

# Recording Vocals in a Project Studio

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## Introduction

The vocals are the most important element in a recording to achieve a professional sound. That is why in professional studios the most time is spent nailing the vocal sound. If ever there was a time for you to take the effort to get a good tone, this is it. In this clinic I will take you through the steps needed to get the best vocal sound possible.

## The Room

Before the voice even hits the microphone the sound has been altered by the room. Smaller rooms like closets and bathrooms will have a greater impact on the sound than a larger open room. The 'room sound' is due to reflections. In a smaller room, like a bathroom, the reflections are a lot stronger and there will be more room sound in your recording. While some great vocals have been recorded in a bathroom, the engineer was looking for a sound that could only be achieved in a small, highly reflective room. This is not a good starting point for a vocal recording. A good place to start is a couple of feet away from the center of the room and away from all computers, fans, or anything that generates noise. Here the reflections will be as minimal as possible and the noise as low as can be. Avoid the center of the room and walls or corners as these areas are the worst for recording.

Many people try to tame these reflections by lining a whole room in foam, egg cartons or carpet. The problem here is that foam and carpet only cut reflections from the mid frequencies and up, leaving the lower frequencies to reflect about the room unstopped. This leads to a muddy vocal recording. By only covering up parts of the wall (often done in a checker board pattern) you will leave enough high frequencies to keep a clean sound.

If you are looking to isolate your vocals as much as possible, there is an easy, relatively inexpensive, and portable way of creating a vocal booth. By using a device such as the SE Reflexion Filter, you prevent reflections from hitting the microphone from most directions, leaving only the area behind the singer to allow reflections in. This can be corrected by hanging a heavy blanket behind the singer.

Now that we have the mic placement figured out, let's choose a mic.

## The Microphone

Along with the room, the mic will have a profound impact on the final sound. Choosing a microphone can be a daunting task, with prices ranging from \$19 to over \$5,000. So how do you choose the best microphone to record with? The first consideration is which type of microphone will give you the sound you are looking for. There are three main categories of microphone: dynamic, ribbon, and condenser.

### *Dynamics*

Dynamic mics are great for the stage, but are rarely used for recording vocals. This is due to a number of reasons. First and foremost is the sound. The high end does not sound as 'open' as vocals you hear on commercial recordings and due to the weight of the voice coil the sound is not as detailed. The finer details that take a vocal recording to the next level are lost on the dynamic mic. Secondly, the output of a dynamic microphone is a lot lower than that of a condenser, forcing you to turn up the gain of your mic preamp; and as a result, increase the noise levels. A higher quality mic preamp will help here. All that being said, artists like Bono from U2 and Tom Petty have recorded the majority of their studio albums using the famous Shure SM58, so don't be afraid to try one out if you have one available, it just might be the right sound. Popular dynamic mics for recording vocals include the Shure SM58 and SM7b, and EV RE20

## *Ribbons*

Ribbon mics are making a come back. After years of only a small handful of companies with stock, ribbon mics can now be found in nearly any music store from a large range of manufacturers. A ribbon mic is not the only mic you want to own, but makes a great second or third mic as there is nothing that sounds like it. Ribbons are famed for their 'warm' sound which is achieved by a gradual high frequency roll off. This roll off on the high end also means that a lot of the presence that people like in a good recording will be lost. A gentle EQ boost around 7-12khz should put a little bit of sparkle back in the sound while keeping the warm tone. Like the dynamics, these mics generally have a very low output - even lower than most dynamics, so make sure you use a decent pre amp. Popular ribbon mics include Royer R-121 and Beyerdynamic M160.

