5-2020

Production Audio for Non-Fiction Video: A Beginner's Field Guide

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Introduction

The intention of this text is to be a practical field guide, to be referenced before, after, and, if needed, during a non-fiction production. While the term "non-fiction" may refer to a wide variety of production styles, the only two covered in depth here are the "run & gun" style, and the "talking head" interview. These often serve as the scaffolding, so to speak, of a variety of videos from web-based to documentary films.

While basic elements of post-production are addressed, the main focus of this work is the practical skills and techniques associated with capturing quality audio while filming. Wherever possible, both best-practices and DIY techniques are discussed. The intended user of this guide is not the seasoned audio professional, but rather the seasoned photographer, early-career independent filmmaker, or novice sound recorder.

1.Pre-Production

As the individual responsible for recording audio, your planning stage, or pre-production phase should consist of learning all there is to know about the production and post-production phases of a production. Such research is simple, but does take time and communication. Discuss the below considerations with your director, assistant director, or whoever is in charge of the production. If that person is you, then you will need to consider these aspects of a production from the perspective of an audio professional (it is always recommended that a production crew include at least one person devoted to audio recording).

Below, are a set of considerations regarding both production and post production:

Space:

When recording audio for video on a professional set, the choice of locations is seldom up to the person recording audio. This is because the image typically takes precedence. On smaller sets, or personal productions, it is easier to choose a space that works both visually and aurally. Also, sometimes there is no choice to be made, you are simply left with a location based on availability and ease. Please know, however, that it is worth considering the acoustic properties of a space prior to production. One can also make changes to a space to improve the ambient sound.

Scout locations beforehand during the time of day when you will be filming. Take notes on any potential issues that may exist. Aspects of spaces to avoid:

Interior:

- hollow sounding

- Hard, reflective surfaces (one option to improve this is to have at least one furniture blanket in your sound kit. placing this over hard surfaces, or on the floor, can help absorb rather than reflect sound waves.

- Loud ambient noise such as: HVAC you don't know how to turn off; any loud noise you're unable to turn off. (if you are able to do so, please do. The refrigerator or water cooler is a common household noise that can be unplugged or turned off)

Exterior:

- constant noise (traffic, construction, stream/water)

- unexpected noise (is there a time of day when location is louder?)

- frequency interference (when using a wireless mic, frequencies from banks, radio stations, hospitals, etc., can cause signal loss or interference)

MOS:

Some spaces are chosen for their visual quality, even though it is impossible to record quality sound in the chosen space. The term, MOS, which stands for the german "mit ohne sound", or "without sound" is used to notate such a location. When using slates, this is noted by placing fingers or anything between the clacker and the board.

Characters/Talent:

The basics are sometimes easy to overlook. That is why it is important to write everything down in a production book as a way of forcing oneself to consider all aspects of a shoot. Also, your production book will serve to be a quick reference. The number of individuals being recorded, and whether they need a mic, is essential to know. Here are the basic considerations when noting what talent will be involved in a production:

- name and occupation of individuals to be filmed for each day/scene/shoot. Organize by day and location. This will tell you how many mics you will need. If there is a total of four people being filmed, but only two are ever on camera at the same time, then only two mics are needed for the day.

- know your locations and who will be filmed in each. Back to *spaces*, knowing where your talent will be filmed will inform your decision regarding which mic to use, or how many to have ready should a plan change.

    - A shotgun microphone may work for a quiet space, but becomes less ideal when in a noisy environment. A boom is easy to use for talent when they are moving, so it is sometimes best to have both a lav and shotgun mic ready should a production require multiple unknown locations.

- each mic used will require at least one accessory to utilize it correctly, whether it be lapel clips, tape, XLR cable, or windscreen. Please note when in pre-production planning.

- Draw a plan for how you will connect each mic to the mixer, and what will be required in each known location. This will allow you to focus on the production, and not on whether or not you remembered particular items.

Budget:

Closely related to the above is the budget of a particular production. Little of this is up to the sound person, but does directly affect the sound person. Based on the production plan, it is important to note one's needs as soon as possible. It is also important to learn to make the most of any limitations by planning accordingly. A shotgun mic and boom may be used to mic multiple individuals rather than devoting a wireless mic to each. Sometimes a camera mounted shotgun mic is enough.

Deliverables:

Where will the final project be seen? If possible, communicate with the individual who will be handling the audio in the post-production phase. On many projects, this will be the post-production supervisor, who will then hire the sound professionals to complete the editing, mix, and ADR, etc.. This knowledge will inform the following decisions:

- Format: mp3, .WAV, AIFF (standard: .wav)

  - In some cases, a polyWAV is requested. This is a way of organizing audio files within a kind of compressed .zip file. This is the main advantage, that it is one file, rather than a number of folders containing separate audio tracks (often organized by date). If it is a small production, with a limited number of speakers, this is sometimes overkill. It may require an extra step to separate the file into mono tracks once it has been imported.

- Sample Rate (standard: 48kHz)

- Bit Depth (standard: 16 Bit)

2. Production

This chapter is devoted to both techniques and practices related to sound recording for a non-fiction video production. Although it is impossible here to address the nuances of each brand of mic, mixer, etc., there are features common to many.

Audio equipment has traditionally been created and marketed towards music and live performance professionals. This equipment was adapted for use within the world of film, and was cumbersome for use in the field. This has changed, and equipment for film audio professionals now exists, no longer a need to adapt. As video production has become more accessible and affordable, so too has audio equipment for non-fiction film.

