

Sample rates, levels and mono and stereo recording

A [dynamic] microphone captures audio when its diaphragm moves as sound waves reach it. The movement creates an electrical response which is then translated into digital information about the sound.

Sample Rate and Bit Depth

- Sound waves are measured in Hertz (cycles per second)
 - Often Hertz is written as Hz or kHz. (4kHz = 4,000Hz)
- Sample rate refers to the number of samples being captured every second over the audible frequency range, ca. 20Hz (bass sounds) – 20kHz (treble sounds). The most common sample rates are 44.1kHz, 48kHz and 96kHz.
- Bit depth refers to the amount of information being collected about each of those samples. The most common bit depths are 16bit and 24bit.
- The higher the sample rate and bit depth the greater the fidelity (because the recorder is capturing more information). The lower the sample and bit rate the lower the fidelity.
- You cannot escape the sound of a low-resolution recording once you have it (even if you create a new file at a higher resolution).
- Try and record at a high-resolution. At the same time remember that the higher the resolution the more storage space you will need.
- A standard audio CD is recorded at 44.1kHz / 16bit
 - At 44.1kHz / 16bit, one audio minute = 8.6MB (approx)
 - A standard audio CD = 74 mins which equals 640MB
- A good starting point for your recordings is to use 44.1kHz / 16bit as it is the same rate as standard commercial CDs.
- Audio technology likes consistent sample and bit rates. You will generally find that audio software will resample (convert) audio recorded at different rates to a consistent rate (eg 44.1kHz). If you have different sample rates within an audio project you may experience audio playing at the wrong speed (fast or slow).

File Types

- Generally record in a loss-less format like .wav. If you record in a lossy format (e.g. mp3) every time you come to re-save the file the sound is degraded as more and more information is lost.
- Some common file types:
 - wav, bwf, flac, aiff = loss less/uncompressed format (larger file size, higher quality)
 - mp3, adpcm = lossy/compressed format (lower file size, lower quality)

Sound Levels

- Audio volume is measured in decibels, often written as dB.
- Often the volume meter on audio equipment is showing you head-room or the margin before distortion.
- Head room is the amount of dB before distortion or clipping occurs. If a sound goes over 0dB in the digital environment it becomes distorted (basically the device says I'm not taking in any more information). It is very hard – if not impossible – to remove distortion once it is present in your recording.
- Organisations have different standards for what is a good recording level.

As a starting point:

- In your original recordings try to record voices between -15dB and -10dB. This allows headroom if someone laughs or slams a door for the recorder to capture it without distorting.
- However when you are preparing a recording for broadcast you would probably want to increase the volume. For example some stations require their audio to be peaking to -1dB.
- When using a portable recorder the display will often show a level meter or margin number which will help you in setting your levels. Remember to use the gain control to set the broad recording level and then use your record +/- level buttons to fine-tune.
- When using audio software use the audio meter to get an accurate reading of the volume. Note that wave form size shown on the screen does not necessarily reflect volume level (because you can always zoom in and out making the waveform bigger and smaller). It does however show the relative volume in the audio.

Mono or Stereo

- Mono is a single channel of audio, stereo is two channels of audio (generally left and right).
- Identify what is the source sound (mono or stereo) and how the sound will ultimately be broadcast. For example, will it play in a stereo radio broadcast on FM or a mono radio broadcast on AM.
- Mono is good when you have a single source - like one mono microphone (e.g. if you were recording voice links or scripts).
- Stereo gives you a wider sound stage to work with. Portable recorders will often record in stereo. Even if you have a single voice talking into a portable recorder the background atmospheres can be in stereo giving the listener a sense of space and depth.
- If you have a stereo microphone you could try recording the interviewer on the left channel and the interviewee on the right channel so that you can visually identify the question and answers later in your audio software. But remember to make sure you mix down to mono:
 - What if the listener has their speakers in different rooms – they may only hear one channel.
 - If the mixing desk is wrongly wired only one channel may be broadcast.

Phasing

- Phasing is when the waveform on one channel in a stereo recording is slightly offset from the other channel.
- When the channels are slightly offset you will get a “tanky” sound quality, or a surround-sound effect while listening in stereo. But listening in mono you will find that the sound gets thinner and thinner and may even completely disappear.
- Phasing can occur in post-production (by slightly offsetting one channel) or when you are recording with more than one microphone.