Zoom Recorders

Quick Start Guide

Audio Recording Controls and Microphone Options

Plus tips for recording audio for video.

A note about background noise

Point the microphone away from any noise in the environment. Fans, refrigerators, traffic and other types of constant "broadband" noise can be amplified by the microphone.

Keep the microphone as close as possible to the subject. Try not to manipulate the microphone while you are recording. If possible, unplug the fridge or turn off the air conditioning unit. Remember to plug the fridge back in when you are finished recording!

The built-in stereo microphone on the Zoom recorder will pick up more background noise in the environment than other microphones. This guide will help you to select another microphone.

The Zoom Recorder

This is the Zoom H6N recorder. The CDA has different models of Zoom recorders with either two, four or six microphone inputs. They all operate with AA batteries.

The recorder has a tripod mount on the bottom of it. It can also be mounted to a microphone stand with an adapter.

The H6N has six inputs: two inputs are for the built-in stereo microphone and the remaining four are XLR/TRS inputs for other microphones.

Zoom Recorder Controls

On the left side of the Recorder:

The power button.

SD card slot: the Zoom records directly on to a SD card.

Headphone output: Always monitor the signal with headphones. You may hear an echo in the headphones while recording due to latency.

Check the first recording by playing it back to make sure that this echo is not present.

Zoom Recorder Controls

On the right side:

USB output to use the recorder as a USB interface or to copy files on to a computer. You can also copy files by taking out the SD card.

The menu button and the toggle switch to go through the menu pages.

Recommended Headphones

Use enclosed analog headphones to monitor recording, like the pair pictured here.

The CDA has many Sennheiser HD 280 headphones. These are excellent.

The Sennheiser HD 206 headphones are OK too if you want to purchase something cheaper of your own.

Common Microphone Options for the Zoom Recorder

- The built-in stereo XY microphone

- Directional condenser (Sennheiser 416)

- Dynamic (Shure SM48)

- Wireless clip-on or Handheld microphone

The CDA has other microphone options as well, but these are the most common for voice and on location recording.

The Built-in XY Microphone

- The built-in XY microphone is good for subjects at a close or medium distance. It does pick up other sounds in the environment. A stereo microphone provides a recording of a sound with a feeling of depth (an idea of how that sound is situated).

- The center of the two microphones should be directly facing the subject or sound source. Point the Zoom recorder at the subject, like you would with a directional microphone. It will pick up sound in a heart shaped area in front of the microphones.

- The Zoom recorder is often used by musicians to get down ideas quickly with a minimum of fuss. The built-in microphone is not ideal but it can be used quickly with a good result.

Recording with the Built-in Microphone

The built-in microphone is on top of the recorder.
It records in stereo with two directional microphones in a XY pattern.
You can adjust the width of the stereo recording from 90 to 120 degrees.

120 degrees will pick up audio from a wider area. The recording will feel more spacious. For a recording of a single person in front of a camera, choose the 90 degree width.

The recording level is adjusted below the XY microphone.

Enable the L and R buttons on the recorder. Press the R button while still pressing the L button. On the screen, the XY channel will turn red, indicating that it is ready to record. Now you can monitor your signal to see if it is loud enough.

Recording Levels

Adjust the recording volume level so that the audio peaks around -12 dB or between -12 and -6 dB.

Press the Record button to start recording.

The recorder will indicate the recording time in red.

About Digital Volume Peak Meters

- Digital Volume Peak Meters end at 0 dB.

- The recording signal should never go anywhere near 0 dB.

- If a sound gets to 0 dB, it will clip and distort.

- The read out on a digital peak meter cannot respond rapidly to display transient (very rapid) peaks. For this reason, it is necessary to give the recording some "head room".

- Keep your peak levels well below -6 dB, ideally within the -12 dB and

 -6 dB range. Zoom recommends around -12 dB.