Audio equipment for non-fiction film should be ideal for use in the field. This means that it is not only sturdy, but can be utilized by one or two individuals, and readily mobile. This chapter will address the main components of a sound kit, as well as optional accessories.

Set Etiquette :

While all productions are different, there are certain hierarchies in place to maintain efficiency and creative control. Compared to fictional film sets, the crew of a non-fiction video is small. A crew may include:

- Producer

- Director

- Director of Photography (DP)

- Sound recordist/mixer

- Boom Op

- PA

The list above, more or less, reflects the hierarchy, as well. The sound person should have an awareness of what the camera is filming, and how wide the shot may be.

Many sets may only include a Director and either a sound recordist or DP. The small crew size allows the crew to more easily establish a shorthand, ways of quickly communicating and anticipating the the actions and intent of others. A few concepts that should be discussed with crew members:

- Order of operations - when to roll sound, action, and cut. (standard: "sound speed", "camera rolling", then some form of "action".

- How to notate each scene - will a slate be used? In other words, how will the editor identify each scene quickly and easily?

- A schedule

- How long long the director likes to hold a shot. For instance, a director may want all b-roll shots to be held for ten seconds or more. This will help provide the director with some latitude in terms of ultimate shot choices.

Equipment:

Mixer/Recorder:

Professional video cameras are typically equipped with two inputs, also known as audio channels. This is not ideal for situations in which there is a need for more than two audio sources, such as more than two lav mics, or a lav/ shotgun combo with two or more talents.

A mixer, which is an indispensable piece of audio equipment, both in the studio and the field, enables more than two audio inputs to be "mixed" down to two outputs. This enables the user to feed audio back to the camera (if two XLR inputs exist) to be recorded along with the video.

Field Mixers are often equipped with recorders, which eliminates the need for feeding your output back to the camera to be "married" to the video recording, or another external recorder. This also means that the sound isn't tethered to the visuals.

Rather than mixing two or more tracks to be recorded as a single stereo mix, each track can be recorded individually (and as a stereo mix). By utilizing this technique, the sound mixer can record the best version of each input, which can then be mixed in the post-production phase. Think of it as recording the audio from each microphone you are using.

As a rule, utilizing a mixer/recorder rather the internal mic of any camera is preferred and will result in better audio. There are a couple reasons for this:

- what distinguishes good audio equipment vs. marginal audio equipment is the quality of components. Cameras are designed and manufactured with a focus upon visual capabilities. Audio is often an afterthought, and therefore the best components, specifically the pre-amp, is reserved for audio gear.

- having a person dedicated to the recording of audio, by the mere physical separation of it, will mean that more consideration will be paid to it during the filming process.

All mixer/recorders will enable the sound person to:

- Monitor the audio you're recording

- adjust gain (input level) of your audio signal

- supply phantom power to your microphones, if needed

- apply in-line effects such as pads and limiters

- convert an analog signal to a digital signal

- name projects and audio files

- set output container (what kind of file do you want your recording to be, and how would you like it organized?) as a .wav, mp3, aiff, etc..

Note that many popular DSLR cameras are only equipped with a 3.5mm audio input (the same size that is found on your computer, and other consumer grade equipment). While there are converters for this, the idea is the same. While this is usable, a *dual-system* sound recording technique will yield your best results in this situation (to be discussed later in this chapter).

Mixer/Recorder Accessories:

- XLR cables (the ubiquitous audio cable. cylindrical terminals, male & female, with three prongs (male), or inputs (female).

- Batteries - there are several options for reusable batteries, or the antiquated battery sled (essentially a pack of batteries that can be replaced quickly). If you know you will be remaining stationary for a shoot, say a sit down interview in one location, an AC adapter is often included.

- Blank Media - Most recorders record to CF, SD, or both. Higher end models can record to two SD or CF cards simultaneously to prevent the loss of a recording due to corrupt media.

- Bag & Harness - An essential part of the sound kit. This enables a sound man to carry all needed accessories, as well as remain comfortable while standing or sitting during a shoot. Manufactures design bags to fit specific mixers, and they vary in price.

- Headphones - these will be discussed in a later section.

- Manual - If unfamiliar with a particular mixer/recorder, it is a good practice to at least have the PDF version downloaded to you phone.

Microphones:

Often mistakenly referred to as a "Boom Mic", the shotgun microphone is the most common style of mic used in non-fiction productions. This is due to its directionality, or its ability to isolate the sound source and reduce noise.

Technically, the shotgun mic is a condenser microphone which requires phantom power (commonly 48v). This is supplied via the mixer, or a AA battery located in the barrel of the mic. The other common microphone type is dynamic, which is better suited to louder sounds and does not require phantom power.

The shotgun mic comes in a variety of lengths, which is an indication of the mic's directionality and pick-up pattern. For interiors, utilize a shorter shotgun mic, while for exteriors, use a longer shotgun mic.

Microphone Accessories:

- XLR cable

- Batteries - Although it is more common to use a mixer as a source of phantom power, it is always good practice to have a back-up.

- Wind Protection - These are highly useful in exterior locations and an essential part of your sound kit. They come in a variety of styles from simple foam, to a blimp which completely encompasses the mic. These include

  - The "dead cat" - includes long "fur" to dissipate the wind silently before it reaches the mic.

  - blimp - this encompasses the entire mic, and often includes a dead cat layer that can be attached to the outside for ultimate protection

  - baby ball gag - like the blimp, it is made of mesh and plastic, but only encompasses the pick up end of the mic.

