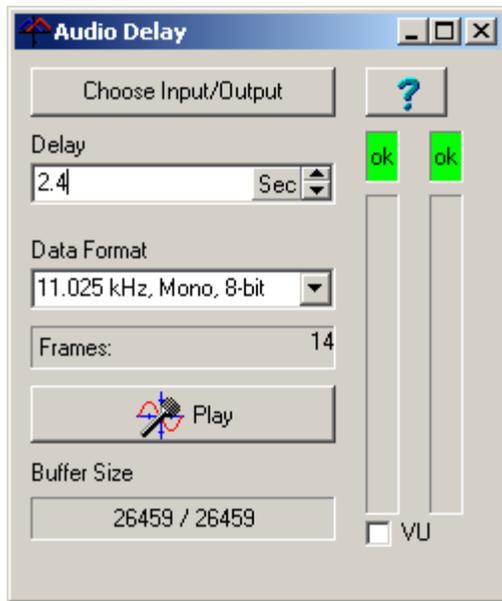
2. This will take you to the "Sounds and Audio Devices Properties" dialog. Choose the "Audio" page from the tabs along the top.

3. In "Sound Playback" section, choose a default device from the list. This will normally be your

sound card. In some instances, like the example above, it doesn't describe the option as a sound card so you may have to refer to your computer documentation to know which device is your sound card.

4. Next press the "Volume" button in the Sound Recording section. This will take you to the "Master Volume Control."
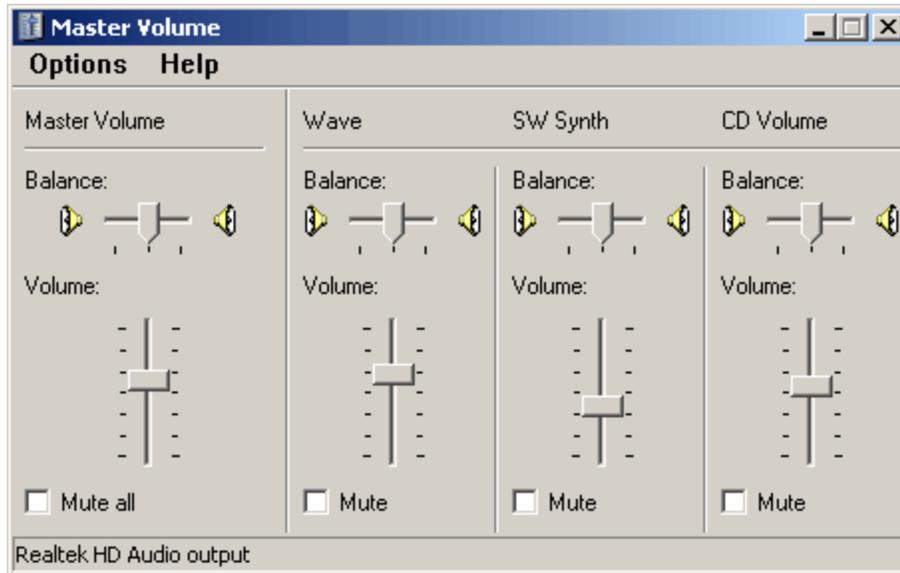

The delayed audio will be played back through "Wave" device, so make sure it is not muted and the volume is at least half way up.

The Master volume should also be un-muted and the volume should be about half way up. You will probably need to adjust this value later as get everything adjusted.

Some sound cards will allow the Line Input to monitored directly and there will be a Line Volume control. If the Line Volume is enabled, this will produce an echo sound as both the delayed and undelayed audio will be played at the same time. If you have this option, make sure it is muted.