Menu Settings: Rec Format
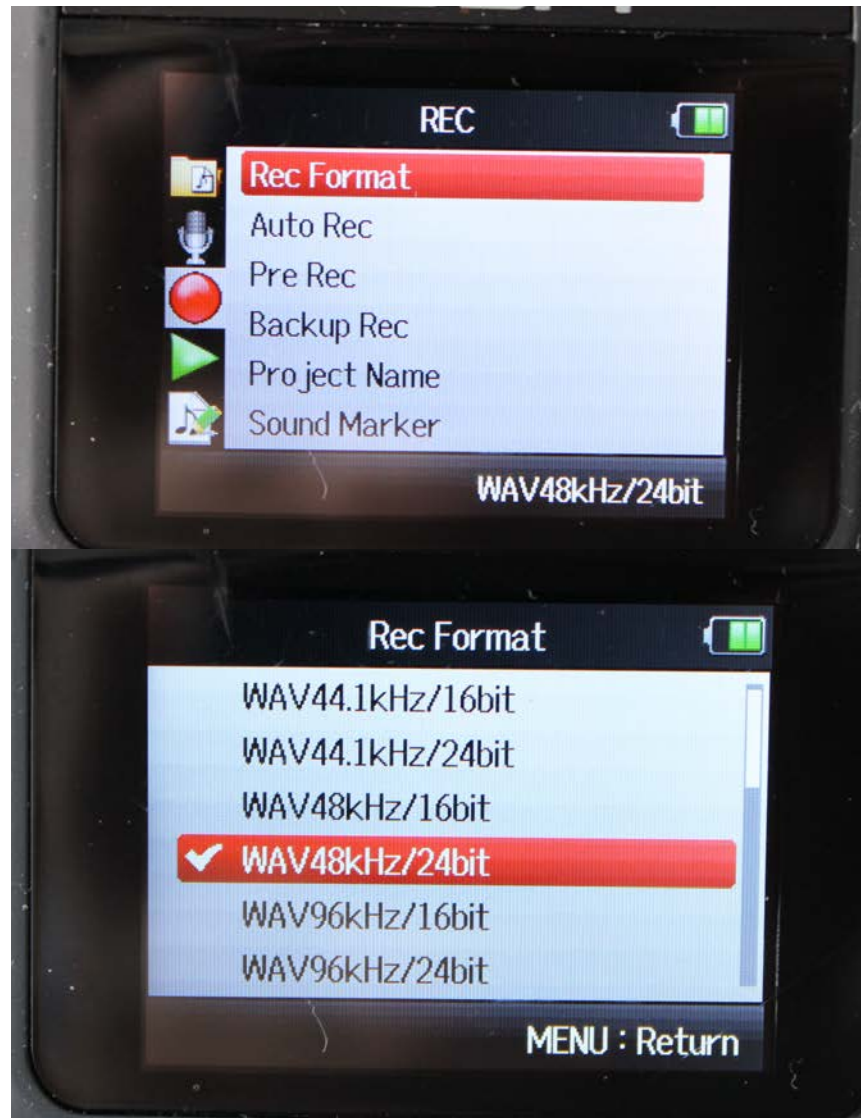
Record in the uncompressed WAV format. Do not use the MP3 format.

The most common recording format for video is WAV 48 kHz/24 bit. Be consistent. Always record at the same sample rate for one project.

48 kHz refers to the sample rate. The sound is being sampled 48000 times per second. The higher the sample rate, the more accurately high frequencies will be reproduced.

24 bit refers to the detail of each sample. The higher the number, the greater the detail and the larger the file size.

Menu Settings: Backup Rec and File Structure

The Backup Rec option will record a duplicate file at a -12 db lower volume than the original file. This is a safety recording in case your original file becomes too loud and distorts.
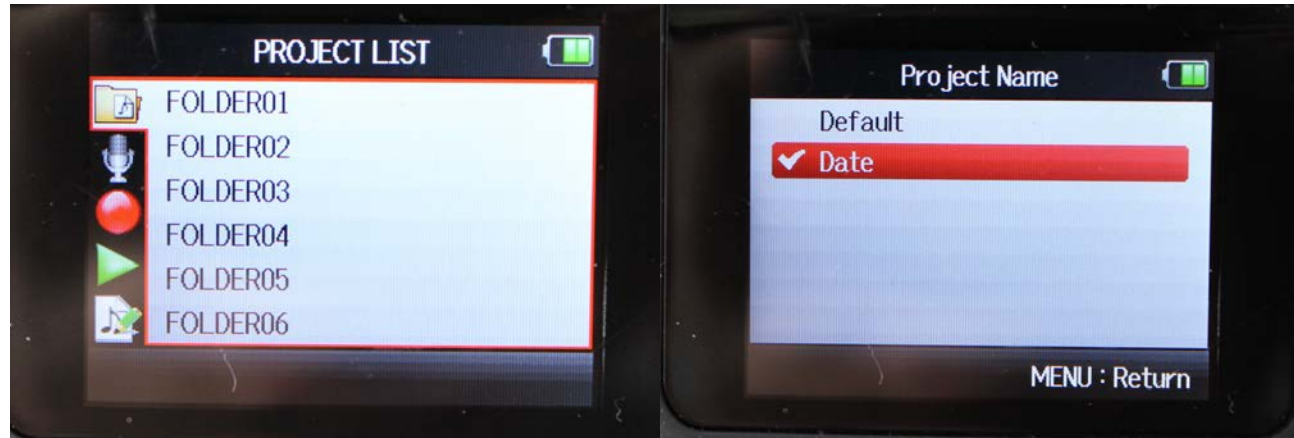
Distortion cannot be corrected. So I advise turning on this option.