Boom Pole:

The reason a shotgun mic is often referred to as a "boom mic" is because it is typically situated at the end of boom pole, affixed via a shock mount. These devices enable a boom operator to extend the mic over the sound source without being in the shot. These come in a variety of lengths, materials and price ranges, some being made by boutique manufacturers. Some have external XLR cables for ease, but these are often of a low quality and are prone to noise.

Boom Pole Accessories:

- Shock Mount - as the name suggests, this enables the mic to be connected to the boom, but in a way that creates a sound buffer from handling noise. Handling noise may still exist however, and it is important not to rely on this to completely isolate any noise. These also come in a "pistol - grip" style for when recording is in small spaces and a boom will not fit. These are also useful for recording ambient sounds and foley.

- Boom Mate - this allows the boom to rest on a C-Stand. This is useful for longer interview settings, or any setting in which the boom and shotgun mic will be stationary for longer periods of time. It saves the boom op from having to stand for long periods of time holding the boom, but is easily removed should the scene require it.

Lav Mic & Wireless Kit:

<u>Lavalier Microphone</u>:

French for pendant, the lavalier mic, or lav, as it is commonly known, is a small microphone (some as small as a match head) placed upon the lapel of a subject or talent. Because it is small, can be hidden under clothing, and is often wireless, the lav is popular on fiction film and reality TV sets. It allows for more unfettered mobility by those who wear it.

A creative choice needs to be made regarding whether or not the mic will be visible. This should remain consistent throughout the project. Once taboo for more creative projects, this is becoming somewhat more acceptable. It is easier to place a mic outside of the closing, but this breaks any desired reflection of reality. A clip can be used, and the possibility of clothing noise is greatly reduced.

Lav mics are chosen according to the wireless kit with which they will be used. While the actual mic will be the same, they are not universal in that each brand of wireless kit requires its own **terminal**. A terminal is the electrical connector at the end of the wire attached to the microphone. Please check compatibility before purchasing, or checking out, or renting equipment.

While lavs do exist as wired mics, which are more consistently reliable and easy to use, many productions prefer to utilize wireless lavs for their mobility.

Common brands of lav mics: Sanken, Countryman, Tram

<u>Wireless Kit</u>:

A wireless kit consists of two main components. The transmitter (TX) and the Receiver (RX).

TX:

A lav mic is connected to the TX, which utilizes a specific frequency to transmit the   audio signal to the RX, which is connected to your mixer/recorder. This device:

- acts as a pre-amp and allows for the adjustment of the mics' sensitivity

    - this is similar to setting the gain on a mixer, and will vary depending on the talent's natural volume. The closer to 0db, the more sensitive the mic will become.

- is placed upon the talent, often on the waistband or belt, via a provided clip, or other method.

    - sometimes an ace bandage is used when other means aren't available. In sit down interviews, this may be place upon the lap, as long as it is not visible in the shot.

- requires batteries

- should be synced correctly with the RX. This can be as easy as holding the two devices together and pressing a button. It may also be done manually. Please consult manual for correct methods.

- is susceptible to interference. Wireless kits will usually have a search option, which identifies open, clean frequencies. Using this is recommended when film in a new location.

- is mutable with one button for when the talent is not filming. This reassures the talent that they will not be listened to when not on camera.

RX:

The RX connects directly to an input on the mixer/recorder. This is, most often, via a cable with a male XLR connection on one end, and a brand-specific terminal on the other. This device:

- Should be synced correctly with the TX

- requires batteries

- is attached to the sound bag via a provided clip. It should be correct side up with the antennae visible.

- is able to boost the signal it receives from the TX prior to sending it to the mixer. Depending on the mixer's ability to do this on its own, and the quality of the signal, this is not always required. This setting is often noted as gain, and is similar to the setting upon the mixer. The closer to 0db, the more gain is applied.

    - Note that the gain will also increase the noise floor, which will sound similar to ambient noise.

Lav Mic & Wireless Kit Accessories:

If you do choose to hide the lav mic upon the talent, then you will need accessories to do so. Below, I've listed the most common ones. This process takes practice, and technique often depends on the movement of the talent, and what they are wearing. Know that the goal is essentially to create a way for there to be no friction between the mic or mic cable, and anything on the body. This is to be done as close to just above the sternum as possible. There is more info located in the Technique section of this guide.

- Transpore tape - available at drug stores. It is a medical tape with a tiny grid of holes, used because it is breathable, rather silent, and easy to remove.

- Overcovers - designed specifically for this purpose. These are "Fur" discs that attach to the body, allowing a lav mic to be placed in between the fur and the double sided disc that sticks to the body. The fur is "silent" and therefor can withstand friction without causing noise.

- Moleskin - a similar technique can be utilized using two small strips of moleskin. Somewhat more difficult to remove, but still usable.

- Ace Bandage - used to attach transmitter to talent when a proper waistband is not available.

- Triangular make-up sponge - also available at drug stores. These are also used to cradle the lav mic. Possible to use in cleavage and bulkier clothing.

- Headlamp - used to mic talent, and monitor a mixer in dark environments. By using one with a red light, you may see without causing squinting if shined in others eyes.

Headphones:

Headphones come in many shapes and sizes. Comfort and quality are the two main attributes to consider when choosing your headphones. Unlike other equipment, this is highly personal. Although some tried and true pairs exist, to each their own.

There are many labels assigned to headphones as well. Many will claim to be professional, but upon further inspection of specs, they are only so in name. One label, that is more of an ill-defined aspect than an accurate, established set of characteristics is, "reference".

In short, reference refers to the headphone's ability to be true to the source, or accurate. Some headphones, such as Bose, are designed to "sweeten" the audio by accentuating specific frequencies, and reducing others. Reference headphones should be flat across the frequency spectrum. This is designed to provide the listener with the truest representation of the audio.

