Soundcard Setup for Radio-SkyPipe
Whitham D. Reeve

1. Introduction

The Radio-SkyPipe II software application most often is used with a PC soundcard for charting signal levels detected by a radio receiver. However, setting up an internal or external soundcard can be difficult and confusing in the Windows operating system, partly because of problems with marginally logical and poorly defined nomenclature and partly because of changes made to Windows 7 and Windows 10 in the way they handle audio digital rights management (the problems actually started in Windows Vista).

This article discusses the Windows hardware and software settings and may help a user overcome these problems. The screenshots and settings shown here are for Windows 10 but also apply to Windows 7. The settings in Windows XP are simpler but follow a similar progression. A specific desktop PC and associated internal soundcard are used in the examples but it is expected that the settings are similar for other desktops and laptops. An external USB soundcard also is used for examples and its settings are similar to other soundcards that use the generic Microsoft soundcard driver.

2. Soundcard Drivers

When setting up a soundcard, the first thing to check is the Device Manager. Right-click *My Computer* or *This PC* and select *Properties*. In the window that opens, click on *Device Manager*. Alternately go to Control Panel – Device Manager. In *Device Manager* scroll down to *Sound, video and game controllers* and click on the > or + to expand the list. The left screenshot below shows the Realteck HD Internal Soundcard in a Lenovo M900 Tiny desktop PC running Windows 10. The right screenshot shows an External USB Soundcard after it has been plugged into a USB port on the same PC.
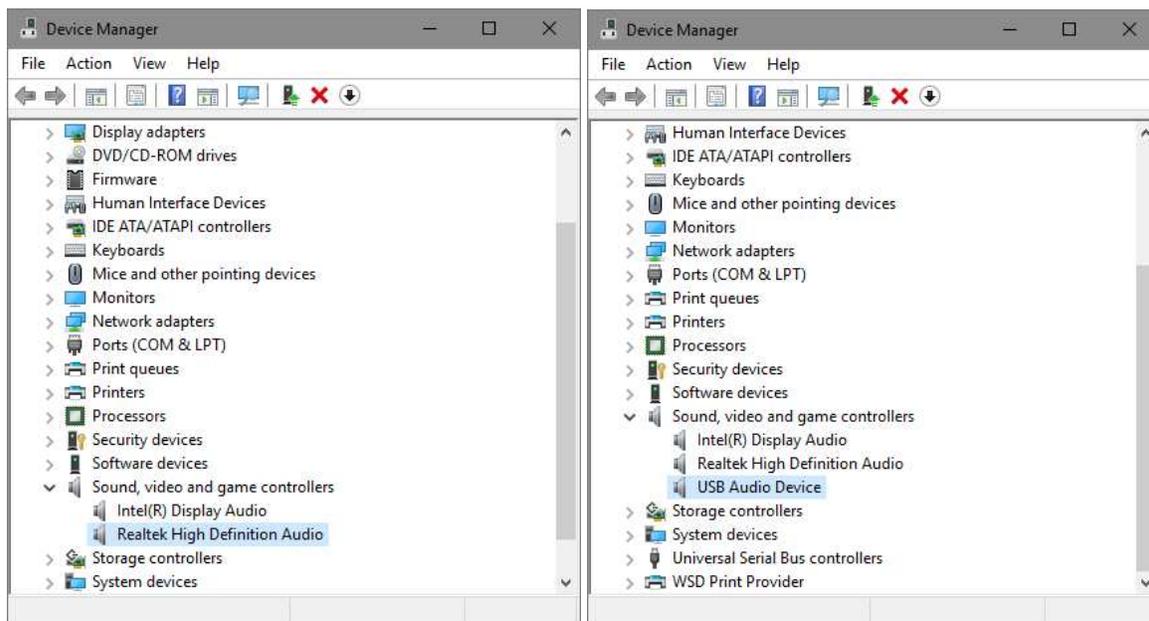
Check the soundcard drivers by right-clicking the soundcard and then selecting *Properties*. The Properties window will have several tabs. Select the *Driver* tab. The left screenshot below shows the latest driver for the Realtek Internal Soundcard dated *6/23/2015* and the right screenshot shows the latest driver dated *7/27/2017* for the Syba SD-AUD20101 External USB Soundcard shown right. When this soundcard is plugged into a USB port and is Enabled, a green LED near its Microphone jack flashes at 1 Hz rate. The LED turns solid On when the soundcard is Disabled.
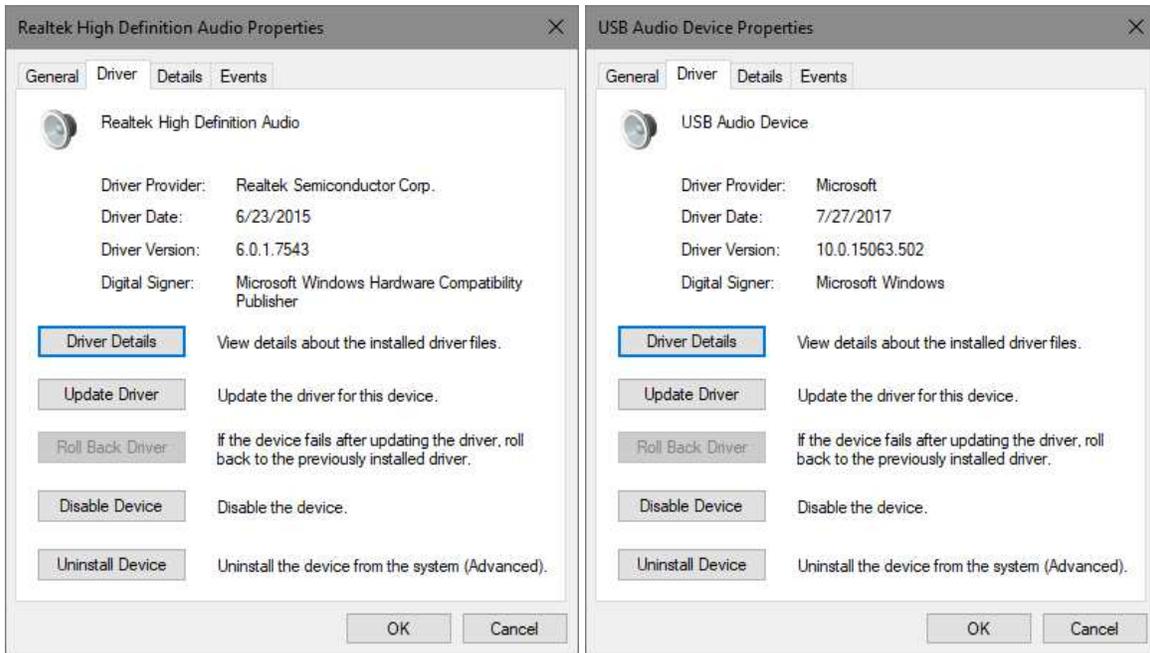
The External USB Soundcard driver is a generic Microsoft driver and the only one available for this soundcard. Click *Update Driver* and follow the prompts to install the latest available driver. Where generic drivers are involved, it is best to allow Windows to find and install the driver, but drivers for internal soundcards should be obtained directly from the PC manufacturer. The importance of having the latest drivers cannot be overstressed.