5. If the Wave or Master Volume Control sections is missing, select the "Options -> Properties" item from the menu bar. This will bring up the Properties window.
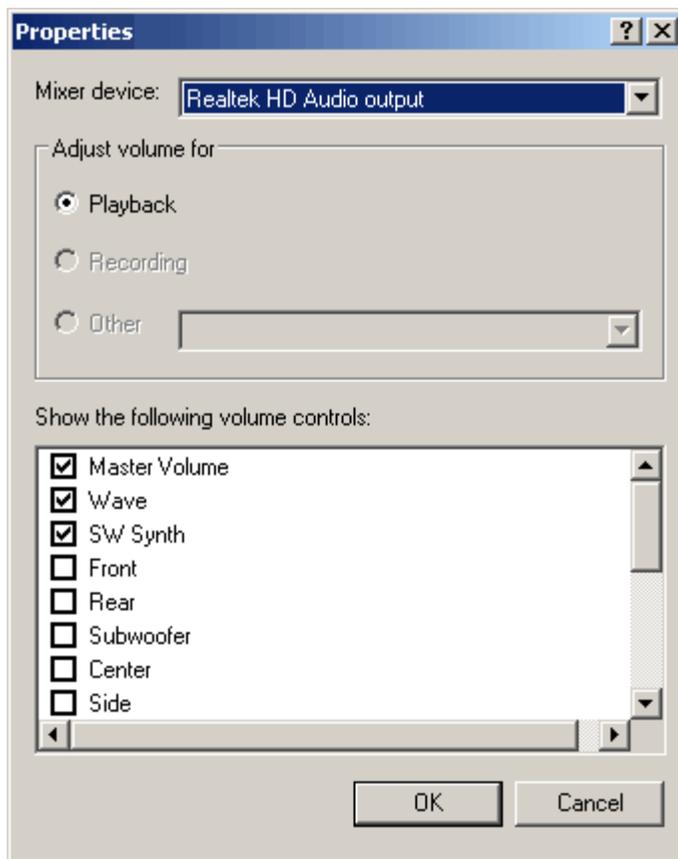
Make sure the Master Volume and Wave options are enabled and press OK. If you still don't have access to the controls you need, you may have to set things up in the Sound Card Configuration utility that came with you sound card. Click here for general information about Sound Card Configuration Utilities. Also, make sure your hardware inputs and outputs are correctly configured.

1.3.2   Vista/Window-7 Configuration

You will need to configure both input and the output channels of your sound card. Here are detailed instructions for doing both:

Configuring Inputs Under Vista/Win7.
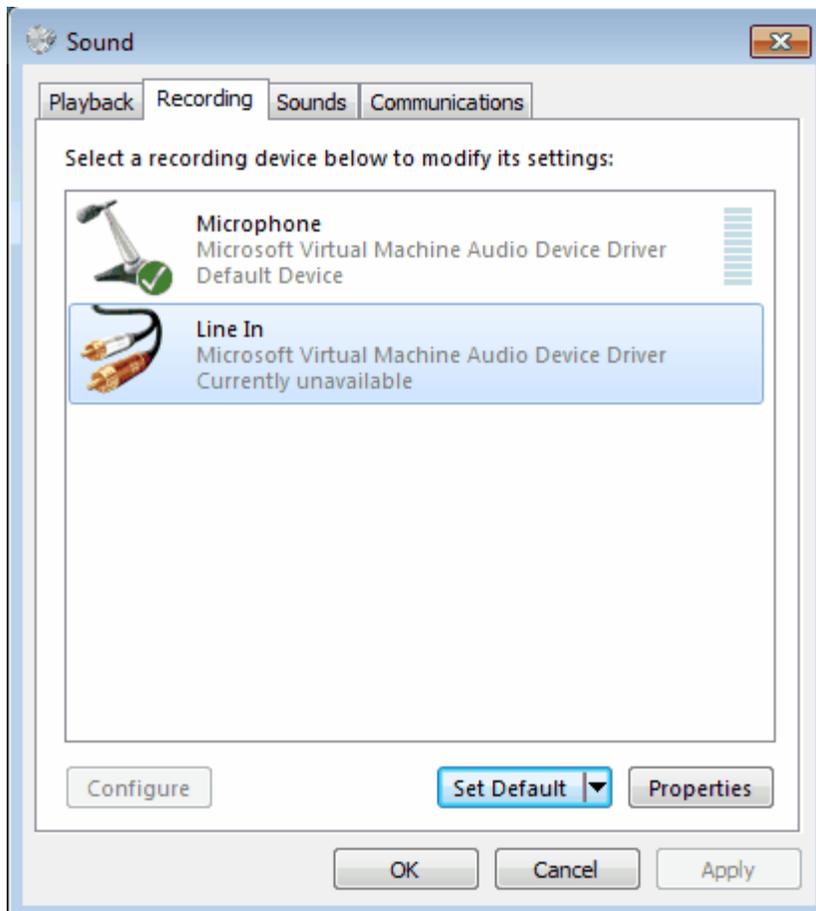Configuring Outputs Under Vista/Win7.

1.3.2.1   Configure Inputs Vista/Win7

Setting Up Inputs. The following section gives detailed instructions for setting up inputs for Vista or Windows-7 inputs:

1. Press the "Choose Input/Output" button in the Audio Delay program.
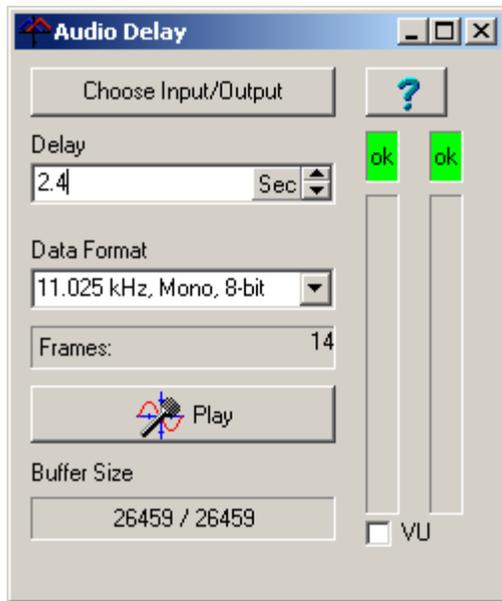
2. This will take you to the "Sound" dialog. Select the "Recording" tab at the top of the window.