Aspects of reference headphones:

- On Ear - this style of headphone covers the ear, which reduces any background noise. They are also more compact than the Over-the-Ear style, which is better for post-production work.

- 1/4" Terminal - this is the larger of the two styles of terminals (or jacks). The other, smaller version which is ubiquitous amongst consumer grade equipment is 3.5mm. Typically, headphones are hardwired withe the 3.5mm terminal and include a 1/4" adapter. It is a good idea to purchase extra adapters, as they are easily misplaced. There is no difference in quality, the bigger is simply less prone to breaking.

- Size - many "professional" headphones are quite large and unable to be folded. These are to be avoided for production work. Headphones which collapse will reduce breakage. Also, not all heads are the same size.

- Component-based - parts of some professional headphones are designed to be replaceable, which increases longevity and means that parts can be purchased rather than an entire replacement pair.

Common Production Headphones: Beyerdynamic DT250, Sennheiser HD 280 Pro, Sony MDR-7506

Mixing & Recording Techniques:

Mic Placement:

At the very basic level, the responsibility of the sound mixer is to record audio at as close to the correct level as possible, all while putting the mic in the correct place. Most often, this means recording the human voice.

Shotgun:

The boom op will extend the shotgun mic above the talent, as close as possible, careful not to be in the frame, or cast a visible shadow. To establish this location, the boom op will communicate with the camera operator by asking for a "frame line". This notifies the camera operator that you will be dropping your mic as close to the talent as possible. Once you are in the frame, the op will tell you, and you will lift the mic slightly above this mark, allowing for room to move.

Imagine a laser extending from the mouth of the speaker to the microphones pick up. this line should be as straight and direct as possible.

Doppler Effect:

When recording dialogue with a shotgun mic, either with a boom or camera mounted, it is important to remember that both the microphone and the sound source move, neither are stationary. The Doppler effect causes the pitch of a sound to change due to either the movement of the source or the object receiving it (in our case, the mic), or both. This causes the pitch of the frequencies captured to increase or decrease depending on where the mic is in relation to the source. Consider a bicycle moving towards you, or a jet flying by. Although the sound made by the bike itself never changes, our perception of it changes the closer the sound moves towards us.

By placing the shotgun mic above and slightly in front of the talent's head (on axis), we are able to capture audio truest to the source, and truest to our perception of how it should sound. Imagine a laser pointer shining from the talent's mouth, and into your shotgun mic, which is placed above and in front of the talent's head.

As the talent or sound source moves, the position of the mic in relation to the source should remain as consistent as possible.

Boom Technique:

The boom pole should be held with firmly placed hands, with arms outstretched above the head. This allows for maximum mobility to maintain a consistent distance and position. Hands should not move while filming, as this can introduce handling noise.

Lav Mic:

This process requires practice. One important aspect to this is to remain professional while placing a lav mic upon anyone. This mean efficient, polite, and confident. Communicate with the talent to let them know what you're doing throughout.

A lav mic is works best when place just above the sternum, in the center of the chest. Straying from this too much will result in uneven and off-axis audio when the speaker rotates their head.

Plant Mic:

A shotgun mic, or even a lav, may be hidden in a location close to the main action of a scene. This is a particularly good way to record room-tone and ambient sound.

Output:

A mixer/recorder also digitizes the analog signal it receives. To do so, it must compress the analog signal by sampling qualities of the sound wave. There are two main settings regarding how this is done. Theses settings affect the quality and size of the resulting digital files.

- Sample Rate - How often an analog sound wave is sampled. A rate of 44.1kHz means that 44,100 samples are taken each second. This is CD quality. The standard for audio for video is 48kHz

- Bit Depth - If we think of the sample rate, visually, as frames per second, then Bit Depth is the resolution. Bit Depth is what is being sampled. In other words, Bit Depth refers to the amount of information gathered each of those 44,100 times a wave is sampled. Common bit depths are 16, 24, & 32. A bit depth of 16 records 65,536 amplitude values each time a sample is taken. The higher the bit depth, the truer the representation of the analog wave. A bit depth of 24 is standard for professional video.

Another factor to these setting is storage space. While audio is traditionally much smaller than video, it still occupies space. The mixer may tell you how many hours of recording time is left based on storage space and current settings.

Once these values are established, however, they should remain consistent throughout the project.

Format:

A related setting is file format. You will typically have the option of MP3, AIFF, or WAV.

While the differences are in how each format is compressed, your decision sometimes also depends on what your plan is for post-production.

.WAV is the standard file format for video production.

Gain & Trim:

The first step to doing this, after plugging in the mic, is setting the gain. The human voice as an electronic signal is rather weak, so it requires amplification. This is done via a pre-amp. The quality of your recorded audio is rather dependent on the quality of the pre-amp.

On a mixer, the gain is represented by a meter. It is adjusted via a knob or pot (short for potentiometer. These vary greatly, but all follow the same principle, when a signal peaks, information is lost. When the gain of a signal is too low, the **signal to noise ratio** (the ratio between desired signal, and inherent noise floor) is reduced. This is similar to film or digital video, when a shot is overblown, there is less information for timing or color correction. There is some latitude, but there is also an ideal "exposure" or level.

A signal begins to peak, typically at any point beyond 0 db, which represents the threshold of the particular mixer, more specifically its preamp. The more gain successfully applied without distortion, the cleaner the signal.