3. Soundcard Setup

After the soundcard driver has been confirmed, it is necessary to setup the soundcard itself. To access the soundcard properties, right-click the Speaker icon in the Taskbar Notification Area shown right or go to Control Panel – Sound. When accessed from the Notification area, a popup window appears. Select *Recording devices*, which are the input sources to a soundcard.
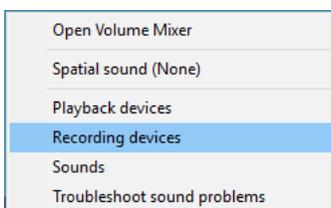
When the Sound Properties window opens, right-click anywhere in the window. Check *Show Disabled Devices* and *Show Disconnected Devices* as shown right.
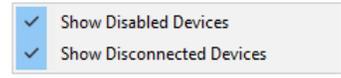
The Lenovo M900 Tiny desktop has a jack marked with a microphone icon shown right and does not have a separate *Line In* jack. Therefore, this soundcard must be setup to use the Microphone as the recording device. The microphone jacks on some soundcards support Stereo (two channels) but most are Mono (one channel).

The soundcards in many PCs do nothing until a plug is inserted in the Microphone or Line In jack (this is called *jack-presence detection*, although it actually is a plug that is being detected). In the case of the M900 PC, with nothing plugged into the Microphone jack the soundcard is displayed as shown in the left screenshot below. Inserting a Stereo or Mono plug activates the jack as shown in the right screenshot below. Note that the Microphone changed from *Not plugged in* to *Default Device*.
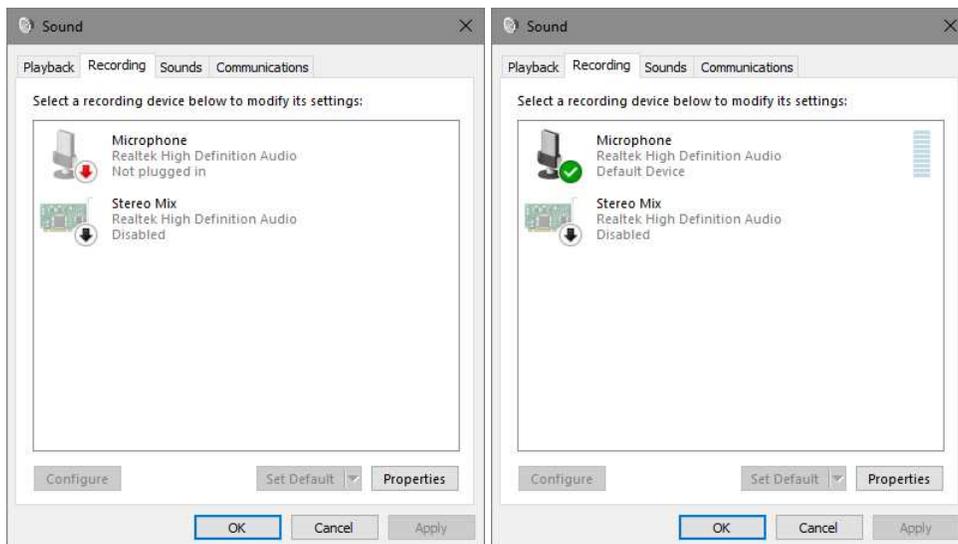
If the Microphone device is Disabled, it will be indicated as shown below-left. To Enable the Microphone device, right-click it and select *Enable* as shown below-right.
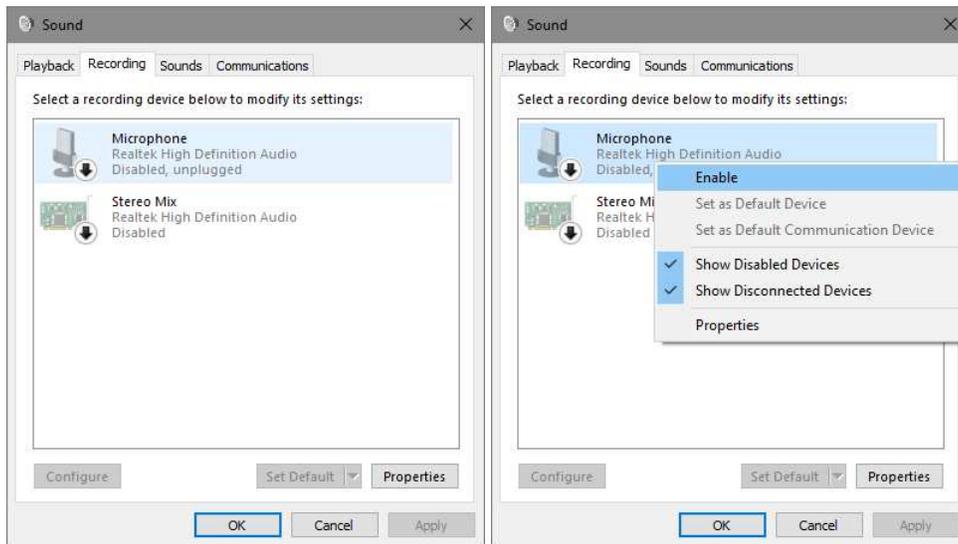
If any other Recording Device is Enabled, right-click it and select *Disable* as shown below-left. Repeat for all devices except the one to be used. Double-check that all devices are Disabled except the one to be used, in this case the Microphone. Now, right-click the Microphone Recording Device again and select *Properties* as shown below-right.
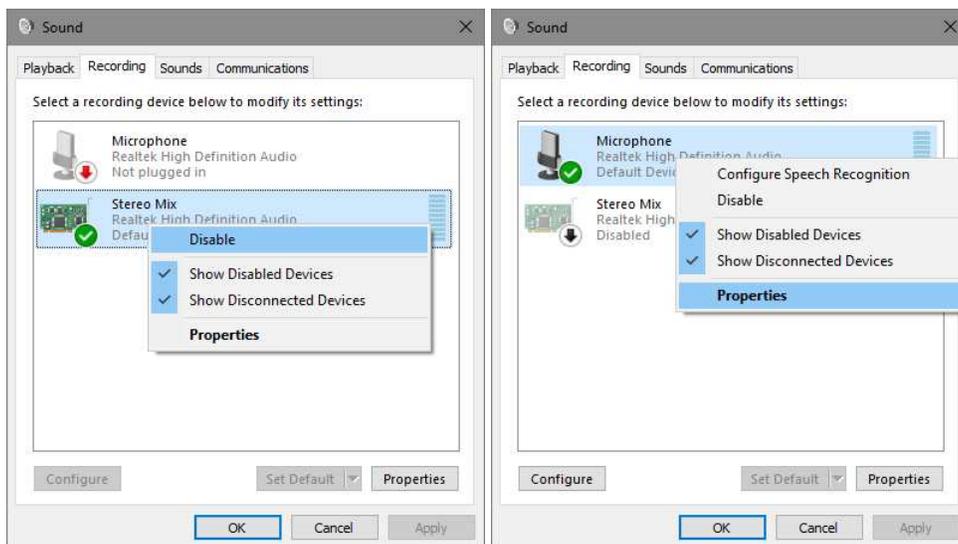
The Microphone Properties window will open to the General tab as shown below-left. Note that the *Jack Information* indicates *Front Panel 3.5 mm jack*, which indicates that a plug has been inserted in the jack. This may vary with the soundcard and Recording Device that has been enabled. Select the Listen tab. If *Listen to this device* is checked, the audio is routed to the Playback device selected in the *Playback through this device* dropdown immediately below it. In the screenshot below-right, the *Default Playback Device* is selected. The Default Playback Device itself can be selected in the Playback tab of the Sound Properties window previously shown.
