# Amateur Radio Using Digital Modes

# Lab 2: Setting up the USB Audio



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### 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

LINUX

<u>STEPS</u>			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:		These levels are starting points for later tuning in removing distortion both transmitted and received	
	Playback/Speaker levels to 60% Recording/Mic levels to 20%			
	See further guidance on your particular operating system in the sections below.			
WINDOWS				
1.	Enter sound configuration for the USB sound device and set Playback levels to 60% and Recording levels to 20%.		Sound  Sound  Playback Recording Sounds Communications  Select a playback device below to modify its settings:  Select a playback device belo	

General Levels Enhancements Advanced

Illustration 1: Windows Sound Levels

0

20

OK Cancel Apply

60 ()) Balance

Speakers

Microphone

Configure

ALSA 1. sudo al 2. 3. 4.	Open a terminal and run. samixer Tap F6 key and select USB sound. 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. Tap Esc to exit and run. sudo alsactl store	Card: USB Audio Device       Fi: Help         Chi: USB Mixer       Fi: System Information         View: F3: [Playback] F4: Capture F5: All       F0: Select Sound card         Item: Speaker [dB gain: -16.00]       Esc: Exit         00       00         00       00         54<-554       32         Auto Gain Control         Illustration 2: USB Sound Levels (AlsaMixer)			
PulseAu 1. sudo pa 2. 3.	dio Open a terminal and run. avucontrol Select Output devices tab and adjust USB Audio Device Speakers to 60%. Select Input devices tab and adjust USB Audio Device Microphone to 40%.	Playback Recording Output Devices Input Devices Configuration         Image: USB Audio Device Analog Stereo         Port:         Speakers         Silence         100% (0d8)         Advanced         Illustration 3: USB Audio Out (PulseAudio)         Playback Recording Output Devices Input Devices Configuration         Image: USB Audio Device Analog Mono         Image: USB Audio Device Analog Mono			
MAC OSX					
1.	Click on the Speaker icon and ensure USB Audio Device is listed.	<ul> <li>♦) Mon 11:28 PM</li> <li>Q :=</li> <li>Volume:</li> <li>Output Device:</li> <li>Internal Speakers</li> <li>✓ USB Audio Device</li> <li>DELL P4317Q</li> <li>Sound Preferences</li> <li>Illustration 5: USB Audio for OSX</li> </ul>			

2. Select Input button and adjust Input volume to 40%.	Sound Effects       Output       Input         Select a device for sound input       Type       Type         Name       Audio line-in port       USB         USB Audio Device       USB       USB         Settings for the selected device:       USB       USB         Input volume:       Input input       Input         Settings for the selected device:       USB       Input ievei:         Ustput volume:       Input ievei:       Input ievei:         Show volume in menu bar       Illustration 6: USB Audio input for OSX
3. Select Output button and adjust Output volume to 60%	Sound       Search         Select a device for sound output:       Input         Name       Type         Internal Speakers       Built-in         Dutput volume:       USB         Settings for the selected device:       USB         Output volume:       Imput         Imput       Imput         Output volume:       Imput         Imput       Imput