Select the "Line In" option. Next, press the "Default" button. This will cause a check mark to appear
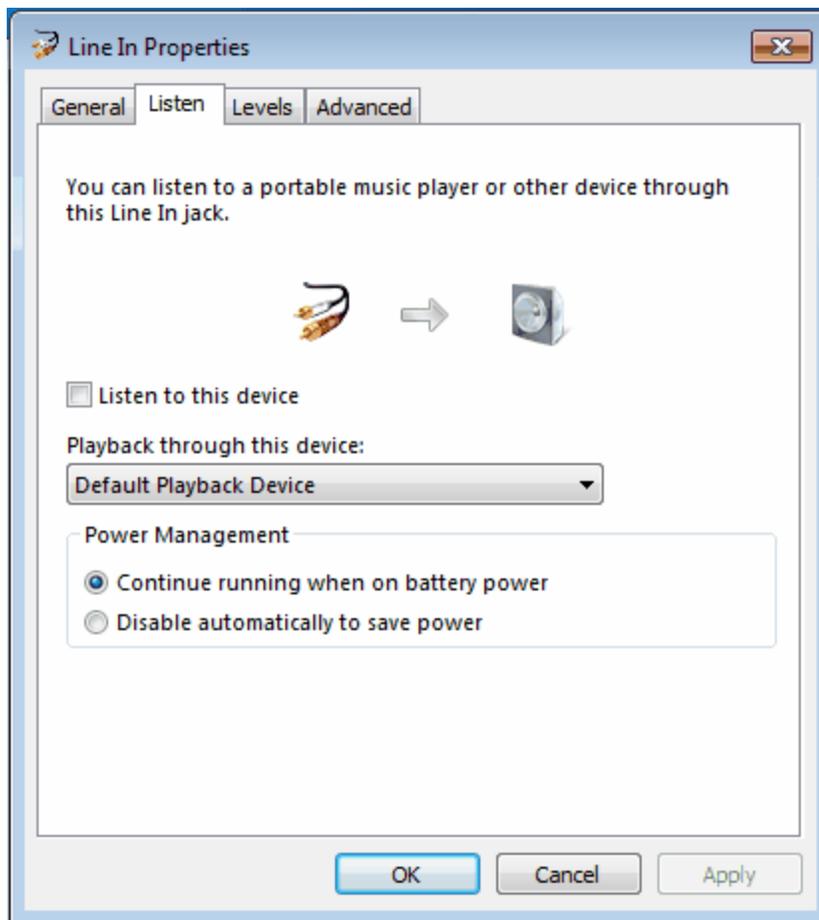
indicating that the option has been selected.