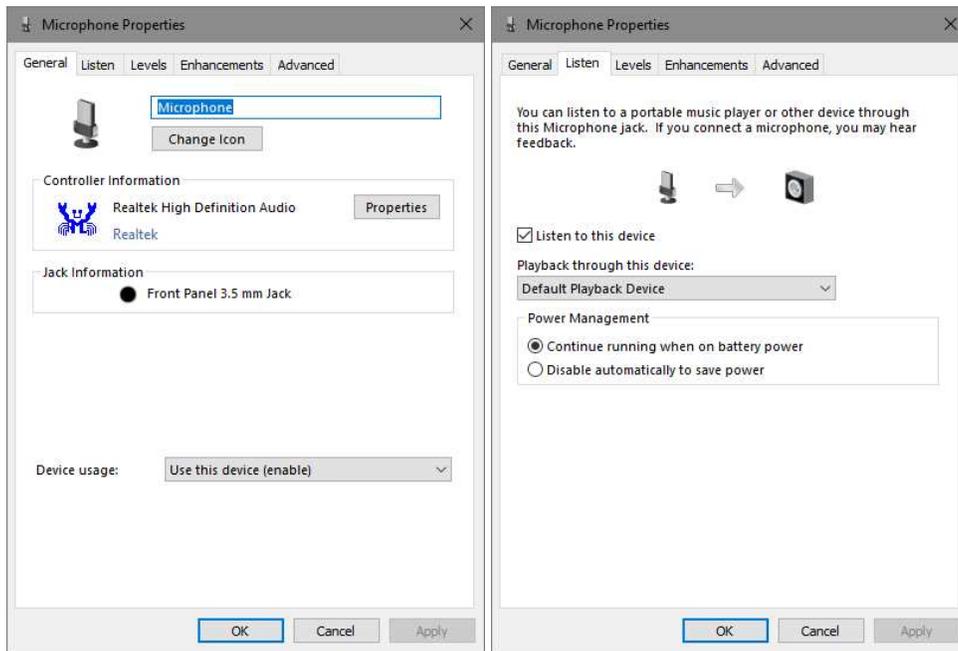
Select the Levels tab and set the *Microphone* gain. Although the setting shown below-left is 50%, a lower setting of, say, 20 to 25% provides more dynamic range. Some experimentation may be necessary to find the best tradeoff between sensitivity and dynamic range. The *Microphone Boost* should be set to 0.0 dB (move the slider all the way to the left). The boost usually is a nonlinear function and should not be used; otherwise, the Radio-SkyPipe chart may indicate unexpected variations. The Microphone Properties may have an Enhancements tab. If so, select it and check *Disable all sound effects* as shown below-right. Note: The *Immediate mode* apparently applies only to configurations that require latency reduction when a voice microphone is used. It is automatically disabled when the *Disable all sound effects* box is checked.
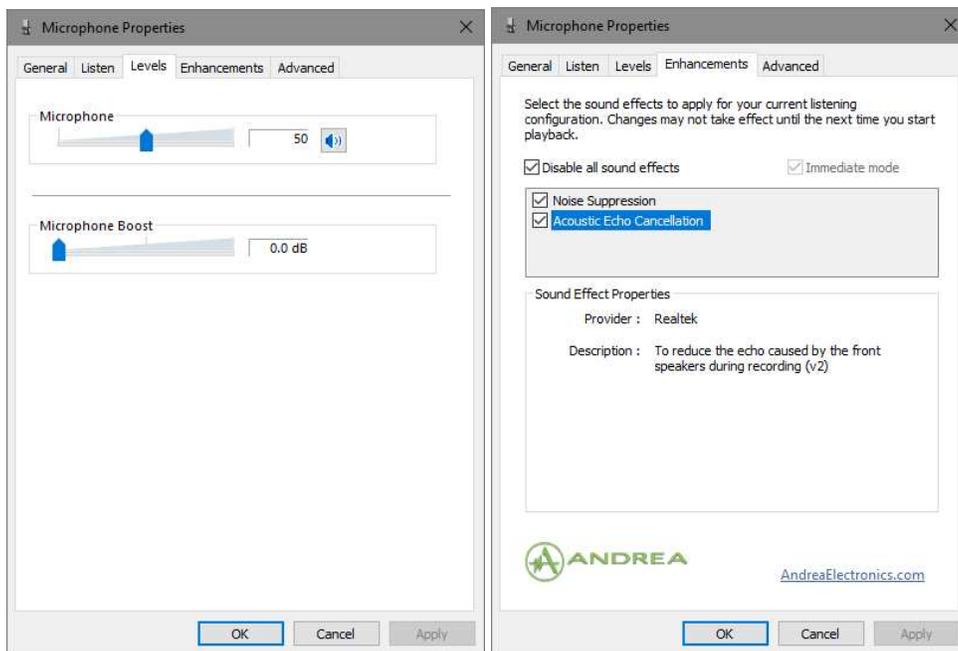
The Advanced tab shown below-left selects the *Default Format* for the digital encoding (sample rate and number of encoding bits) to be used by the soundcard. Note that both selections in the *Exclusive Mode – Allow applications to take exclusive control of the device* and *Give exclusive mode applications priority* are checked. These appear to have no direct effect on Radio-SkyPipe but they both probably should be checked to prevent other applications from hijacking the soundcard or audio stream while Radio-SkyPipe is in-use.
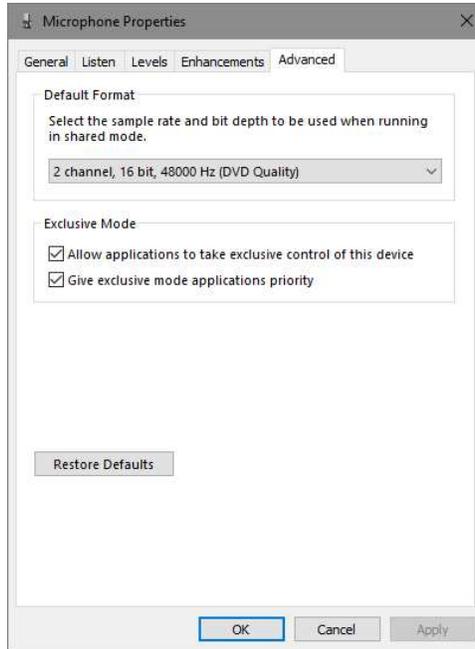
When an External USB Soundcard is plugged in, its Properties are setup similarly to the Internal Soundcard described above. Inexpensive External USB Soundcards usually have only one input jack and it is marked with a Microphone icon. If the microphone jack in an External USB Soundcard is to be used, Enable it. Disable all other devices by right-clicking each Device and selecting *Disable*. Now, right-click the Microphone device associated with the External USB Soundcard and select *Properties* as shown below.
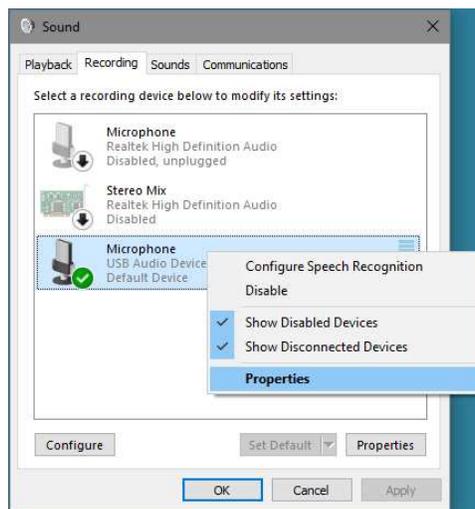
Most of the tabs for the External Soundcard Microphone Properties are very similar to the Internal Soundcard Microphone Properties previously described. The General tab is shown below-left, and the Listen tab is shown