Setting the Gain:

Once the mic is placed correctly, ask the talent to speak clearly. Reposition the mic so that is sounds as though the speaker is speaking directly into the mic (although mic will most likely be

Pads/limiters:

Most mixer/recorders, and some microphones, have a readily available option to apply a pad (typically -20 db) to individual channel inputs or outputs (mic). This feature reduces the input (or output) signal so that it does not overload and peak. If you are in an environment in which the volume can significantly without notice, such as a sporting event or concert, this is a desirable feature.

Redundancy:

This is a method of recording in which one signal is recorded in more than one way. This can apply to the technique of using both a lav and shotgun mic to record a single speaker, or it may apply to recording one speaker to two channels, each with separate input levels to ensure no peaking. This is a highly recommended practice in non-fiction, and some mixer are even equipped with ways of recording simultaneously to both a CF and SD card.

Check Lists:

The following sub-chapter is a collection of checklists designed to be used before and during production phases. Specific to the size of productions, they contain lists of equipment needed for shoots, as well as brief notes on methods used.

Ideally, a drawing can be made of an audio set up within a rendering of the production space. This way, the sound

Information regarding the use of specific equipment is not addressed, but general concepts and methods are.

Non-Fiction Audio Checklist 1 (Full Set-Up)
- For both interview and run & gun productions

EQUIPMENT:

- Shotgun Mic
  - XLR Cables (2-3)
  - Shock Mount
  - Wind Protection
  - Headphones

- MM-1 for Boom Operator (if separate from mixer) (optional, only for when the mixer operator is separate from Boom Op).

- Mic stand w/ boom or C-Stand with Boom Mate

- AA batteries (4 per kit)

- Shotgun mic mounted on camera via a shock mount

- lav mic w/ wireless kit
  - If you plan to hide the mic for a more realistic style, then you will need the following to attach and hide the mic:
    - Overcovers or Moleskin
    - transpore tape

- Mixer/ Recorder (University Zoom F4 or SD MixPre 6)
  - SD Card
  - Headphones
  - Battery Check

- Slate

TECHNIQUE:

Dual System Sound:

Simply put, this means that you will be recording audio with both your camera and a separate mixer/recorder. The idea behind this is to capture "redundant" audio. In other words, we will be capturing the same audio source to more than one recording device. To be further redundant, we will, when appropriate, be recording a single source with both a lavalier mic and a shotgun (boom) mic. Think of this as insurance, if one captured track of audio does not capture the sound correctly, then we have another track to fall back on, so to speak.

For this, check the following:
- Audio is set to record on your camera's internal mic, or any external mic you have   connected to your camera - this is known as a Scratch Track
- You are set to record on your mixer/recorder

RODE VIDEOMIC GO (external on-camera mic)
- The benefit of this mic is that it is directional, whereas camera's internal mic is meant to pic up all sounds, not just those coming from a speaker, or object of focus.
- However, do not rely on this mic to provide you with usable, quality audio. Often, the proximity of the camera to the subject is too far for this mic to pick up good levels of sound.
- Make sure mic is securely plugged into the camera's "mic" input.
- Depending on the scenario, you will need to set audio levels manually within the camera's menu (see manual).

LAV KIT*:*
- each Lav kit consists of a transmitter (TX) and receiver (RX)
- check that both RX and TX are in sync (if not, use sync setting on RX (hold to TX) to do so)
- plug Lav mic into TX
- plug RX into Mixer input
- Adjust TX input level (sensitivity) (start around -20) (have talent speak into mic while setting levels - not all voices are created equal).
- Adjust RX output level (start around 0)
- Adjust mixer level accordingly - Your goal here is low signal to noise ratio. If you're hearing a lot of background noise, you'll need to readjust the sensitivity and output of your wireless kit.
- Your best preamp will be in your Mixer, so do not boost your RX output level too high
- Apply mic to talent
- Test and adjust levels

SHOTGUN MIC (Boom) w/ Headphone Monitor
- Connect shock mount to boom pole
- Attach shotgun mic to shock mount
    - Attach wind protection if needed
- Connect XLR cable 1 to mic (female)
- Connect XLR cable 1 to Headphone Monitor (male)
- Test and adjust levels - set phantom power from headphone monitor to On
- Connect XLR cable 2 to headphone Monitor (female)
- Connect XLR cable 2 to mixer (Male)
- Test and adjust levels - phantom power from mixer turned Off
- TIP - to avoid ear or mic damage, turn gain all the way down when inserting XLR into mixer

SHOTGUN MIC (CAMERA MOUNTED)
- Connect shock mount to camera using cold shoe connection
- Attach shotgun mic to shock mount
    - Attach wind protection if needed
- Connect XLR cable to mic (female)
- Connect XLR cable to camera (male)
- Test and adjust levels - set phantom power to On
- TIP - to avoid ear or mic damage, turn gain all the way down when inserting XLR into mixer

MIXER:
- Format SD card if needed (should be done prior to arrival on set)
- Create folder for project, and choose how you would like your files named (date, numeric, text, etc) (should be done prior to arrival on set)
- be sure that you are recording to TR1-6 + L/R - This will give you a separate file for each mono track you are recording, plus the L/R Stereo track.
- SHOTGUN MIC on channel/input 1 *w/ Phantom Power enabled*
- LAV(s) on Channel 2 (and 3, etc)
- Adjust each channels Gain, then Trim if needed.
    - Gain is essentially the level at which you will be recording your audio, while trim allows a "fine tuning" of the signal. Not all mixers have this function, in which case gain is only setting regarding a mic's level.
- Levels should average between -12 thru -6.
- Record

Non-Fiction Audio Checklist 2 (Small Set Up 1)
- For both interview and run & gun productions