3. Press the "Properties" button. This will display the "Line In Properties" dialog. Select the "General" page.
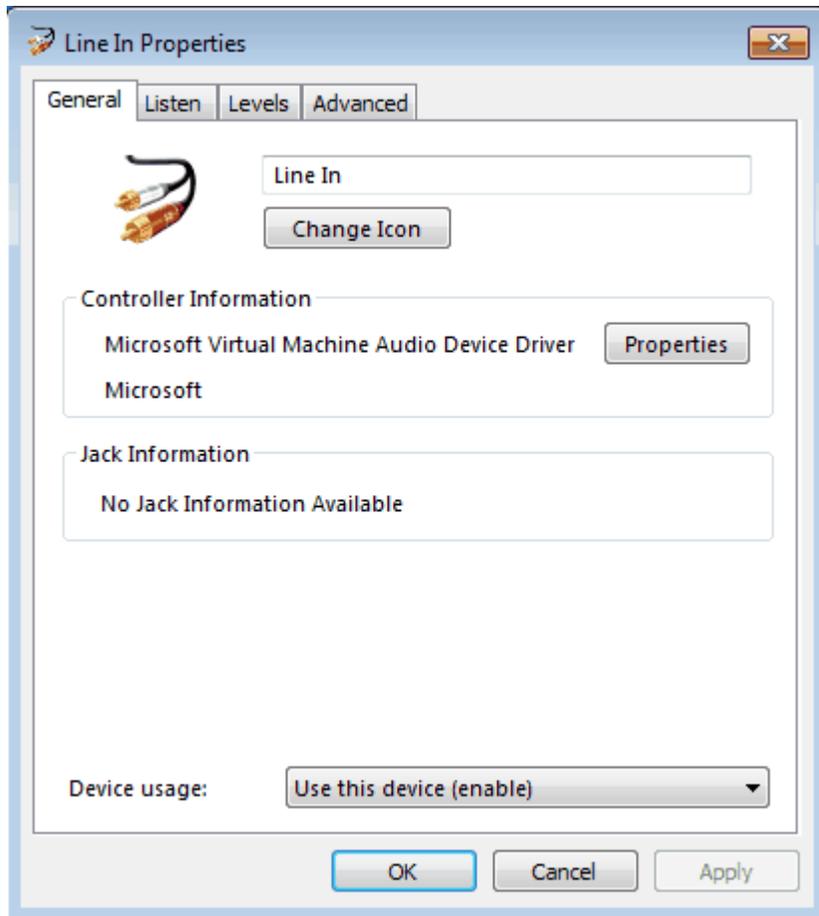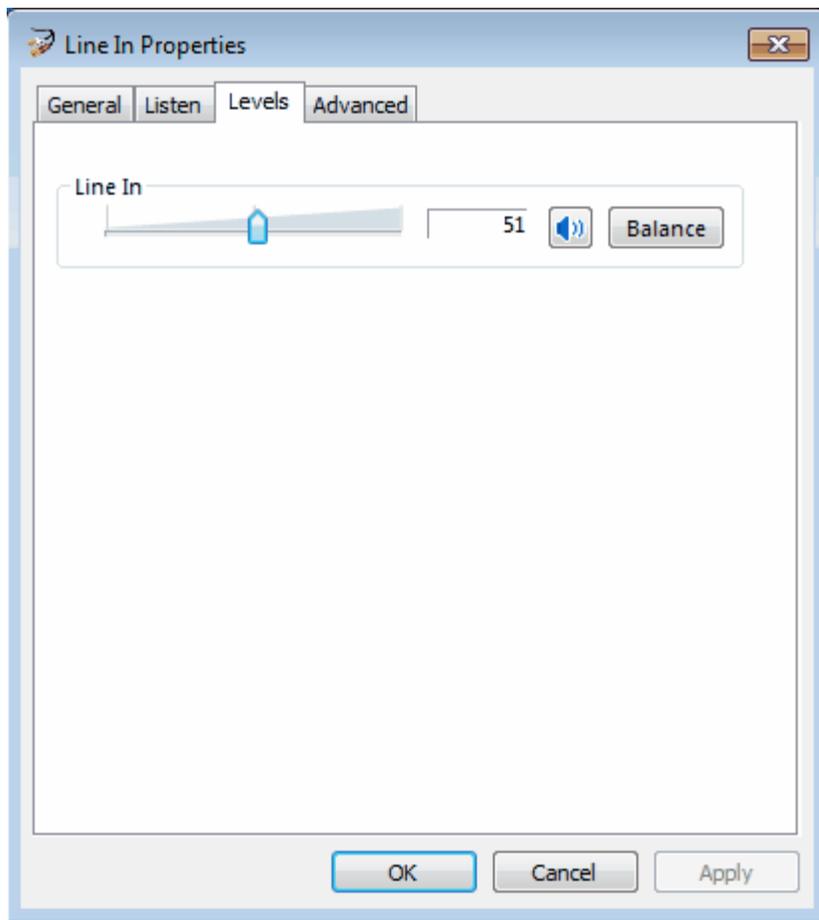

Make sure the "Device Usage" option at the bottom of the page is set for "Use this device (enable)."

4. Now choose the "Listen" page.

Make sure the "Listen to this device" option is not enabled, otherwise there will be an echo in the playback.

5. Switch to the Levels page.

Adjust the levels to about 50%. If necessary, you can return to this dialog and adjust them later.