below-right. Note that the *Jack Information* indicates *No jack information available*. Apparently, this is normal for the generic soundcard driver even when a plug is inserted into the jack.
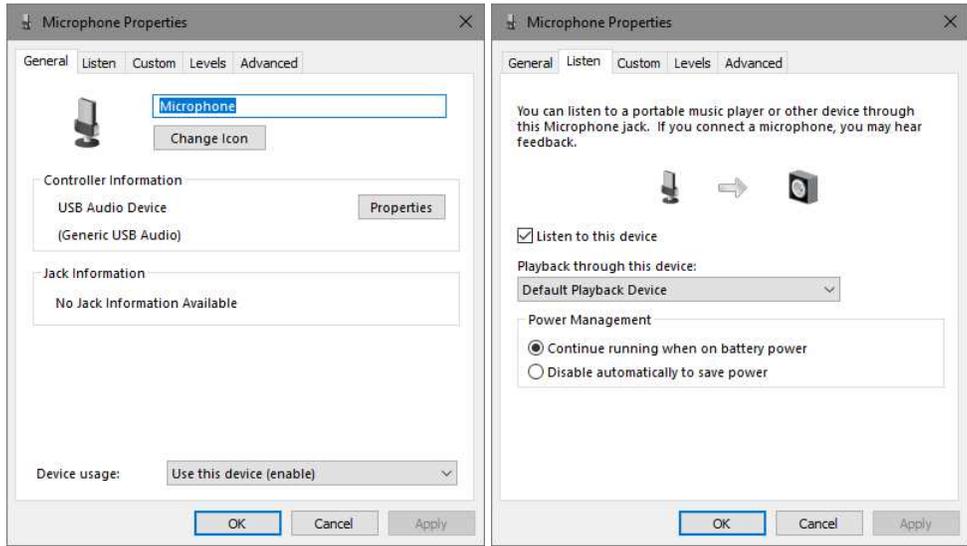
Select the Custom tab if present. The one shown below-left has an *AGC* (Automatic Gain Control) checkbox. Uncheck the *AGC* and all other features in this tab. Now, select the Levels tab as shown below-right and set the *Microphone* gain as previously described for the Internal Soundcard. There are wide variations in soundcard microphone input gains, so the Radio-SkyPipe chart power amplitude for an internal soundcard likely will be much different than an external USB soundcard with the same gain setting. Some experimentation will be necessary to obtain the best tradeoff in sensitivity and dynamic range as with the internal soundcard.
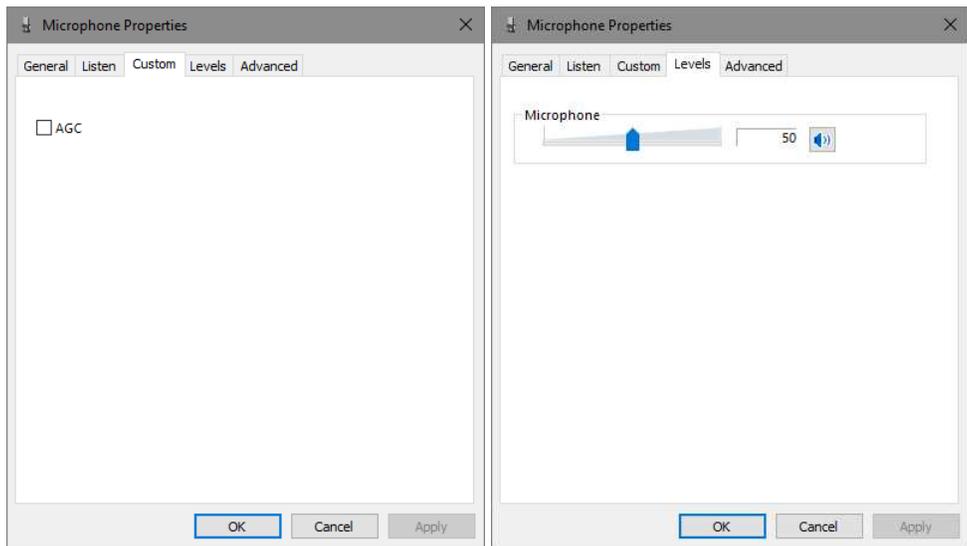
The Advanced tab shown below will be similar (or identical) to the Internal Soundcard and can be left at its *Default Format* settings with both *Exclusive Mode* items checked as shown.

Microphone Properties

General | Listen | Custom | Levels | Advanced

Default Format

Select the sample rate and bit depth to be used when running in shared mode.

