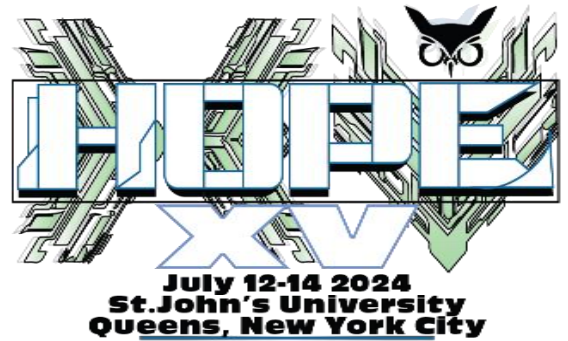


# Amateur Radio Using Digital Modes

## Lab 2: Setting up the USB Audio



prepared by Joe Cupano, NE2Z

### What you will need

- Successful completion of Lab 1.
- Laptop running up to date build of Windows, Linux, or Mac OSX.
- USB Sound device from the Amazon Idea List.

### Purpose

Setup and functional test of external USB sound device.

### Introduction

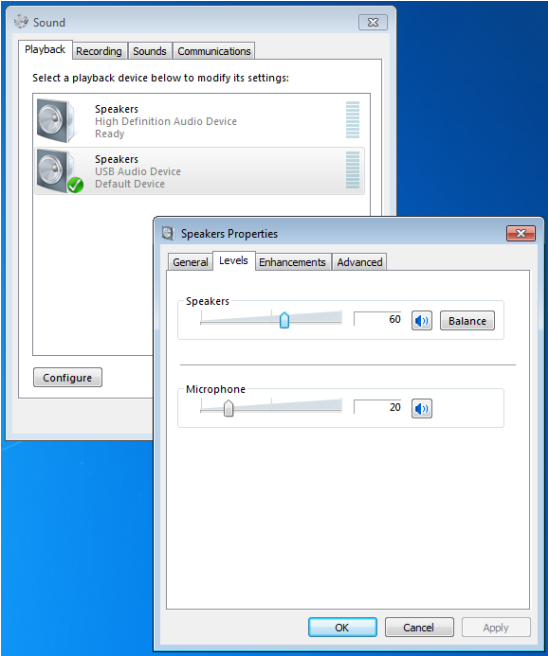
Adding a USB sound device allows to isolate audio signals used for digital modes from other sounds generated by the operating system and other applications. We connect the USB audio to the radio using the Baofeng Audio cable. The isolated audio to the radio ensures VOX is only triggered to transmit by sounds from the digital mode application.

Using VOX introduces a few milliseconds latency between audio detection and switching the radio from receive to transmit. Digital modes sensitive to latency include tunable preambles to allow time for the latency.

Since the digital modes we will be using use AFSK, correct audio levels are critical to avoid distortion. Distortion not only affects readability of a signal but can also introduce spurious signal emissions.

The steps that follow are generic to whichever operating system you will be using – Windows, Linux, or OSX. Where known, configuration specific to an operating system will be called out.

# Exercise

STEPS	NOTES
1. Remove the USB programming cable.	You can store this cable since we will not be using this anymore in the workshop.
2. Insert the USB sound device into an available USB port.	Note any device registration notifications generated by the operating system – visual and/or log files.
3. Open the sound configuration panel for your particular operating system, select the USB audio device, and set levels for USB audio as follows:  Playback/Speaker levels to 60% Recording/Mic levels to 20%  See further guidance on your particular operating system in the sections below.	These levels are starting points for later tuning in removing distortion both transmitted and received
WINDOWS	
1. Enter sound configuration for the USB sound device and set Playback levels to 60% and Recording levels to 20%.	 <p>The screenshot shows the Windows 'Sound' control panel window. The 'Recording' tab is selected, showing a list of audio devices. The 'Speakers' device is highlighted. A 'Speakers Properties' dialog box is open, showing the 'Levels' tab. The 'Speakers' volume slider is set to 60% and the 'Microphone' volume slider is set to 20%.</p>
LINUX	

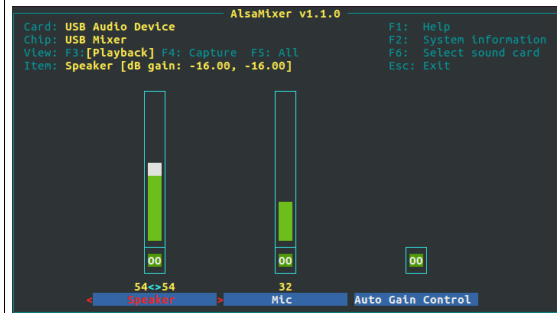
## ALSA

1. Open a terminal and run.

`sudo alsamixer`

2. Tap F6 key and select USB sound.
3. Enter sound configuration for the USB sound device and set Speaker level to 52 and Mic level to 32. If you see MM under Mic then the device is muted. Unmute with M.
4. Tap Esc to exit and run.