When you have completed all the steps, press OK twice to exit back to the Audio Delay program.
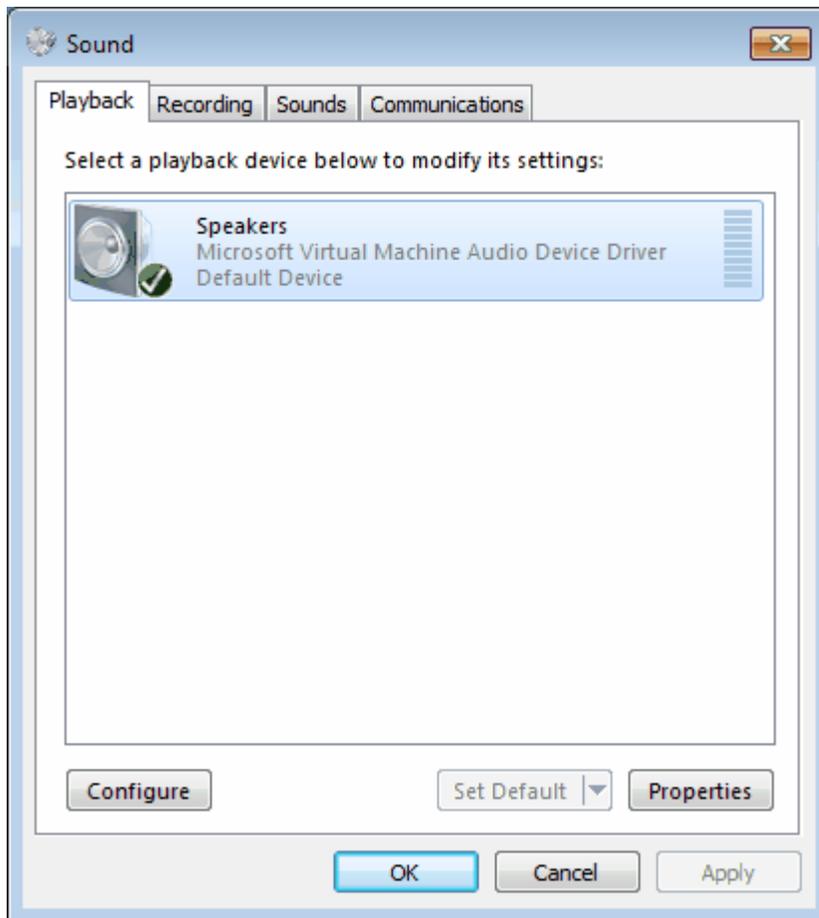
1.3.2.2   Configure Outputs Vista/Win7

Setting Up Output. The following section gives detailed instructions for setting up an output for Windows outputs:

1. Press the "Choose Input/Output" button in the Audio Delay program.
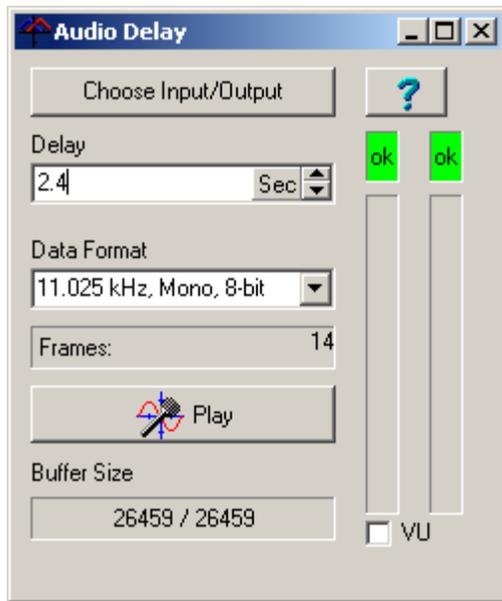
2. This will take you to the "Sound" dialog. Choose the "Playback" page from the tabs along the top.

Make sure the Speakers options is selected and press the "Set Default" button. This will place a

green check mark next to the speaker icon.

3. Press the Properties Button. This will bring up the Speakers Properties dialog. Select the "General Tab."
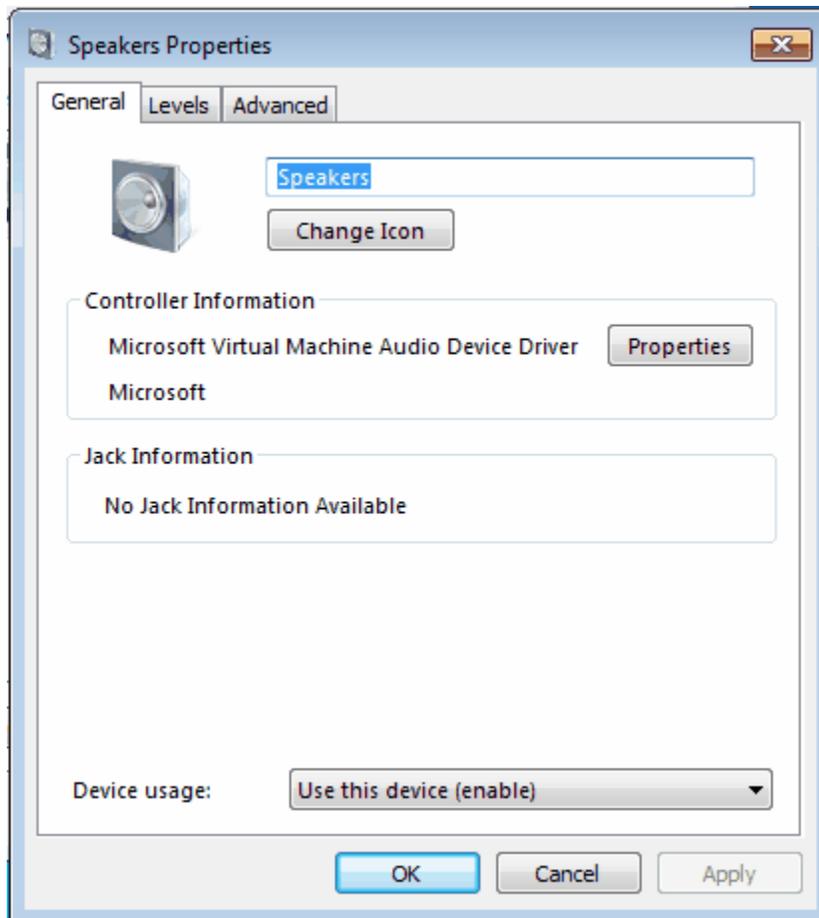
Make sure the "Device Usage" option at the bottom of the page is set for "Use this device (enable)."