## *Condensers*

Condenser mics are probably the go-to vocal mic in 95% of vocal recording situations. They can be described as having a smooth, open, high end, and capture the most detail of any mic. Please note: all condenser microphones need phantom power. This is supplied by most modern mixers and interfaces. Condensers come in a number of flavors, tube or transistor, and large or small diaphragm. For vocals I will almost always use a large diaphragm as it tends to warm up the voice. Small diaphragms are great for capturing the absolute most detail and most even frequency response, which make these mics ideal for acoustic instruments. The difference between tube and transistor mics is that tubes can be used to warm up the sound going into our system, whereas the transistors will remain clean. I like tubes when recording directly to your computer because as soon as the signal converts to digital it becomes much more difficult to add that analogue warmth our ears love to hear. Some well placed plug-ins can help, but nothing beats the sound of a tube. A Condenser should be the first mic you purchase for recording vocals. These mics are now available at every budget so figure out how much you want to invest and then ask someone to show you the best mics in that price range. Some popular tube mics include the Rode NTK and ART M-four, popular transistor mics include Rode NT2a, AKG C414, Audio Technica 4040, Neumann TLM103, and many many others.

As a side note, the microphone preamp will also have an affect on the sound. This is going to make less of a difference than changing the microphone, but you should know it exists. For the purpose of the clinic I wont be going into mic preamp selection but as with microphones, any preamp used properly will deliver good results.

## **Setting Up**

Now that we have selected our microphone, it is time to get set up. As discussed earlier, you want to be a couple feet from the center of the room with the capsule of the mic aimed at the singers mouth. At this point there are a couple of things that you can do to get a real pro sounding recording.

### *Pop Filter*

First and foremost, you should be using a pop filter. A pop filter blocks the bursts of wind that escape the singers mouth on anything with a 'b', 'p' and sometimes 'f' in it. These bursts of wind will hit the diaphragm of the mic and cause distortion. This can not be saved in the mix, so don't forget about the pop filter. To use a pop filter, attach the clamp onto the stand and place the filter about three inches away from the front of the mic so that the filter is centered around the diaphragm. For best results, have the vocalist stand about 6 inches away from the pop filter. If you don't have a pop filter you can set the mic up so that rather than singing straight on the singer is singing over the mic (or below if you have the mic hanging upside down) with the mic angled towards the mouth. This will help the rush of air from distorting the microphone.

## *Shock Mounts*

Shock mounts are another vital piece of equipment for recording vocals. These help prevent any thuds, knocks or rumbles from being picked up by the microphone. By preventing the vibrations in the mic stand from reaching the mic you will eliminate another source of noise in your recording. Most condenser microphones will come with a shock mount. If not, there is a wide range of aftermarket options available. Should you find yourself recording vocals and don't have a shock mount, don't fret, you can always place a piece of foam under each leg of the mic stand. This is not as effective as a proper shock mount, but it will eliminate some of the noise.

## *Filters and isolation*

As mentioned before, a filter around the microphone such as a Reflexion filter will go a long way to cleaning up the vocal sound. If you have one, use it. If not, do your best to get a heavy blanket or rug behind the singer to prevent reflections from coming over the shoulder into the most sensitive part of the mic. Some blankets round the front of the mic will also help if you don't have a filter, however don't put them too close as this will colour the sound.

## *Headphones and Setting up a Headphone Mix*

The singer will need to hear themselves and the music. You “can” do this with speakers by panning everything mono, reverse the phase of one speaker and place the microphone at the exact peak of an equilateral triangle with the other two points being the speakers. Being out of phase the sound waves will cancel at the mic, but be audible to the vocalist. This will only work properly in a perfect environment with very limited reflections. Otherwise you will get a lot of bleed from the speakers or the volume will be so low the singer isn't really hearing much of anything. Not to mention the dangers of feedback from having an open mic in front of speakers. There is a better way.

Closed design headphones allow the singer to hear themselves and the music at whatever volume they wish. I suggest getting a good set of headphones for this, as you will be able to get much louder volumes without bleed and the improved sound quality makes it a perfect tool for checking bass while mixing in small bedroom setups. A small amount of bleed is acceptable as it will be audible only when the singer stops, and that is easy to edit out.

What the singer hears in their headphones is nearly as important as the choice of mic or placement in the room. A bad headphone mix will lead to a bad performance and a bad performance can't be fixed with any software or plugins

## *Latency*

The first problem that is often encountered in computer recording is latency. Latency can be defined as the time it takes a sound to enter a microphone and exit out the speaker. In a live sound environment this does not exist. However in a project studio there can be a constant struggle between latency and cpu load. The latency in a computer system is determined by 2 main things: your audio drivers and your audio buffer setting. To make sure you have the lowest latency from your audio drivers make sure you have the most updated firmware and drivers for your system.

