A Short Guide to Good Microphone Recordings V 0.1

17th April 2011 Pranav Jawale, DAPLAB

Here we are concerned with vocal (and not instrumental) recordings. The setup is as below -

Setup

A mic connector connects the microphone and the PC sound card. We are using <u>XLR connector</u> on the mic side and <u>TRS connector</u> on the jack side. We have two models of mikes Sony F-V420 and Shure-SM58.

Recording instructions -

- 1. Turn off fans / AC in the room to avoid any background noise. Ask everyone around to keep quiet. Make sure that the CPU fan noise is not affecting the recordings.
- 2.
- 2.1. On Windows-XP
 - 2.1.1. Go to Control Panel. Double-click Sounds and Audio Devices
 - 2.1.2. Click on the Audio tab. Here you will see volume settings for headphone, mic etc. [Fig 1]
 - 2.1.3. Click on **Volume** under *Sound Recording*. This will open the Recording Control window. [Fig 2]
 - 2.1.4. Set the Mic Volume slider to maximum.
 - 2.1.5. Click on **Advanced** below the Mic Volume slider. Make sure that **Microphone Boost** option is checked; otherwise the recording will have very low volume. [Fig 2]

Sounds and Audio Devices Properties						
Volume	Sounds Audio Voice Hardware					
Sound playback						
0	Default device: Realtek HD Audio output					
	Volume Advanced					
- Sound r	Sound recording					
2	Default device:					
Realtek HD Audio Input						
	Volume Advanced					
- MIDI mu	MIDI music playback					
₽	Default device:					
<u>nien</u>	Microsoft GS Wavetable SW Synth					
	Volume About					
Vse or	Use only default devices					
	OK Cancel Apply					

Figure 1 - Audio devices settings

	Advanced Controls for Mic Volume
U Recording Control	These settings can be used to make fine adjustments to your audio.
Mic Volume Line Volume Stereo Mix	Tone Controls
Balance: Balance: Balance: Balance: Balance: Volume: Volume: Volume: Volume: Volume: Image:	These settings control how the tone of your audio sounds. Bass: Low High Treble: Low High Other Controls These settings make other changes to how your audio sounds. See your hardware documentation for details. I Microphone Boost
Realtek HD Audio Input	Close

Figure 2 - Normal and advanced recording settings

- 2.2. On Windows 7
 - 2.2.1. Go to Control Panel. Select Hardware and Sound.
 - 2.2.2. Click on Manage audio devices. [Fig 3]
 - 2.2.3. Select **Recording** tab. Double-click on Microphone (green check indicates that the mic is connected.) This will open **Microphone Properties** window. [Fig 4]
 - 2.2.4. Select the **Levels** tab. Here [Fig 5] under "Microphone" you can see the volume slider. Set it to maximum.
 - 2.2.5. Unlike Windows-XP here various "Microphone Boost" levels are possible. Choose +20dB level.



Figure 3 - Hardware and sound options

🚱 Sound	A Microphone Properties
Playback Recording Sounds Communications	General Listen Levels Advanced
Select a recording device below to modify its settings:	
Microphone High Definition Audio Device Not plugged in	Change Icon
Microphone High Definition Audio Device Default Device	High Definition Audio Device Properties Microsoft
Line In High Definition Audio Device Not plugged in	Jack Information Rear Panel 3.5 mm Jack
Configure Set Default V Properties	Device usage: Use this device (enable)
OK Cancel Apply	OK Cancel Apply

Figure 4 - Recording devices and microphone properties

A Microphone Properties					
General Listen Levels Advanced					
Microphone					
Microphone Boost +20.0 dB					
OK Cancel Apply					

Figure 5 - Microphone levels

2.3. How to hold the mic?

Use the mic stand to avoid handling noise. Keep the mic at a distance of 2-3 inches from your mouth. If the mic is unidirectional, its axis should point to your lips.

Do not keep the mic pointing at your nose as it will make the recording nasalized. Do not touch the head (ball grill) of the mic.

Make sure that relative position between your mouth and the mic remains the same throughout the recording (i.e. don't swing back and forth / wave the mic around if held in hands)

2.4. Recording using Cool Edit software [Audacity instructions will be updated later]

Note: You may study "Intro to Cool Edit" from here

http://vk6hgr.echidna.id.au/warsug/tutorials/introcooledit.pdf

[Local copy for above- <u>http://home.iitb.ac.in/~pranavj/introcooledit.pdf</u>]

Cool Edit Pro manual is here <u>http://home.iitb.ac.in/~pranavj/CoolEditPro_2_manual.pdf</u>

- 2.4.1. If your mic has a switch, turn it on.
- 2.4.2. Open Cool Edit.
- 2.4.3. Click on the Red button for recording near bottom of the window. This will throw up a New Waveform window. Here you can set Sampling rate, number of channels, bit resolution etc. [Fig 6]
- 2.4.4. Click **OK.** This will immediately start recording.

- 2.4.5. Observe the background noise level. Now say something. On the right hand side you will see the sample value scale. (If there is 0 1 scale, you can right click on it and select Sample Values option.) *Make sure that the max speech amplitude is at least 40% of the maximum value of the scale*. To get high SNR (ratio of signal power and noise power) it is important that background noise floor is very small.
- 2.4.6. On Windows- 7, if you observe that noise level is too much, you may reduce the "Microphone Boost" level. If you observe that the mic is saturated [Figure to be added], reduce the mic volume.



Sample Rate-	Channels	Resolution
lannol	Mono	C 8-bit
	C Stereo	16-bit
192000		C 32-bit (float)
96000		
64000		
48000		
44100		
22050		
16000		UK
11025		Cancel
11023		Cancer
8000		

Waveform properties

Figure 6 - Recording using Cool Edit



Figure 7 - Recorded waveform using Cool Edit

Mic saturation example

Following waveform was recorded using an old Sony F-V420 (<u>http://www.sony.co.uk/product/pam-vocal/f-v420/tab/technicalspecs</u>) mic. The waveform got clipped at ~18000 sample value. To avoid this mic volume should be reduced. The Shure SM58 mic did not show this clipping problem.



Figure 8 - Mic saturation

Tips from SM58 user guide

Please refer to - http://home.iitb.ac.in/~pranavj/sm58ug.pdf

Some useful links

- Introduction to sound recording, online textbook by Geoff Martin Link1- HTML <u>http://www.tonmeister.ca/main/textbook/</u> Link2- PDF <u>http://www.musicoff.com/Files/Intro_2_SoundRecording.pdf</u>
- 2. <u>4 Simple Tips for Recording High-Quality Audio</u>
- 3. <u>Microphone technique</u>
- 4. Digital Audio Field Recording Equipment Guide
- 5. <u>Equipment for Audio Recording of Speech</u>, University College London, Division of Psychology and Language Sciences
- 6. Intel[®] High Definition Audio
- 7. A blogpost on soundcards http://shinesystems.blogspot.com/2010/05/sound-card.html
- 8. "<u>Miking the vocals</u>" article in Shurenotes
- 9. How Do Microphones Work?
- 10. "Mic types & characteristics" an article in SoundOnSound magazine