The backup file appears in the same audio folder as the original file marked as "BU".
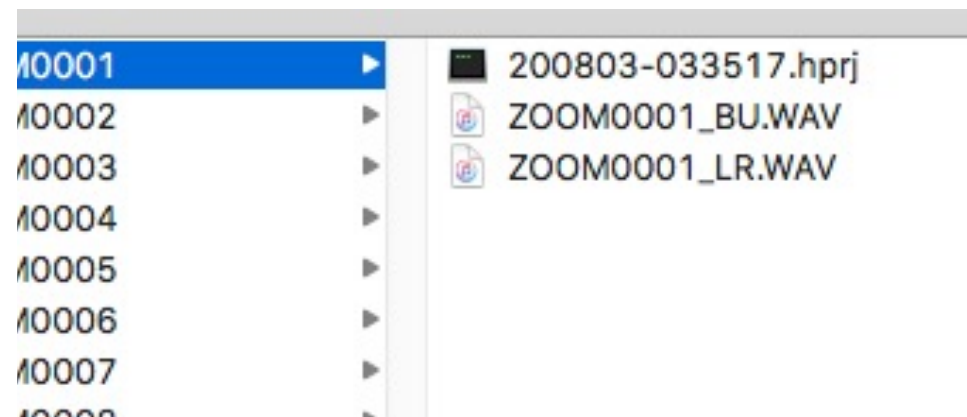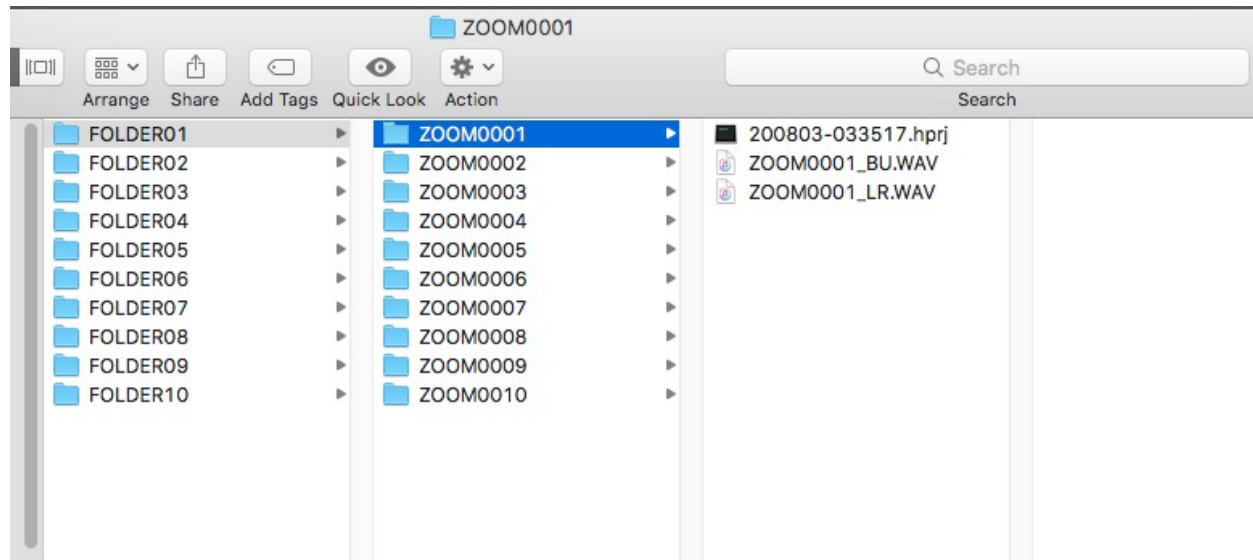
Menu Settings: Project Record Location

There a ten folders on the SD card.
Make sure you know into which folder you are recording!
Each audio file will have it's own folder within that folder! The file name of the audio will indicate the channel. "LR" means the built-in microphone.

The file appears in the menu system of the Zoom recorder as the date (shown above as year (20), month (08), and day (03). But the actual audio WAV file has the generic ZOOM name.

The .hprj files are not required for editing and can be discarded after you are finished with the Zoom.