4. Select the "Levels" tab at the top of page.
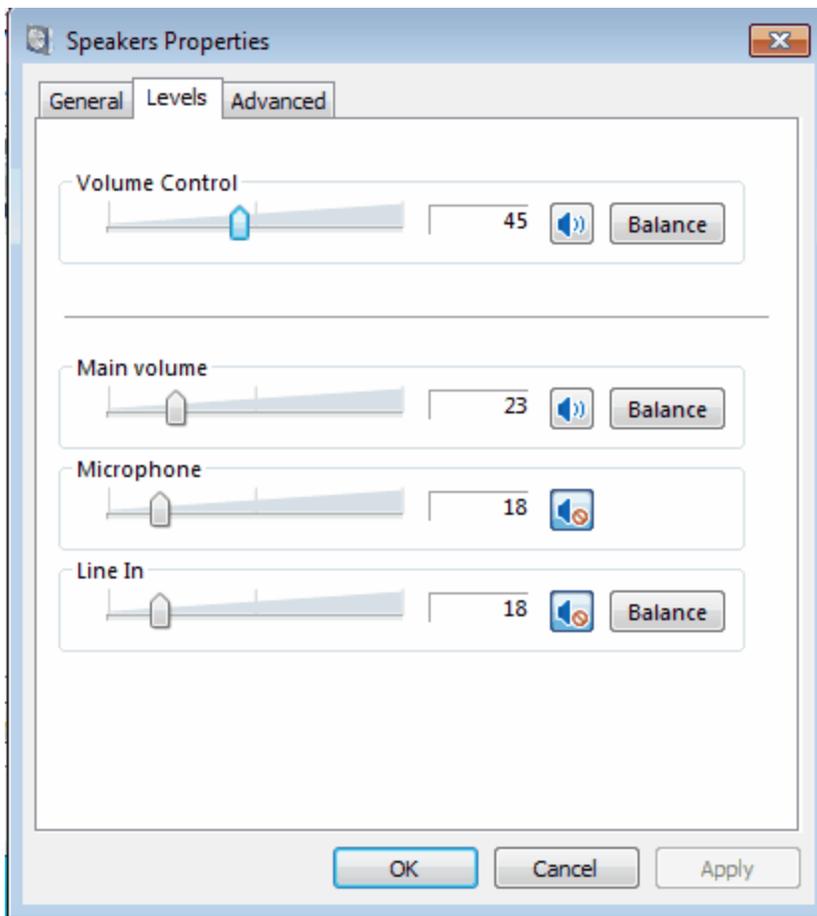
Make sure Volume Control and the Main Volume controls are about 50%. Make sure the Line In input is muted, otherwise it may cause an echo. When you have completed all the steps, press OK twice to exit back to the Audio Delay program.