EQUIPMENT:

- Shotgun Mic
  - XLR Cables (2-3)
  - Shock Mount
  - Wind Protection
- Headphones
- AA batteries (4 per kit)
- Slate
- Lav mic w/ wireless kit
  - If you plan to hide the mic for a more realistic style, then you will need the following to attach and hide the mic:
    - Overcovers or Moleskin
    - transpore tape
- Mixer/ Recorder (University Zoom F4 or SD MixPre 6)
  - SD Card
  - Headphones
  - Battery Check

TECHNIQUE:
Dual System Sound:
Simply put, this means that you will be recording audio with both your camera and a separate mixer/recorder. The idea behind this is to capture "redundant" audio. In other words, we will be capturing the same audio source to more than one recording device. To be further redundant, we will, when appropriate, be recording a single source with both a lavalier mic and a shotgun (boom) mic. Think of this as insurance, if one captured track of audio does not capture the sound correctly, then we have another track to fall back on, so to speak.

For this, check the following:
- Audio is set to record on your camera's internal mic, or any external mic you have   connected to your camera - this is known as a Scratch Track
- You are set to record on your mixer/recorder

LAV KIT:
- each Lav kit consists of a transmitter (TX) and receiver (RX)
- check that both RX and TX are in sync (if not, use sync setting on RX (hold to TX) to do so)
- plug Lav mic into TX
- plug RX into Mixer input
- Adjust TX input level (sensitivity) (start around -20) (have talent speak into mic while setting levels - not all voices are created equal).
- Adjust RX output level (start around 0)
- Adjust mixer level accordingly - Your goal here is low signal to noise ratio. If you're hearing a lot of background noise, you'll need to readjust the sensitivity and output of your wireless kit.
- Your best preamp will be in your Mixer, so do not boost your RX output level too high
- Apply mic to talent
- Test and adjust levels

SHOTGUN MIC (Boom)
- Connect shock mount to boom pole
- Attach shotgun mic to shock mount
  - Attach wind protection if needed
- Connect XLR cable 1 to mic (female)
- Connect XLR cable 1 to mixer (male)
- Test and adjust levels - phantom power from mixer turned Off
- TIP - to avoid ear or mic damage, turn gain all the way down when inserting XLR into mixer

MIXER:
- Format SD card if needed (should be done prior to arrival on set)
- Create folder for project, and choose how you would like your files named (date, numeric, text, etc) (should be done prior to arrival on set)
- be sure that you are recording to TR1-6 + L/R - This will give you a separate file for each mono track you are recording, plus the L/R Stereo track.
- SHOTGUN MIC on channel/input 1 *w/ Phantom Power enabled*
- LAV(s) on Channel 2 (and 3, etc)
- Adjust each channels Gain, then Trim if needed.
  - Gain is essentially the level at which you will be recording your audio, while trim allows a "fine tuning" of the signal. Not all mixers have this function, in which case gain is only setting regarding a mic's level.
- Levels should average between -12 thru -6.
- Record

Non-Fiction Audio Checklist 3 (Bare Bones Set-Up)
- For both interview and run & gun productions

EQUIPMENT:

- Shotgun mic + shock mount on camera

- Short XLR cable (coiled)

- Wind Protection

- Headphones

TECHNIQUE:

Dual system sound is no longer an option when only using a camera-mounted mic. The benefit of this is maximum mobility. Camera mounted shotgun mics offer surprisingly impressive audio. Short shotgun mics, with less directionality, are preferred for this application.

For this, check the following:
- Audio is set to record on your camera's internal mic, or any external mic you have   connected to your camera - this is known as a Scratch Track
- You are set to record on your mixer/recorder

CONSUMER GRADE SHOTGUN MIC (external on-camera mic)
- The benefit of this mic is that it is directional, whereas camera's internal mic is meant to pic up all sounds, not just those coming from a speaker, or object of focus.
- However, do not rely on this mic to provide you with usable, quality audio. Often, the proximity of the camera to the subject is too far for this mic to pick up good levels of sound.
- Make sure mic is securely plugged into the camera's "mic" input.
- Depending on the scenario, you will need to set audio levels manually within the camera's menu (see manual).
- The Rode VideoMic is a popular option

PROFESSIONAL SHOTGUN MIC (CAMERA MOUNTED)
- Connect shock mount to camera using cold shoe connection
- Attach shotgun mic to shock mount
   - Attach wind protection if needed
- Connect XLR cable to mic (female)
- Connect XLR cable to camera (male)
- Test and adjust levels - set phantom power to On
- TIP - to avoid ear or mic damage, turn gain all the way down when inserting XLR into mixer

MIXER:
- Format SD card if needed (should be done prior to arrival on set)
- Create folder for project, and choose how you would like your files named (date, numeric, text, etc) (should be done prior to arrival on set)
- be sure that you are recording to TR1-6 + L/R - This will give you a separate file for each mono track you are recording, plus the L/R Stereo track.
- SHOTGUN MIC on channel/input 1 *w/ Phantom Power enabled*
- LAV(s) on Channel 2 (and 3, etc)
- Adjust each channels Gain, then Trim if needed.
   - Gain is essentially the level at which you will be recording your audio, while trim allows a "fine tuning" of the signal. Not all mixers have this function, in which case gain is only setting regarding a mic's level.
- Levels should average between -12 thru -6.
- Record

Non-Fiction Audio Checklist 4 - Mixer Routing
- For both interview and run & gun productions

Setting output for dialogue recording to Mixer/Recorder:

-If you are recording only two channels (One boom & one lav, or two lavs), use method one.
-If you are recording three channels, which is *preferred*, then use method 2
-If you are using the physical output jacks to plug into a camera's XLR inputs, then you would use method 3

Method 1:

To record two mono channels (ex. Boom & Lav, or two lav), meaning you're only using inputs 1&2, simply set **PAN** of input 1 to LEFT, and input 2 to RIGHT.