Playback of Files
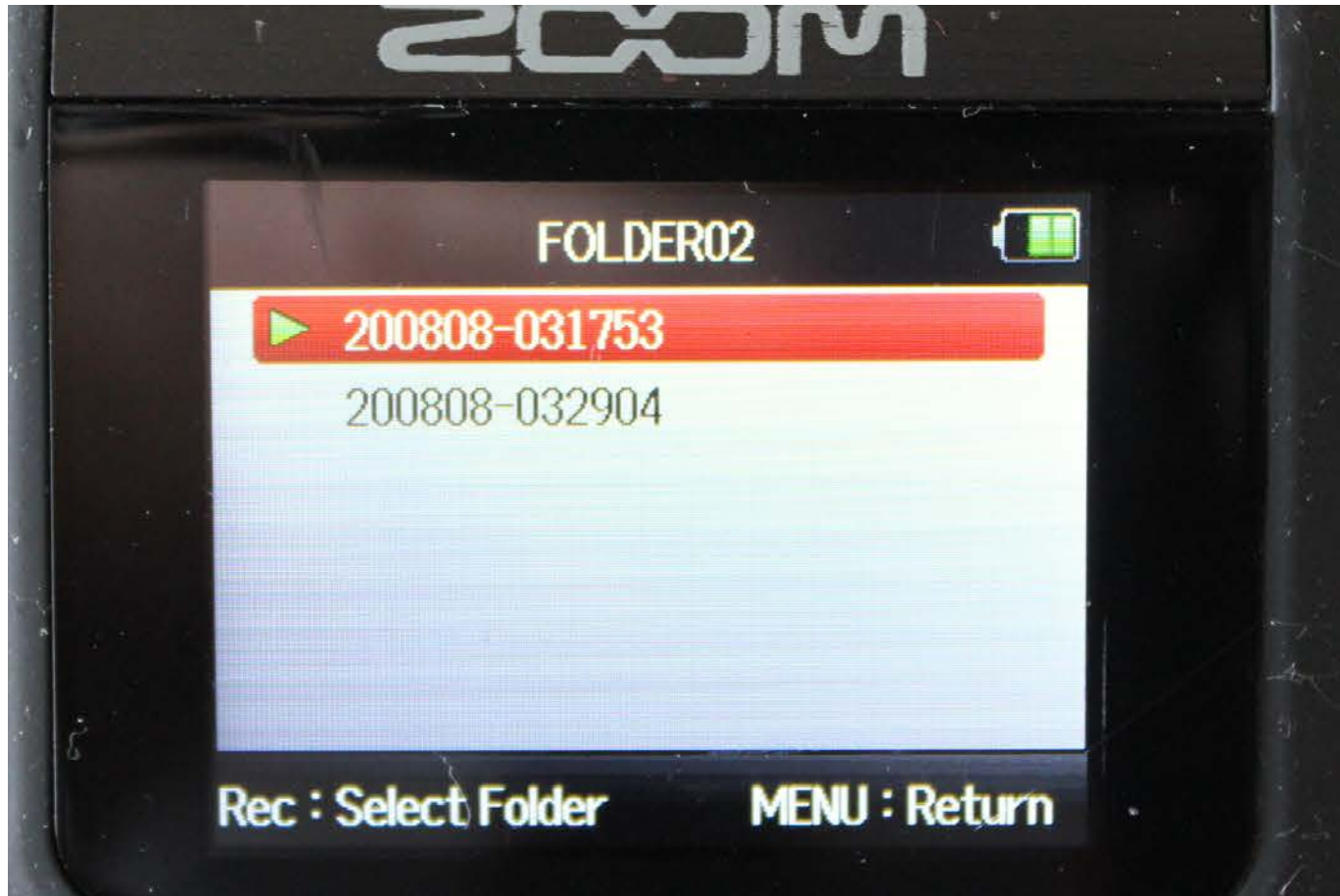
Do a quick test recording.

In the menu system, navigate to the folder where you have recorded the file. Then press play on the Zoom recorder.

Adjust the volume for the headphones on the side of the recorder.

Information on the LCD Screen

The main screen tells me the following:

I am recording into Folder 01 on the SD card.

My recording format is 48 kHz 24 bit WAV file.

I am recording on track 1 (red) that has phantom power.

I can also see that I have compression effect on the XY (built in mic) input, a lo cut effect on input 2.

Phantom Power and effects will be explained in following slides.

Analog Audio Output

The Zoom recorder has an analog line output to send the audio signal to another device while it is simultaneously recording audio to the SD card.

This output could be used to send audio to the microphone input of a DSLR camera. Unfortunately, this output does not work with an input that has an automatic level control like the microphone input of the Canon Rebel camera.