5. We will now adjust the playback and speaker volume for the Audio Delay. This should be done after you configure the Audio Delay and have pressed the Play Button.
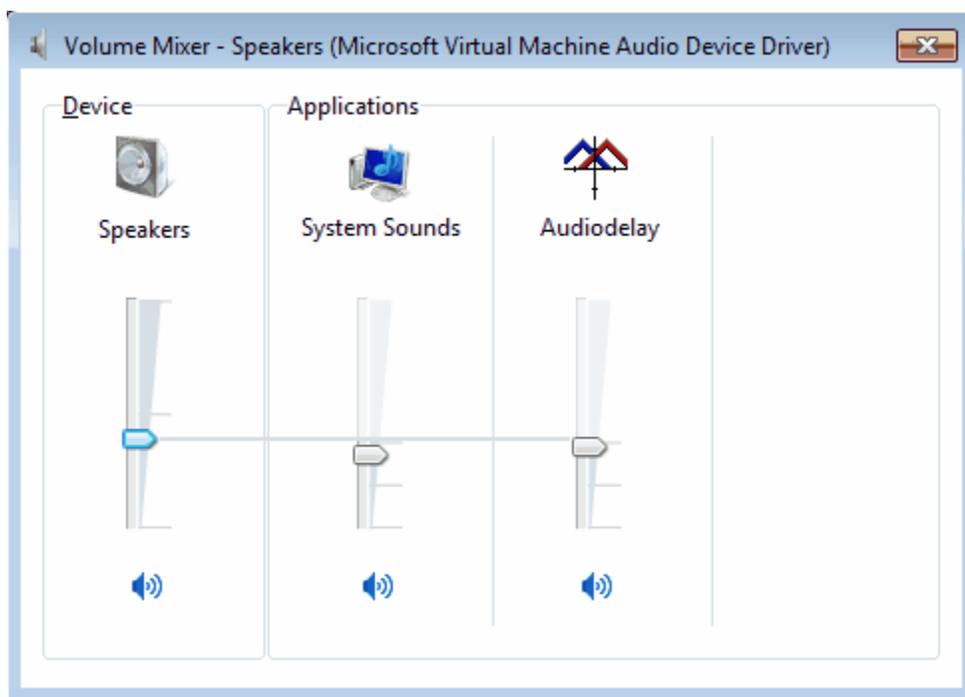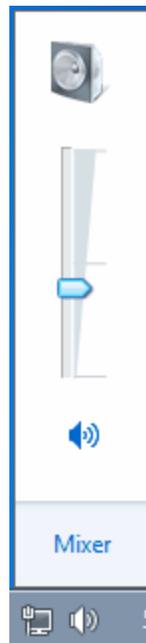
Click on the "Speaker" icon in the Task bar. This will display the Windows Volume control.

Double on the "Mixer" text at the bottom of the volume control. This will bring up the Volume Mixer for the Speakers.

Adjust the Audio Delay and Speaker volume to get a comfortable listening level. On some computers, you may need to turn up the system sound level as well as the Audio Delay volume.

1.3.3   Sound Card Configuration

These days, most computers have sophisticated sound cards that come with built-in utilities to configure the advanced features of the cards. In some instances, you may need to directly configure

the sound card through one of these utilities to get everything setup the way you want.

The RealTek Audio controller is one of the most common sound cards built into mother boards. For this reason, we'll walk through the configuration process with their configuration utility. Other sound controllers will have similar utilities.

1. Running the Utility. Most sound configuration utilities are displayed in the System Tray, so just double click on the appropriate icon to start the program.

2. Setup Recording. Go to the Mixer Page and check the Line Volume control to be sure it is not muted.
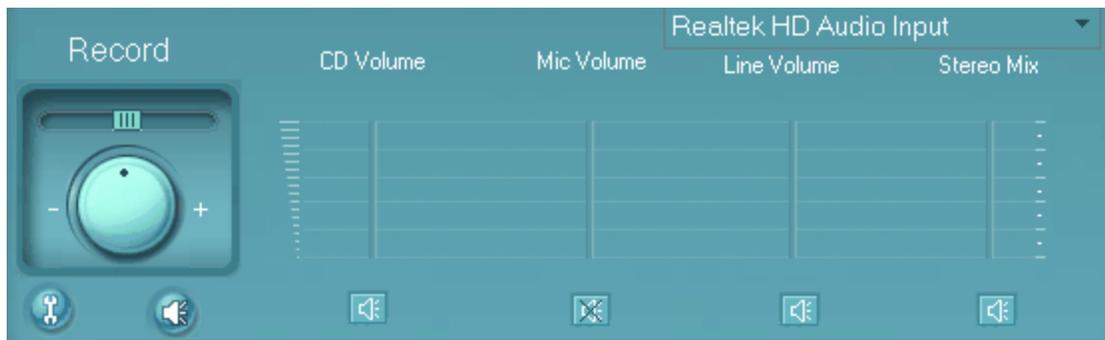

If there is a volume slider, make sure the volume is at least set about half way. If you don't see a line volume option, press the little "Tool" button in that is shown in the lower left corner of the image above. Make sure the Line Volume is enabled.

2. Setup Play Back. In Playback section, make sure the Wave option is enabled and the volume control is at least halfway up.