2 channel, 16 bit, 44100 Hz (CD Quality)

Exclusive Mode

☑ Allow applications to take exclusive control of this device
☑ Give exclusive mode applications priority

Restore Defaults

OK   Cancel   Apply
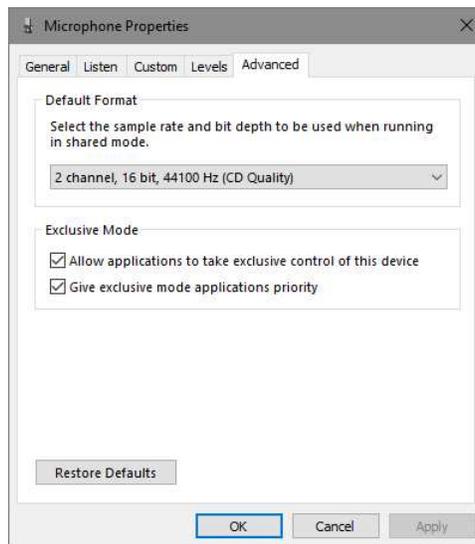
4. Radio-SkyPipe Setup with Internal Soundcard
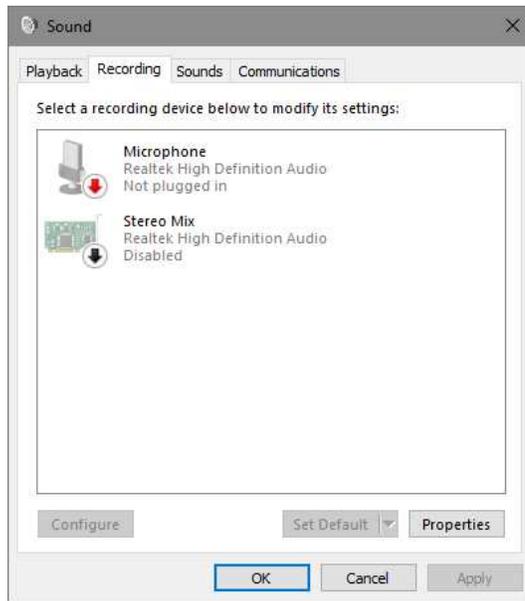
Return to the Sound Properties Recording tab. In the screenshot to left, the Sound Properties for the Internal Soundcard Microphone jack indicates *Not plugged in* because an audio cable plug has not yet been inserted into the jack.
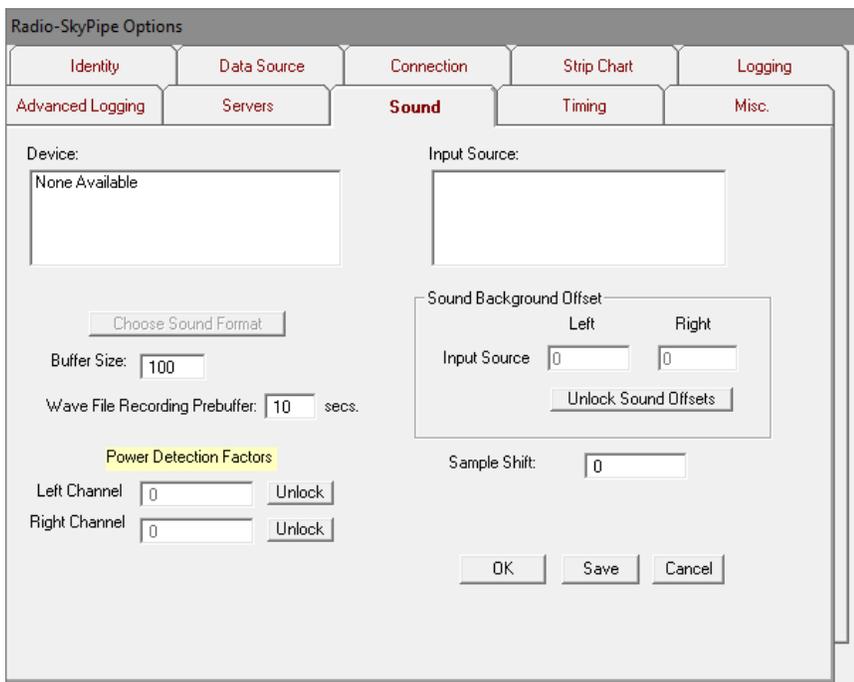
Now open Radio-SkyPipe and go to the Options – Sound tab. With no plug in the Microphone jack, the *Device* window shows *None Available*. Close Radio-SkyPipe, and see below to correct the problem.
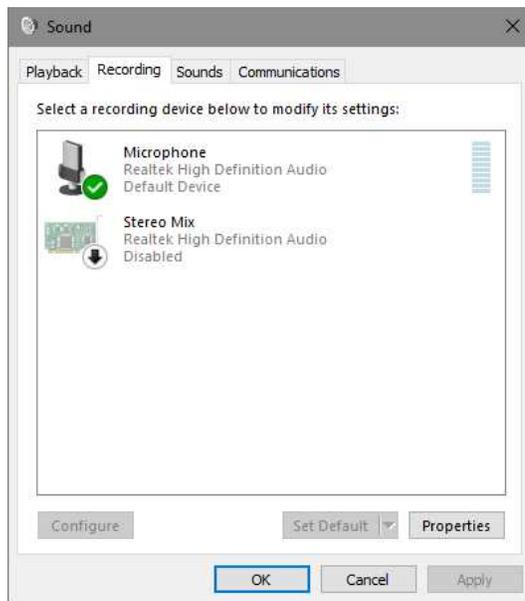
Insert a plug to activate the Microphone jack as previously described. The indication for the Microphone in the Sound properties Recording tab changes to *Default Device* because all other devices are disabled.

Reopen Radio-SkyPipe and go to the Options – Sound tab.
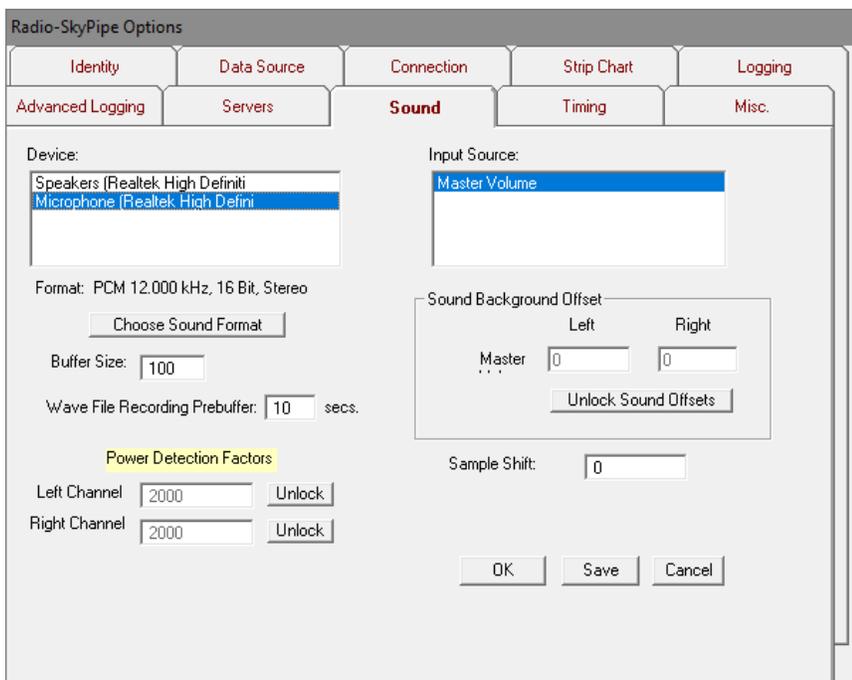
With the Microphone jack activated, Radio-SkyPipe Options – Sound tab shows availability of the PC Internal Soundcard in the *Device* window. Select *Microphone ()* in the *Device* window and *Master Volume* in the *Input Source* window.