- Set **DUAL CHANNEL RECORD** (if available) for both input 1 and input 2
This will record a -12dB version of each input in case either input clips during recording. It's essentially a safety backup of each track. Considering this, err on the side of higher gain while recording.

- Set **RECORDING FILE FORMAT** for recording to your SD card.
  - Choose between mp3, poly .Wav, or AIFF, etc.

Method 2:
To record three mono channels (ex. one boom + two lavs), use the above methods. There will be backups of inputs 1&2, but input three will only have one version. Consider this when choosing what to plug into each input. i.e. using inputs 1&2 for lavs, and input 3 for boom. This will maintain consistency.

Method 3:
To use the mixer as an external input for a camera that has XLR inputs, then you would use the mixer's ROUTING menu (if available) to set what signals come out of the output jacks (on the mixer, these are located on the opposite side of the inputs). This is typically done because the preamps in the mixer are superior to those in most cameras. Also, this eliminates the need to marry the audio to the visuals in post. Remember that you only have the ability to have two outputs when doing this, so actual mixing of signals is required when using more than 2 inputs. For this method:

-pre for track 1 (M1) boom
-pre for track 2 (M2) lav
-pre for track 3 (M2) lav

3. Post-Production

The knowledge and skill-sets associated with Post-Production audio are more extensive than those of production audio, and are therefore best handled by post-production professionals. That said, understanding this last phase can contribute to the success in the other two. Also, with smaller, no-budget projects, the same person may be required to handle all aspects of the video's audio.

The raw elements of audio for video are captured during the production phase. Due to the, at times, unpredictability of recording audio in the field, even under controlled conditions, this practice can result in the raw audio being imperfect, or worse, non-existent. The work of the post-production audio professional is to take what the production mixer has recorded and create, or recreate, the sonic world of the film.

Understanding the basic steps, and techniques, of post-audio can help inform decisions made during the pre- and production phases.

This chapter also contains a checklist intended for those without the budget to involve a post-production audio professional, or those making a short video intended for social media or web-only distribution.

Syncing Audio To Video:

Audio Post-Production for videos of any kind is conducted within Non-Linear Editing (NLE) software and a more specialized Digital Audio Workstation (DAW).

If the project was recorded using dual-system audio, this means that the audio from the mixer needs to be set in sync with the audio and video from the camera. There are a number of ways to do this, and NLEs often have automatic sync options within them.

Because the production sound recorder works with the DP or Director, there should be audio clips for each video clip. This is because each time the director or DP says "action", the audio should be recorded. Similarly, the recording should be stopped each time the director or DP says, "cut." If this remains a constant, even with MOS shots or false takes, then the number of audio files should match your video files. Find an organization method that works for you, but typically these files are organized by day and location.

It is possible to create a multi-camera source sequence, which contains all camera footage (from multiple cameras) synced to your desired sound track. You may have more than one video clip if more than one camera was used during production. For each clip:

- Create a folder within your NLE which contains:

    - Audio from mixer/recorder

    - All video footage (camera 1, camera 2, etc) w/ scratch track audio

Scratch Track:

The purpose of recording a scratch track during production is primarily for the purpose of sync. Because it is inherently in sync with your visuals, the NLE uses it, by matching waveforms, to sync audio from your mixer/recorder to your scratch track, thus aligning the separately recorded audio to the visuals.

This should be a first step to any post-production workflow. Rather than doing so piecemeal, syncing first enables the editor to sync large pieces of footage at once.

NLEs vary in how this is done, so please review your NLE or DAW of choice.

Timecode:

Some professional mixers and cameras have the capability of Timecode. This technique utilizes an external clock to sync separately recorded audio to video by "burning" in the same timecode to each. This is by far the easiest way to sync, but it is not always available, and is an extra cost. (Common Brands: Tentacle).

Manual Sync:

While the least ideal, it is possible to use a slate, or scratch track, to "nudge" your mixer recorded audio in to place. This technique is time consuming and imperfect.

Fixing Bad Audio:

There is little one can do to fix poorly recorded audio that is either too low or too high, or recorded with ambient noise. This is because the information sampled from the analog sound is, simply, incomplete. It is not always the fault of the sound recordist. Sometimes there is interference, from a signal or clothing, and a moment is unintelligible. Below are a few techniques used to address bad audio.

Noise Reduction:

This process uses a noise print of the ambient noise floor of a recording, and eliminates these frequencies throughout the track to which it is applied. Unfortunately, because some noise broadband, meaning they exist throughout the frequency range of desired sounds, this may result in "digitized" or "metallic" audio.

Third party companies, such as iZotope, do make quality noise reduction plug-ins, which work with varying degrees of success.

Foley:

This technique is used to enhance, replace, or repair audio that may be imperfect in your recording. This is reserved for diagetic sound (within a scene), other than dialogue (footsteps, doors opening, etc.). It begins by spotting such instances, then replacing them with a desired sound performed in sync with the action.

Automatic Dialog Replacement (ADR):

This technique is used to replace any dialogue that is imperfect within a scene. Similar to Foley, it begins with a spotting session and is completed by having the original talent recording their lines, while directed, by syncing their lines with the original video.