Your audio buffer settings are often tucked away in a menu inside your DAW (Digital Audio Workstation). Basically the buffer size is how many samples your computer processes before playing back the audio. A higher buffer gives your computer more time to get through the complex calculations of audio plugins. However, the delay between speaker and mic will be greater. A small buffer size is much better for latency as the

delay is much shorter; however, this does put greater load on your cpu. If you are not able to get down to 128 samples for a buffer, try saving your session and closing the DAW as well as any other programs running on your computer to free up some processing power. Some DAWs allows you to freeze a track. If yours does, use that and freeze any tracks with plugin's on them. If yours does not have a freeze function, bounce the tracks down to a stereo track and disable the tracks that you bounced. Do not delete them, as when you are finished recording you can increase the buffer and go back to working with the original tracks.

There is a third way of reducing latency and that's by working at a higher sample rate. Sample rate is how many times a second the converter measures the voltage of the audio signal. Each measurement is called a sample. Therefore, a higher sample rate means it takes less time to get to the number of samples your buffer is set to. The higher sample rate however will put a strain on your system and not all sound cards are able to work at higher sample rates.

All that confuse you a little? Well there are other ways around latency. In pro studios, all audio being recorded comes through a mixing board before being sent to your computer. The audio routed to the headphones comes from the mixer and not the computer, thereby bypassing the driver and buffer all together. You just need to be sure to mute the track on the computer or you will be hearing the vocal both in realtime and the delayed signal. Some interfaces have incorporated this idea into their routing with a software mixer provided by the driver that routes incoming audio to the outputs before it reaches the audio software. This means the only latency is from the driver itself. Again, mute the track in your software to avoid hearing the signal twice.

A final way is if your interface has a mix or monitor knob on it. By setting the knob all the way to the computer side (refer to your manual for your interface) you hear nothing but the audio coming from the software, and if you turn the knob all the way to the other side you get nothing but the audio entering the interface. Mute the vocal track in the software and adjust the knob so the singer is happy with the balance between themselves and the music.

A few last notes about your headphone mix. Try to keep highly percussive sounds lower inf the headphones while tracking vocals, as the snare and cymbals will bleed the worst through headphones. A lot of singers like to sing with a little reverb on their voice. Set up a send from the vocal track (prefader if you have it muted due to latency) and set up a reverb effects track with a good vocal reverb (I like plates for this). Adjust the levels so the singer is happy, but the reverb is not too loud as this can lead to a singer under singing and getting a little off pitch, a little reverb though will often help correct these problems. Don't worry about the latency here as the reverb can be delayed without many ill effects to the performance.

## **Recording**

### *Levels*

The most important thing about the recording process at this point is setting the recording level properly. Now the levels you are going to shoot for will vary depending on the bit depth you are recording at. 16 Bit loses a lot more detail at lower levels so you want to shoot for as high of a level as you can without distorting. I usually look for averaging around -6 dBfs, but be alert for any clipping distortion. When you distort a digital recording it is not a pretty sound, definitely not one you want in your mix. This can make things tricky as a singer must be more controlled with their part and may feel like they have to hold back instead of letting loose an amazing vocal part. For this reason (and a couple others) I always record at 24 Bit. If your sound card cannot do 24 Bit, this would be the next piece of gear I would look at upgrading. When recording at 24 Bit I typically shoot for around -12 dBfs with peaks topping at -6 dBfs. The increased detail of 24 Bit means you can record quieter with less noise and avoid clipping on that perfect take. Levels can be brought up after the take.

## *Tracking*

Now that levels are set we can start recording. There are many different schools of thought on recording vocals. If you are looking for the most professional sound I suggest you read a couple books or articles on the topic and try out a number of methods, then practice with the method that works best for you. Some vocalists are used to recording in a particular way, so be open to changing how you track the vocals to get the best performance.