You also need to make sure the Line Input isn't being feed directly to the output. This will cause an echo because you will hear both the delayed and undelayed sound. RealTek software doesn't identify the Line Input as "Line Input," it identifies it by the color of the plug on the rear of the computer. When we setup the rear plugs, the "Line Input" was on the Blue Plug. So scroll the display to the right using the arrow button (in the lower right-hand corner above,) until you get to the "Rear Blue In" option. Make sure it is mute or the volume is all the way down.
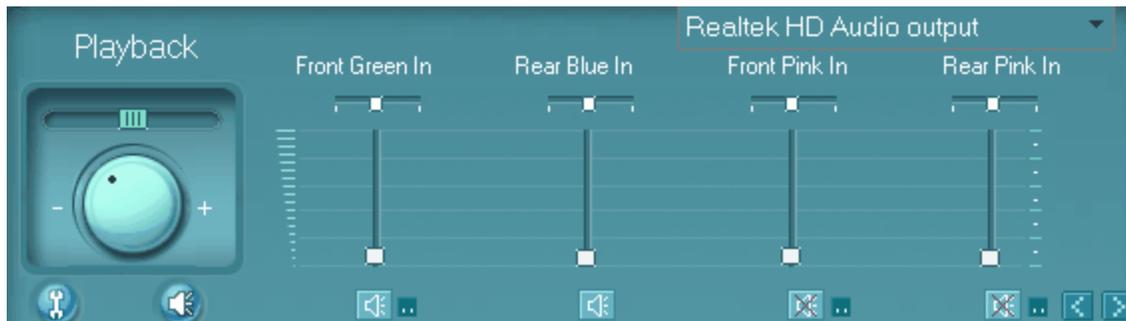
If you cannot find the "Rear Blue In," option, click on the little "tool" button, (in the lower left corner of the image above,) and see if the option is available. If it is, enable it and then mute or turn down the volume.

1.4 Configure Audio Delay

1. Data Format. Begin choosing a data format.

a. Sample Rate. Sample Rate controls the frequency response of the audio delay. The higher the sample rate, the higher the frequency of the audio dleay Generally you will have choice of at least 3 sample rates:

11.025 kHz - AM Radio Quality
22.05 kHz - FM Radio Quality
44.1 kHz - CD Quality

If you are connected to an AM radio, you should the 11.025 kHz setting. Using a higher setting will accent the noise and static found on AM radio. Likewise, you may want to use 22.05 kHz for FM radio, although you still may end up accenting high frequency noise. The 44.1 kHz sample rate is almost never used for radio applications
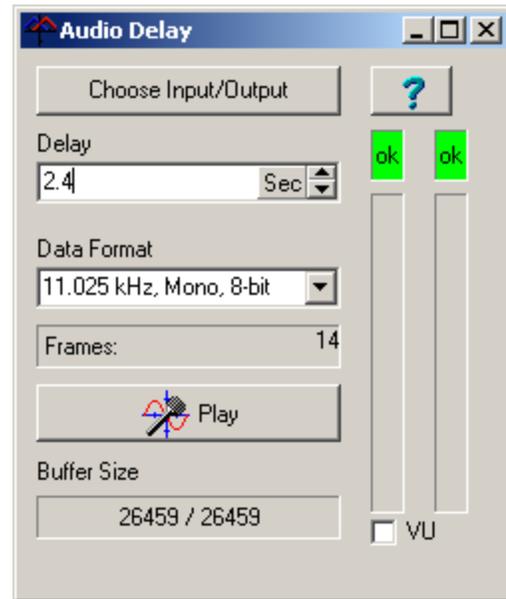
b. Mono/Stereo. If you are using AM radio you will always use the mono option. If you are using FM radio and have the proper jacks, you can use a stereo option.

c. 8-Bit/16-Bit. This option controls the dynamic range of the audio. Dynamic Range is the range of loudness between the softest and loudest sounds. In almost all applications, 16-bit is the preferred option since it produces more realistic and natural sound.

2. Adjust Volume. Make sure all your cables are plugged in and the delay is set to 0.1 seconds. Turn on your radio and press the "Play" button. Turn up the volume on the radio until you hear sound. (If you don't hear sound, check your cables, adaptors and jacks and make sure they are plugged in the Line Input. Also check your computer's configuration making sure the Line Input and the SW output are not muted and their volume controls are turned up at least half way.)

Now check the VU check box in the lower right corner. You should see the audio levels graphically displayed just above the check box. Turn the radio volume up until it almost reaches the top. The box at the top should always be green and never red. If the box turns red even for a fraction of a second, the audio is too high and will be distorted.

3. Adjust Delay. Your Television Signal can take many different paths to reach your receiver. For example, it may travel by satellite and each satellite bounce adds about a second of delay. Also, many live events have 5 second delay so that the broadcast crew can catch any obscene language or gestures that might be caught accidentally on camera. Finally, digital TVs introduce their own delays.

Radio is different. It is usually sent directly to the broadcast station and transmitted immediately. That means there is practically no delay in the signal. What the Audio Delay program does is delay the radio sound so it matches the delay of the Television and is synchronized with video stream.

The final task is to adjust the Audio Delay program so the delays exactly match the television.To do

this, press the Play Button again to disable playback. Next, increase the delay to about 2.5 seconds. This is the typical delay for off an air broadcast with no satellite delay. Now re-press the Play Button. There will be a 2.5 second delay before the audio starts playing. Watch the television while listening to the audio. If the audio is a head or behind the video, repeat the steps above, adjust the delay up or down, until the audio is in sync with the video. Remember in some cases the delay may be more than 10 seconds.

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