Mixing Checklist:

The following checklist is designed to be used as a simple approach to improve the audio of a non-fiction project, and therefore focuses mostly on dialogue and ambient sounds.

Non-Fiction Audio Checklist 5 - Basic Post Production

Filters and Processes:
- Low Cut Filter (or High Pass Filter)
  - This removes or reduces low frequencies from 20Hz to 100Hz. The human ear can hear between 20Hz-20kHz. Handling noise, wind, and other unwanted low frequencies exist in this range.

- High Cut Filter (Low Pass Filter)
  - The opposite of a low cut filter, this is used to cut frequencies between 15 - 20kHz.

- De-Esser
  - Certain sounds made by the human mouth displace more air than others. This filter is quite good at eliminating the noises associated with these words containing sibilance.

- Compression
  - Dynamic range is defined as the difference between the softest sound and the loudest. While dynamic range increases the quality of a visual image, a sound is only as good as the speakers that amplify it. By reducing the range of frequencies, a track become "punchier". In other words, the essential aspects of the sound is accentuated, while the frequencies which tend to give is a unique character, are cut. Compression is used to increase intelligibility of dialogue and provide an overall "sheen".

- EQ
  - The human voice exists within the 2-4kHz range. By using the EQ to boost within these ranges, your dialogue may become more present.

Editing:
Stereo vs. Mono:

Most of the microphones we use, especially shotguns and lavs, record a mono channel, you will need to "split" this singular track into stereo. While not true stereo, this is a common practice, as few productions use stereo mics.
Your sequence most likely contains stereo audio tracks. This can changed within sequence settings.

If your soundtrack is only audible in one ear, you most likely only have a mono track set in a stereo channel. You will be able to "FILL LEFT" or "FILL RIGHT" within your menu, which duplicates the existing track and nests it within the empty channel.

Transitions:
Because audio is edited to fit with visuals, at times there are imperfections. Also, we typically don't need every word someone has said. While visual jump cuts are taboo, audio jump cuts are common, contain crossfades.

- Crossfades - Use these to mask the transition from one audio clip to another. The length is adjustable by frame, and even though you may not hear any "fading", they are helping to reduce the possibly of a clip.
- Fades - Use these when there is no track to crossfade with. Most likely your audio moves to another channel, which potentially leaves a significant So that there is no "clip" or awkward transition, these are used to mask any abrupt audio changes.

Silence & Room Tone:
In film, as is true in real life, there is rarely a moment of true silence - a time period where there is a 100% absence of sound. When editing together select pieces of dialogue or audio, you will need an ambient track, or pieces of room tone to fill the gaps, so to speak. When looking at your soundtrack, at no point should the track be left empty.

Room tone should be recorded during the production phase. While you can return to a location to collect it, there are variables which might have changed. This is a moment, typically a minute, during which the sound recordist asks all on set to remain silent. During this time, you will essentially be recording ambient sound, or what the space sounds like rather than those who are in it.

Mixing:
Essentially, your goal is to maintain a level of consistency throughout the soundtrack. This doesn't necessarily mean to ensure all audio is at the same volume, but rather to ensure that the levels of each track are correct in relationship to one another. In other words, make sure sounds that are loud or quiet are supposed to be loud or quiet. Importantly, if a sound or voice is loud after a moment of quiet, it will not have to be as loud to stand out if it comes after a moment of normal volume. This process is less technique, and more listening and adjusting.

Loudness Meter/Radar:
This is used to gauge the loudness of your audio, and it's consistency, according to broadcast and cinema standards. This is a useful tool, that should serve to be a final step prior to export.

A Word on:
Normalization:
Normalizing increases the gain of all clips within your soundtrack to a set level. The idea is, again, to reduce dynamic range, but to also reach a standard. This is a bit like using auto-focus. While results can be impressive, it is more likely to be imperfect. It is best to manually set gain on individual tracks.

Panning:
There is a tendency to want to pan a specific speaker's dialogue to their location on the screen. This can be distracting - avoid this. Dialogue and narration should remain in the center channel, with music typically being panned to the extreme left and right. This helps to place the dialogue within a scene. A Stereo Expander can be used to assist with this effect.

4. FAQ

● What should my gain levels be?

Meters on mixer/recorders vary, but average levels of -12 thru -6 are ideal because this allows for headroom should the speaker become louder. If dBs are not available on your meter, then attempt to achieve an average gain that read 1/4 below the top "peak" line.

● Should I adjust the gain during recording?

This depends on the mixer and the sound source. Dialogue remains rather consistent, so if you achieved the correct levels while testing before recording, then you should be able to "set and forget" your levels.

Hanging on every word and constantly adjusting gain should be avoided. This causes uneven levels in the recording and can result in bad audio.

In short, be attentive and try to anticipate changes. Also, if available, trim allows for smaller, less noticeable adjustments in gain, and can still record both levels to your recorder.

● Can I just record audio to my camera or phone?

Yes, you may, but the quality will be poor and reflect as such on your project.

● What if I don't have a boom operator? Can I just use the mixer and hold the boom?

Yes, this is fairly common, but does take some practice. In fact, controlling the boom and mixer solo is preferable to asking someone with no audio experience to be a boom operator. You should take the time to teach a friend the basics before throwing them into a situation in which the expectations are greater than their skill level.

● I can see levels, but I can't hear anything. What's wrong?

Many mixers have separate volume control for the headphone output. This should be the first thing you check.

● Is gain the same as volume?

No. Gain refers to the input level, while volume refers to the output level.

● What makes some audio equipment expensive, and is it really better?

Although expensive, audio equipment maintains it's value.