`sudo alsactl store`



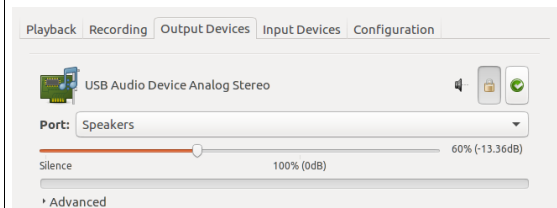
*Illustration 2: USB Sound Levels (AlsaMixer)*

## PulseAudio

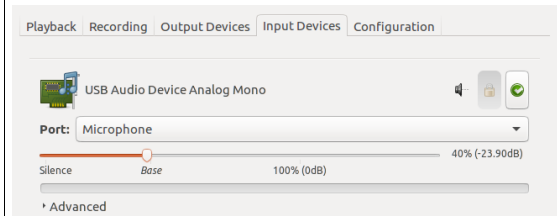
1. Open a terminal and run.

`sudo pavucontrol`

2. Select Output devices tab and adjust USB Audio Device Speakers to 60%.
3. Select Input devices tab and adjust USB Audio Device Microphone to 40%.



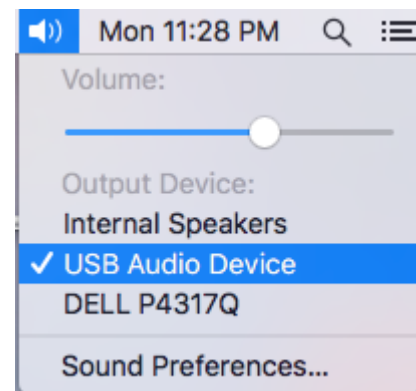
*Illustration 3: USB Audio Out (PulseAudio)*



*Illustration 4: USB Audio In (PulseAudio)*

## MAC OSX

1. Click on the Speaker icon and ensure USB Audio Device is listed.



*Illustration 5: USB Audio for OSX*

2. Select Input button and adjust Input volume to 40%.

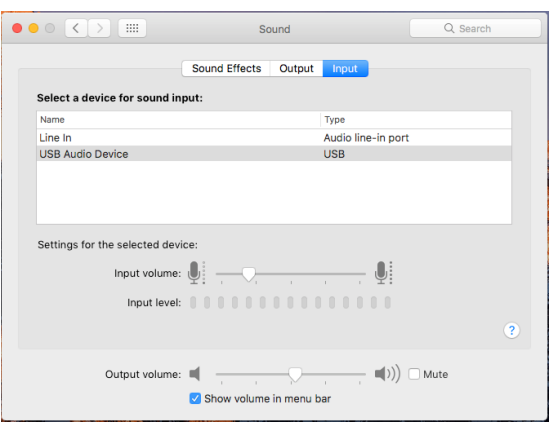


Illustration 6: USB Audio input for OSX

3. Select Output button and adjust Output volume to 60%

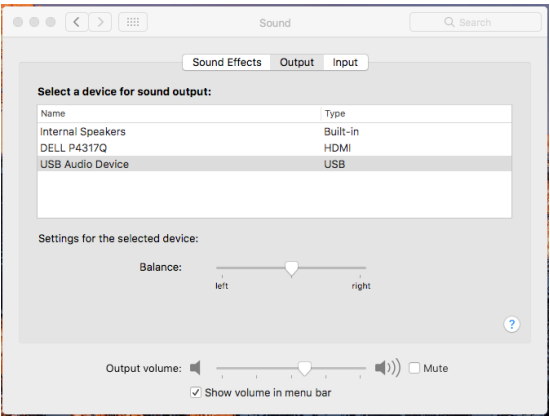


Illustration 7: USB Audio output for OSX