Some variations may exist in how the *Input Source* is rendered but for simple internal soundcards, *Master Volume* usually is the only one shown; a more capable soundcard is shown later.

The audio encoding Format can be set here. Click on *Choose Sound Format*. See below.
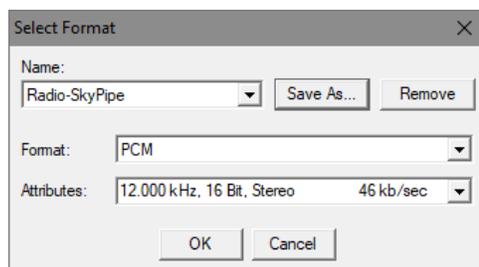
Setup the encoding Format to *12.000 kHz, 16 Bit, Stereo* as shown here. Other values may be used but these are the recommended settings. The settings may be saved to a custom *Name* (shown here as *Radio-SkyPipe*) but this is not necessary. They become the Default values and do not have to be selected each time they are used. Click OK.
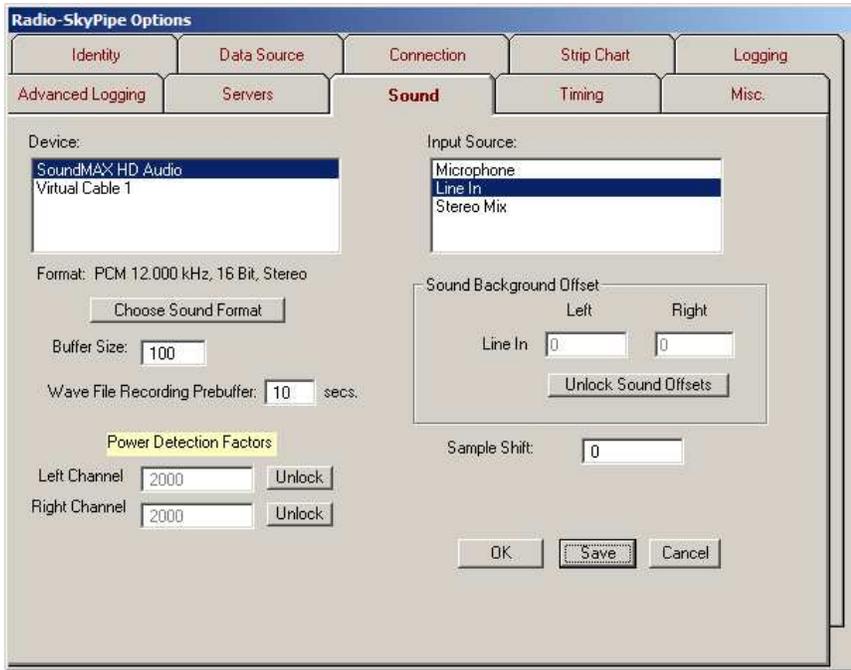
The screenshot to the left shows a more capable soundcard. This is the Analog Devices AD1982 soundcard chipset used in the Lenovo A61e desktop, which includes the SoundMAX HD Audio software application. Together they provide *Microphone*, *Line In* and *Stereo Mix* Input Sources.

The Line In and Stereo Mix Input Sources are accessed through the Line In jack on the PC, and the Microphone source is accessed through a separate Microphone jack.

Also shown here is a Virtual Audio Cable that may be used to connect to different sources but it is not being used.

Other tabs in the Radio-SkyPipe – Options menu may need attention before actually recording a chart. These are described in the next section along with External USB Soundcard settings.

5. Radio-SkyPipe Setup with External USB Soundcard
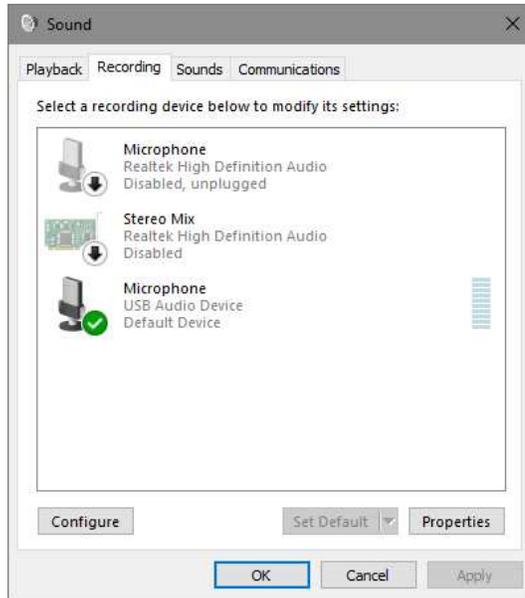
The screenshot to the left shows the Sound properties for an External USB Soundcard that has been plugged into a USB port. To use an External USB Soundcard, be sure to Disable all other devices as shown.