You cannot use it with the Canon Rebel cameras, but you can use it with other DSLRs like the Sony A7S II or the Sony A7R cameras.

Using Other Microphones

- The built-in microphone on the Zoom makes a good clean voice recording, especially when placed very close to the speaker (1 to 2 feet, .3 to .6 m).

- However, the audio file can be quite thin sounding in comparison with other microphones. The low frequencies are not very present and there is also a sense of space from the stereo XY pair. This is not an "intimate" recording where you have the sense of someone speaking directly to you.

- If this is what you desire, the Shure SM 58 and Sennheiser AVX clip-on microphone can provide that type of recording.

- Also, the built-in stereo microphone can pick up more room noise than a directional mono microphone or a dynamic microphone.

Dynamic vs Condenser Microphones

- A Microphone is a transducer changing acoustic energy to electrical energy.

- Dynamic microphones do not require electrical power to operate. They can be used to record very loud sounds.

- Condenser microphones are smaller and more sensitive. They are ideal for recording soft sounds. They can reproduce a greater range of frequencies but they must be powered by an electrical current called "phantom power".

- When using condenser microphones you must be more careful to avoid distortion from loud sounds or from too much microphone pre-amplifier gain.

Directionality: Pick-up (or Polar) Patterns

CHARACTERISTIC	OMNI-DIRECTIONAL	CARDIOID	SUPER-CARDIOID	HYPER-CARDIOID	BI-DIRECTIONAL
POLAR RESPONSE PATTERN					
COVERAGE ANGLE	360°	131°	115°	105°	90°
ANGLE OF MAXIMUM REJECTION (null angle)	—	180°	126°	110°	90°
REAR REJECTION (relative to front)	0	25 dB	12 dB	6 dB	0
AMBIENT SOUND SENSITIVITY (relative to omni)	100%	33%	27%	25%	33%
DISTANCE FACTOR (relative to omni)	1	1.7	1.9	2	1.7

Microphones do not only pick up sound from what they are pointing at. They can have a spherical (omni-directional) or more directional (hyper-cardiod) pick-up pattern.

Each one of these patterns cancels out sound from behind the microphone. Look at the angle of rejection (of sound) on the chart and the amount of rear rejection.

This chart and image on the following slide are reproduced from p. 27 of the *Shure Microphone Techniques Recording Manual*, Shure Education Publications, 2014. This publication can be downloaded free from the Shure website.
I highly recommend it!

Microphones Inputs

All the following microphones will plug into one of the four XLR inputs on the Zoom.
The Zoom accepts ¼" TRS cables and XLR male connectors.
The XLR male connection has three plugs.

Input Controls

Adjust the volume for each microphone input on the front of the Zoom recorder.

XLR microphone inputs should have the PAD set to 0.

The PAD switch is used when connecting devices that output at a higher volume like audio mixing boards or guitar effects pedals.

Do not plug electric guitars directly into the Zoom!
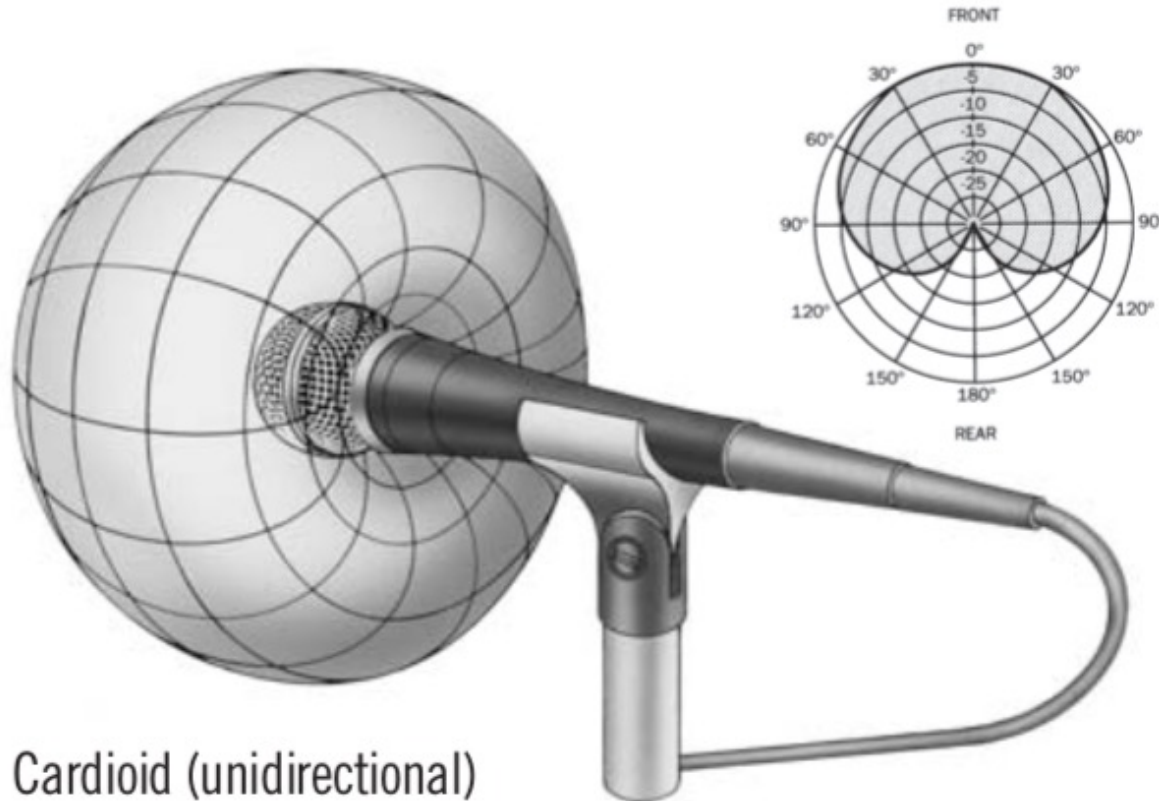
Shure SM 58 Dynamic Microphone