This is how I like to work. I will run through the chorus to set my levels, usually giving the singer the last couple bars of the verse so they can get ready. With my levels set I jump to the start of the song and get the singer to do one full take of the song (in genres that strain vocalists, offer them the choice of doing it verse by verse as you don't want to wear them out on the first couple takes). After the take make sure that you say something to the singer – anything. After a performance, it is very unsettling to a singer if the engineer just sits there and clicks away. Make sure to communicate. This will loosen up the singer and often the next take will be better. From this point I will normally get the artists to sing through the whole song once or twice more, recording on a new track or in a 'lane' if your program supports them. If you are not familiar with the song this is the perfect time to really get to know and understand the song. After these takes sit down with the singer and play back the three takes making notes as to which parts you like.

## *Overdubbing*

Overdubbing is a big part of pro studio vocal sound. Overdubbing is basically recording a small part of a song over a previous take. These could be as small as a word or as large as a verse. There is an easy way to do overdubs. Simply put the track cursor where you want to start recording and set your preroll for 2 to 4 bars. Tell the singer to sing along during the pre roll, if not the volume will likely drop and the pitch will be out when they start singing. Hit record and the software will play for however many bars you selected in your pre roll and then start recording when it reaches your cursor. When the take is over hit stop and listen back.

## *Comping*

Now it is time to compose, or 'comp' the vocal part. Comping consists of taking parts from one take and adding it to another. It is not unusual in a pro studio for the engineer to comp single syllables into a line. So don't be afraid of taking that end syllable with that wicked slide from one take and add it to another. With a decent singer staying in the same spot on the mic the transition should be seamless. Go through verse by verse and comp the vocals together, overdubbing as needed. Its always a good idea to get the vocals for a song done in one day as the vocalist may sound different any other day and getting parts to blend is difficult to do when the mics have been moved, the singer had a cold or was out drinking the night before.

When you have what you believe to be a solid vocal part, take a listen to the song in full and listen for any weird spots or anything that sounds unnatural. Then listen to the first or second take in full and make sure you are not corrupting the feeling with all of the edits. If you are, thin out the number of edits until things sound natural.

## **Edit**

Truth be told, with the comping done most of the editing is out of the way. The first step in editing is to check the transitions between the edits you made while comping the vocal track. To do so, solo the track and listen for clicks or pops between edits. If you hear any, apply a crossfade between the two edit points to remove the sound. From here I listen for any noises between words or lines, most commonly it will just be sounds from the vocalist

that don't belong - clearing throats, lip smacks, etc. At this point many people will take out the breath sounds thinking that it does not need to be in the track. This often leads to an unnatural sounding vocal part and is a dead giveaway that the part was heavily edited. If the breaths are particularly loud bring the volume down either with automation or by separating the breath and dropping the gain for that clip.

Now is the time that I look at timing issues, if the vocalist came in early on a word you can make cuts on either side of the vocal and slide it into time with the song, applying crossfades at either end as when comping the parts. Take care not to over correct as you end up with a lifeless, robotic vocal part.

If tuning vocals is your thing, now is the time to do it. I won't get into how to do this as each plug in works in its own special way and would require a clinic on the topic alone. Search YouTube for video tutorials on the subject. There is a lot out there that can help.

### *Sibilance*

Sibilance is the hissy 'es' sound in words and is an issue for some vocal parts. Much like tracking vocals there are a number of ways of handling sibilance. The easiest way (not necessarily the best way) is to use a de-essing plug in where you twist a couple knobs and dial out the 'es'. The way I prefer to work on a track is to cut out each 'es' onto a separate track with the same plugins and eq out the harshness just a little and lower the send to the reverb. This method gives me the most control and the most natural sound, but does take longer than a simple plugin. An alternative to creating a separate track is to automate an eq plugin to bypass when not on an 'es' and to turn on during. You can achieve the same results, but I find that I still have more control when its on a separate track.

The final edit that I sometimes make is to separate the chorus from the verse vocals onto separate tracks. This is really useful if the verse and chorus have completely different sounds. . This way you don't mess around with the verse sound while working on the chorus. Which is where the mix comes in.