If changing from an Internal Soundcard to External USB Soundcard, close Radio-SkyPipe, plug in the External USB Soundcard and then re-open Radio-SkyPipe; otherwise, the External USB Soundcard will not be shown as an available Device in Radio-SkyPipe.
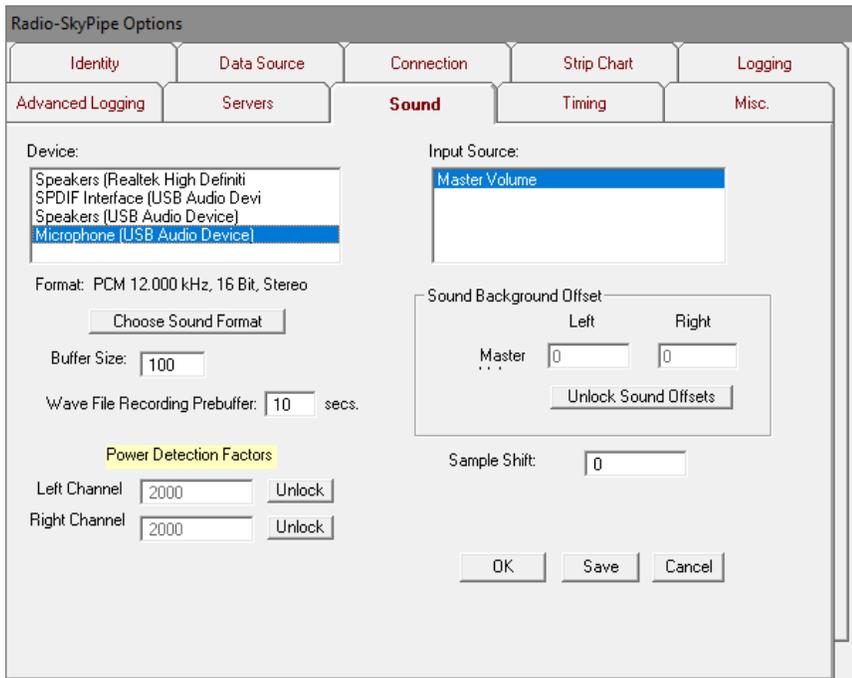
Open Radio-SkyPipe and select Options – Sound tab to show availability of the External USB Soundcard. To use this soundcard, select the *Microphone (USB Audio Device)*. Select *Master Volume* in the *Input Source* window. Check the encoding *Format* to be sure it is set to the desired values as described previously for the Internal Soundcard.
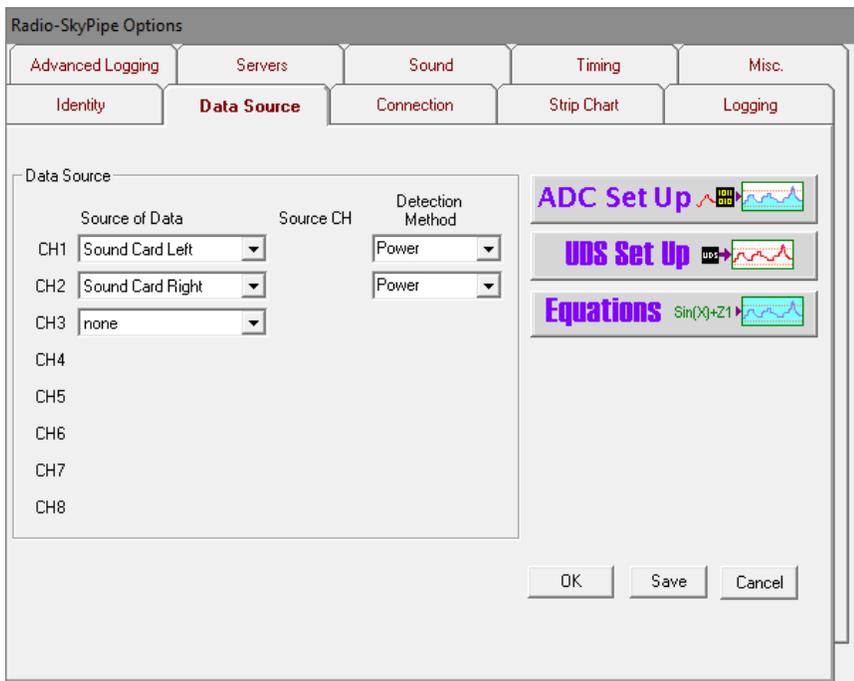
Select Radio-SkyPipe Options – Data Source tab to set *Source of Data*. Set Channel 1 to *Sound Card Left* and Channel 2 to *Sound Card Right*. Set *Detection Method* to *Power*.

Note: Even though a Microphone input source may be Mono (and not Stereo), no harm is done by setting up the *Source of Data* for two channels.
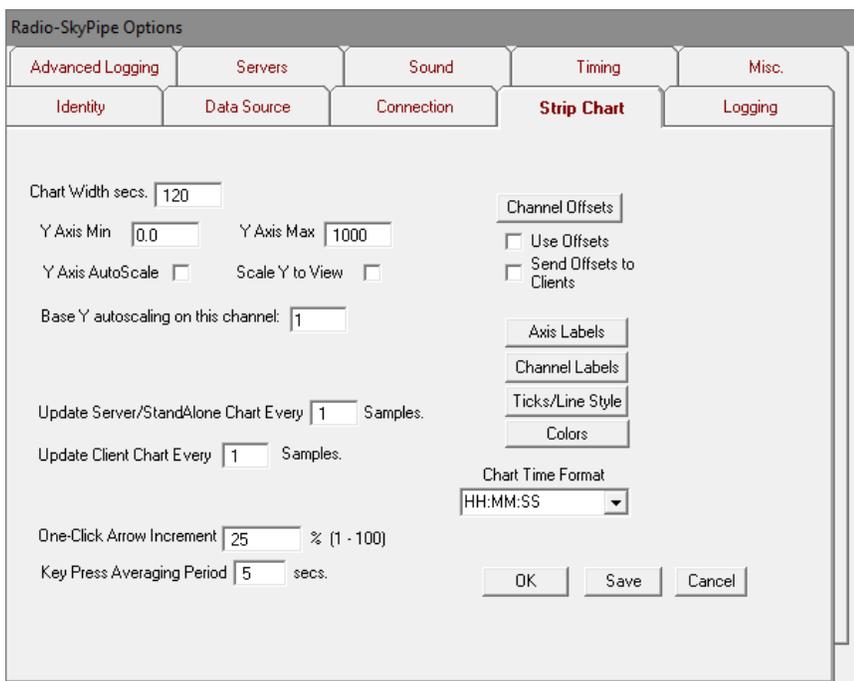
Select Radio-SkyPipe Options – Strip Chart tab. This tab is used to adjust the settings for the vertical scale (Y Axis) and horizontal scale width (X Axis). A *Chart Width* of 120 s (2 minutes) is good for setup and testing purposes and can be changed later if desired.

Uncheck *Y Axis AutoScale* to keep the chart from auto-scaling to very large values by transients during setup testing. The *Y Axis Min* should be set to *0.0*.

The Strip Chart tab also allows setting many other chart characteristics such as labels, tick marks and chart colors. The best way to learn these is by experimentation.
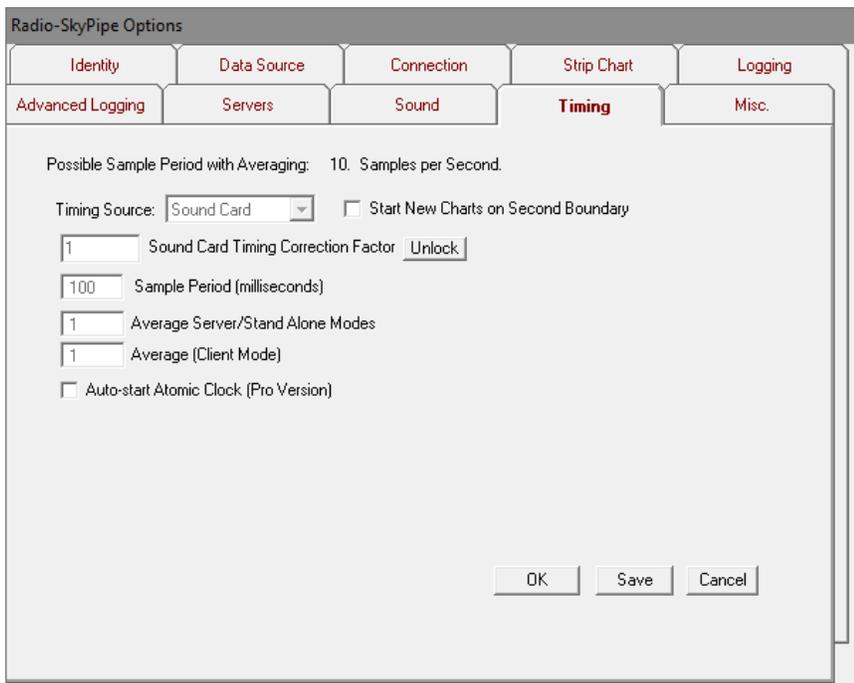
Select Radio-SkyPipe Options – Timing tab to set the *Timing Source* (*Sound Card* timing generally is best). The *Sample Period* also is set in this tab. Most observations are made using 100 ms *Sample Period*.