The Shure SM58 is a dynamic microphone. It does not require power to operate.

The dynamic microphone has a low volume output so it will require more input gain than a condenser microphone.

The SM58 has a cardiod polar pattern and is a great choice for voice recording in an environment where you cannot eliminate background noise. It will only pick up sounds very close to it. It is also used for recording loud sources like wind instruments, guitar amplifiers or drums.

The heart shaped cardioid pick-up pattern requires you to place the microphone close to your mouth.

Pick-up or Polar Pattern of a Shure SM58

FRONT

0°

30°   30°

-5
-10
-15
-20
-25

60°   60°

90°   90°

120°   120°

150°   150°

180°

REAR

Cardioid (unidirectional)

The Shure SM 58 dynamic microphone will offer the maximum rejection of surrounding noise.

It is often used by vocalists on a stage where is can minimize the sound of all the surrounding musicians.

Dynamic Microphone Placement for Voice

In this photo I am holding the microphone about six inches from my mouth but not pointing the microphone directly at my mouth to minimize "popping" sounds created by consonants "b", "p", "t" and "d". People who speak softly may benefit from pointing the microphone more directly at themselves but still trying to keep a little "off axis" by pointing it between the nose and the mouth.

Dynamic microphones can accentuate the bass frequencies especially when placed very close to the mouth. There are ways to avoid this "proximity effect" (see next slide). I recommend a 80 Hz lo cut.

Lo Cut Filter for eliminating Proximity Effect

A low frequency cut filter can be added on an input channel in the Zoom recorder. Go into the INPUT/OUTPUT menu to add this effect. This will reduce the "proximity effect".

Here I am adding a 80 Hz low cut filter, meaning that the low frequencies will start to have their volume reduced starting at 80 Hz.

The microphone is plugged into input 2. The lo cut filter is indicated by a blue line.

Clip-on Wireless Microphone

For a more inobtrusive microphone (or if you require both hands), use the Sennheiser AVX wireless microphone kit.

The clip-on wireless microphone should be placed about 20 to 25 cm below your mouth. It also gives a very close "intimate" voice recording like the SM 58.

This is an omnidirectional condenser microphone. It does pick up more room noise than the dynamic SM 58 but it is more responsive to quiet sounds. The pick-up pattern is spherical.

Because condenser microphones are more sensitive, the speaker should avoid wearing noisy clothing like squeaky leather jackets or bead necklaces, etc.

Establishing Wireless Transmission

Transmitter

Receiver

The Sennheiser AVX wireless clip-on microphone must be plugged into a transmitter.

Turn on the transmitter first and then turn on the receiver once it is plugged into the WAVE recorder and has phantom power (see next slide).

Then long press the PAIR button on the transmitter until it flashes green. Then long press the PAIR button on the receiver until it flashes green. A link will be established shortly and both lights will be green.

Phantom Power must be enabled

All audio devices that accept an input will have a "+48 V" button. This can be turned on to deliver "phantom power" to a condenser microphone. It should never be turned on when a dynamic microphone, like the SM58, is plugged into the channel.

To use the AVX wireless condenser microphone through the receiver, go into the Menu system to enable the Phantom Power for the input channel. Here I am recording on channel one.