If Network Time Protocol (NTP) or some other automatic PC time setting method is not used, the *Auto-start Atomic Clock* option should be checked. However, this feature is available only in the Pro version of Radio-SkyPipe.

Network Time Protocol is the preferred PC timing method. NTP is an external process and is not setup in Radio-SkyPipe. See {NTP}.

6. Playback Settings

To access the Windows 10 audio Volume Mixer, right-click the Speaker icon in the Taskbar Notification Area (lower-right corner of Windows screen). To see the Volume Mixer, click on *Open Volume Mixer*.
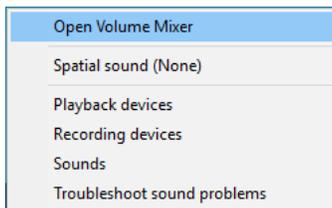
The Volume Mixer shows all audio input sources that have access to the Mixer and may be routed to the Speakers. The two relevant sources shown in the example below are *SkyPipeII.exe*, which is the Radio-SkyPipe program, and the PC's internal soundcard *Microphone*. Note that disabled Recording Devices will not appear in the Volume Mixer, and Radio-SkyPipe appears only if it is open and is set to an enabled Recording Device in the Options – Sound tab.
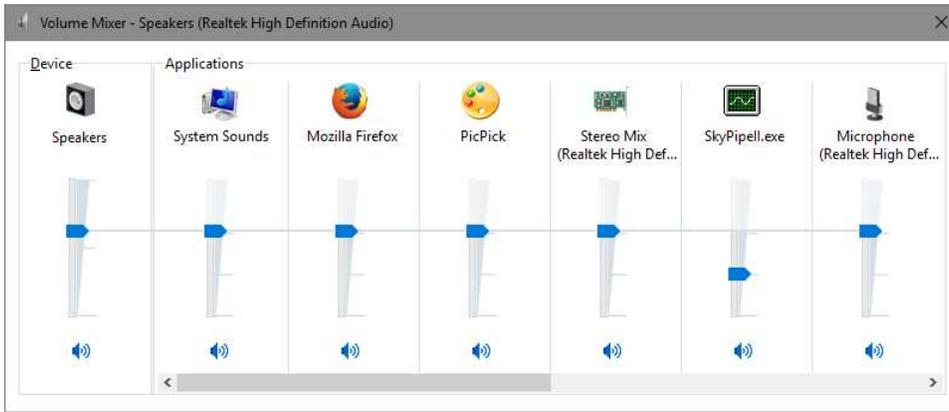
To view Playback devices, right-click the Speaker icon again and select *Playback Devices*. The Sound properties window will open to the Playback tab. When live audio is being routed to the *Speakers*, the audio level will be indicated on the bar-graph to the right of the Speakers as shown below (one bar of audio volume is shown in this example).
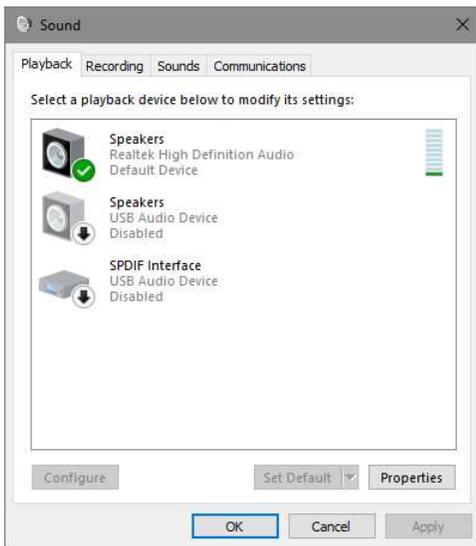
7. Troubleshooting Radio-SkyPipe Soundcard Setup

When Radio-SkyPipe is opened it will display a popup window with the warning shown below if nothing is plugged into the Microphone jack of an Internal Soundcard and if an External USB Soundcard is not equipped. Close Radio-SkyPipe, correct the problem (connect a cable from the receiver to the soundcard input jack or install an External USB Soundcard) and then reopen Radio-SkyPipe.
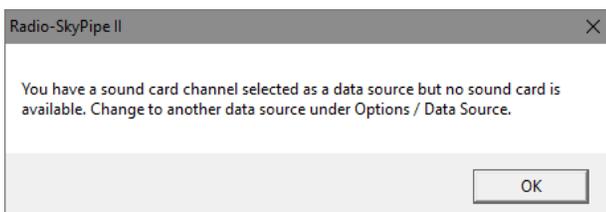
If Radio-SkyPipe is recording from the Internal Soundcard and the plug in the Microphone jack is removed or if it is recording from an External USB Soundcard and it is removed from the USB port or is Disabled, Radio-SkyPipe will display a popup window with the warning shown below. Close Radio-SkyPipe, correct the problem (reconnect the audio cable or plug in the External USB Soundcard) and then reopen Radio-SkyPipe.
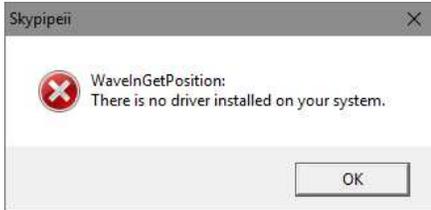
If all settings appear to be okay but there is no playback through the Speakers, try disabling the *Speakers* in the Sound Properties *Playback* tab and then re-Enabling them. This problem may occur if both the Internal Soundcard Speakers and External USB Soundcard Speakers are Enabled. Disable one or the other and be sure the Speakers are connected to the enabled output device. Similar advice applies to Recording Devices (toggling Enable and Disable).

If Playback cannot be made to work, it is possible that a Windows registry setting has changed that controls an application's permissions to use the Windows audio processes. In this case, the fix requires a registry edit described at {Registry}.

6. Soundcard Setup Tester

Setup can be more convenient if a known audio signal source is connected to the soundcard input. A separate article has been produced that describes construction of such a device; see {SCT}.

7. References and Web Links

{NTP}   Network Time Protocol and Meinberg NTP Time Server Monitor ~ Installation Guide, available at:
           http://www.reeve.com/Documents/Articles%20Papers/Reeve_NTP-MeinMon_Install.pdf
{Registry} http://www.techsupportforum.com/forums/f217/solved-no-sound-the-unsolvable-problem-take-
           the-challenge-594113.html#post3401894
{SCT}   Soundcard Tester for Radio-SkyPipe, available at:
           http://www.reeve.com/Documents/Articles%20Papers/Reeve_SoundcardTest.pdf

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Author: Whitham D. Reeve

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0.3   (Minor edits to clarify, 15 Aug 2017)

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