Phantom Power is indicated by the +48V note underneath the channel and the lightning bolt symbol.
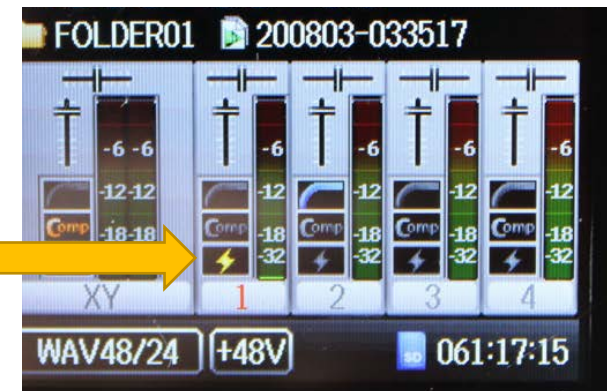
Output Volume Level adjust on Receiver

A meter on the side of the receiver shows the output volume level of the signal to the recorder.

Press the AF Out button to change the level.

Keep the level three quarters of the way up (three lights lit up).

The input should peak on the Zoom recorder around -12 dB.

Sennheiser 835 handheld microphone

This is like a wireless SM58 microphone, but it has an omnidirectional polar pattern. It will pick up a little more room noise than the SM58.
Position the microphone in the same manner as the SM 58 microphone.

This microphone has a built in transmitter. Follow the same procedure: turn on the microphone first and then turn on the receiver once it is plugged into the WAVE recorder and has phantom power.

Then long press the PAIR button on the microphone until it flashes green. Then long press the PAIR button on the receiver until it flashes green. A link will be established shortly and both lights will be green.

Make sure to unmute the microphone.

Plugging the wireless receiver into a camera

The XVX kit comes with a XLR to 1/8" adapter to plug the receiver straight into the line input of a camera.

Do not use this with the Canon Rebel cameras or any other DSLR camera that has automatic volume control on the input. The recording will be constantly distorted.

In this picture, the adapter is used with the Sony A7R camera. Both the Sony A7R and A7S cameras from the CDA depot have manual volume control and can be used with the adapter. See the A7R guide for details.

Sennheiser MKH 416 Super-Cardioid

This microphone is a good choice for when you cannot place a microphone close to your subject and it is the best choice for recording outside.

It is a highly directional condenser microphone and should be pointed directly at the subject. It can be placed a long distance from the speaker or subject (12 to 15 feet, 3.5 to 4.5 m) but still produce a good recording. Surrounding sounds will be largely cancelled out.

Never handhold the microphone as pictured. It should always be mounted on a stand or if handheld, it should be in a shock mount.

This microphone is very sensitive and can be used to record quiet ambient sounds or sound effects.
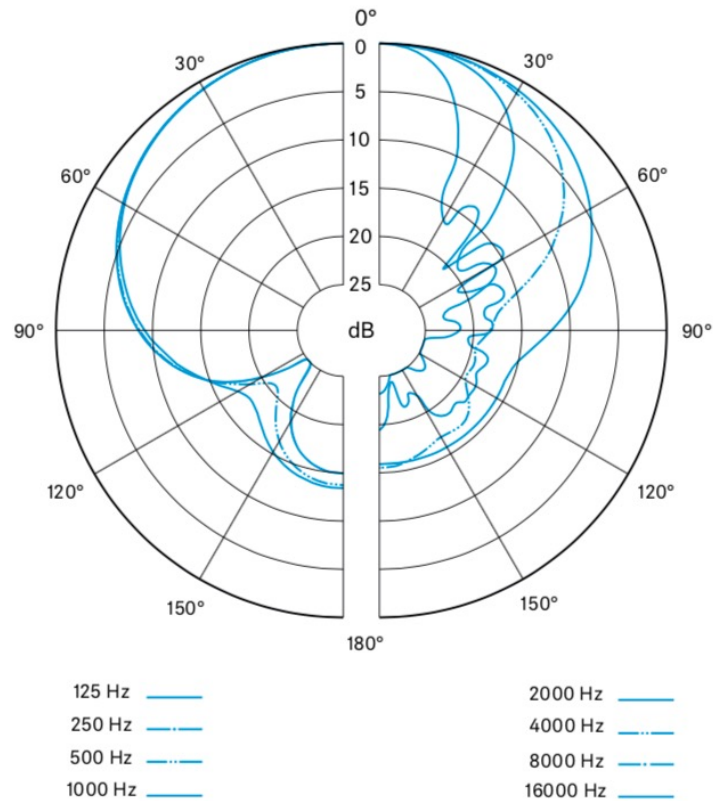
Sennheiser MKH 416 Field Kit

The MKH 416 has a field recording kit, made by Rycote, for recording outside. The kit includes a shock absorbing mount and windshield. The windshield works well and also comes with an additional furry cover.

The microphone is often mounted on a pole so it can be aimed at speakers from above.

Of course, the shield does cut the volume.
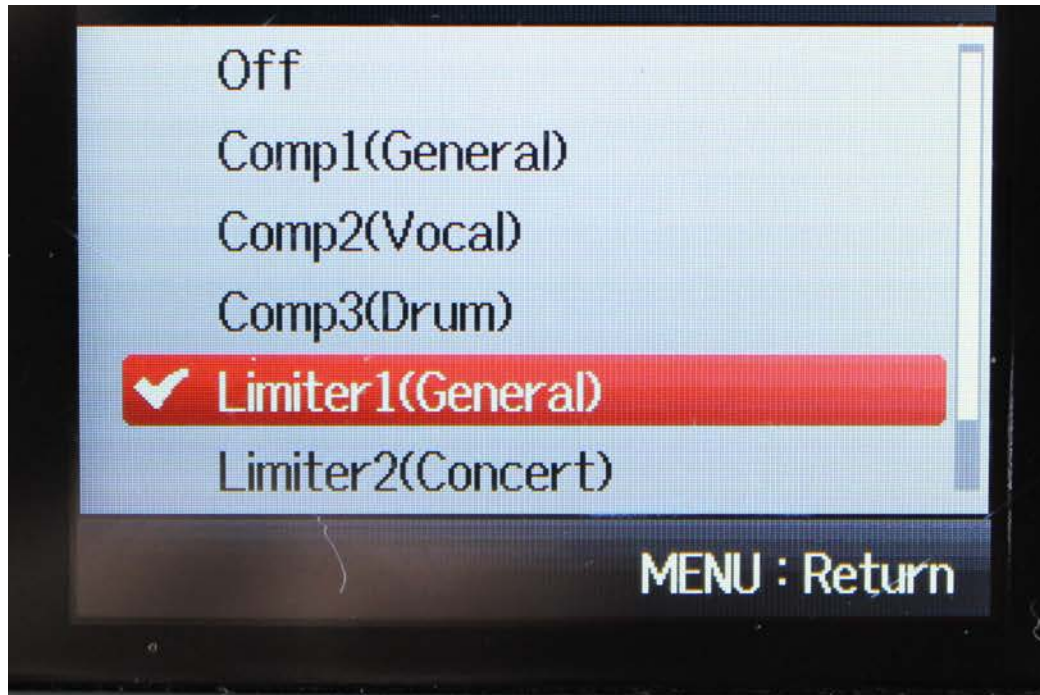

Pictures from the Rycote website.

Polar Pattern of the MKH 416

This diagram is reproduced from the Sennheiser MKH 416 manual.

It has an unusual shift to the left in the pick-up pattern.

Adding a Limiter Effect with the 416

The MKH 416 is a very sensitive condenser microphone. I recommend putting a limiter effect on the input channel.

The limiter will avoid loud sounds distorting and peaking. It could also save your ears when you are wearing headphones to monitor the recording.

The Zoom has a number of limiter presets. Find the one that fits your situation.

Slating for Synching

If you are recording audio for video with an external Zoom recorder, the audio will have to be synchronized to the image with video editing software.

Some software can synchronize the audio to the guide track audio on your video file. For example, if you used a low quality built-in camera microphone this might suffice as a guide track.

But take no chances, always slate each video clip that you record. The CDA has a few proper cinema slates, but here I am improvising by using two pieces of wood. Many people use a hand clap. The next slide has some tips for slating.

Tips for Slating

- The sync mark is a sharp loud noise that lasts for one frame of video.

- A proper slate, two pieces of wood or a hand clap will suffice.

- Make sure the slate is in the frame so that you can clearly see the point of contact. This is your visual reference for slating. A proper slate will also allow you to visually identify the shot and take.

- Start recording on the camera and the audio device before you make the sync mark and announce the shot you are about to record (what is written on the slate). Right before you bring down the slate, say "mark". This is to distinguish the sound from any other random sharp noise.

- You can slate at the end of a shot if the camera framing is too tight at the beginning. In this case the slate is usually held upside down. You can clap your hands upside down, if you want to.

Thank you for reading this guide.

- I hope you have found this guide helpful.
- Look on the Video and Sound Editing/Technical Support Documents page of the CDA website for more equipment and software guides.
- www.concordia.ca/finearts/cda.html

- Positive and constructive feedback or comments are welcome.

- Write to: philip.hawes@concordia.ca