### **The Mix**

This is the part of the process that will take the most practice and the most careful care and attention. Mixing is, at its most basic level, the balancing of levels between parts. This can be done using just the volume fader on each track set so you can hear every part. But this will not make a great mix. To get a great mix you must use a number of tools. Mainly panning, compression, EQ, reverb/delays, and volume automation. There are many other tools and effects which have a place in songs, but these are the ones you will be using in nearly every song you record. Whole books are written on mixing and I suggest reading them, I will only be giving you some starting points for mixing. It's up to you to play around and figure out what works best.

Before we go changing things I always load up a similar song by a professional in my session and have it muted at the bottom of the tracks. By listening to this you have something to judge your mix against. Listen for the balance between the vocals and the rest of the instruments, how much reverb are they using, where does the bass sit? Pros mix tracks that sound good on most systems, amateur mixes sound good on only one or two. You can get a professional sounding mix by referencing commercial tracks and listening to your mix on as many different systems out there as you can. With that covered lets get mixing.

### *Balance*

I generally get the drums and bass sitting well first then add the vocals to a mix. If the track is heavily vocals driven then consider starting with the vocals. The first step is to find a good volume for the vocals. You

want each word to be heard clearly. If you find a level where every word is clear except a couple leave it there, as future changes will help those sections. As a rough estimate, with the vocals soloed I should be averaging around -6 dBfs on the meters. This is not a hard and fast rule as the average level varies depending on the song and the genre.

### *Panning*

Once the level is set you need to think about where to place the sound in the stereo picture. As a rule lead vocals are almost always dead center, with harmonies or doubled parts panned left and right. You can stray from this rule, but there must be a good reason for doing so as it will not sound like a professional recording if the vocal is off center.

### *Compression*

Unless there is something drastically wrong with the tone of the vocals I will turn to compression next. Compression increases the volume of a track by making the loud sections quieter and the quiet sections louder. Compression can be a bit of a confusing topic for people. Changing presets on a compressor often results in no noticeable change of sound. This is because no matter what the preset is you will need to adjust the threshold so that gain reduction is occurring (typically there will be a meter in the plugin). Threshold is the level where things start to get 'turned down', the lower the threshold the more that will get compressed. Many plugin's will have good vocal presets, but will require you to set the threshold so there is about 4-6 dB of gain reduction. If you don't have any presets or want to try setting it up yourself I recommend starting with a 4:1 ratio with medium attack and medium release. If the volume of the vocals seems to decrease, the plugin does not have automatic make up gain and the gain will have to be increased to bring the vocals back into balance. As with everything else play around with this, sometimes more extreme settings will sound great.

### *EQ*

Next in my vocal chain is EQ. You can think of EQ just like the tone knobs on stereo systems. Some will have just a treble and a bass knob, while others can have more advanced multiband EQ's. My first step is to put in a high pass filter (also known as a low cut filter) and set it somewhere around 70-90 Hz. This will take out any low frequency hum and most rumbles but leave the voice intact. This is not always needed, but the low end of the mix is usually the most in need of attention and I like to remove what I can at every step. The rest of the EQ process will depend on the genre, the song, the performance and so on so I can only give you some general guidelines here. It is always better to cut (turn down a frequency) than to boost (increase a frequency). The more you boost the wider the Q (bandwidth) should be set. Boost a little at 125 to 250 Hz to emphasize the voice fundamentals and make it a little more "chesty" sounding, while boosting 2 to 4 kHz brings out the consonants and makes the vocals seem closer to the listener. Those are the 2 main ranges to look at, however adding some 'air' at 12 kHz can add a nice crispness to the recording.

Between the compression and the EQ you should have a good sound, now it is time to add the finishing touches. Reverb, delay and volume automation will take the vocal up to the next level. Reverb and delay play with the spacial aspects of the recording. The more isolation you used the more important they become. If you had recorded the vocals in a large open room with no filters there is a good chance that there is already reverb on the recorded vocals as they will sound like they were sung in a room. However if you used a filter around the mic and had something behind the singer, the vocal will sound very dry and almost unnatural. By adding reverb or delay you will place the singer in a room. Whether its a small room or a cathedral depending on the settings.

### *Reverb and Delays*

Reverbs work well for most kinds of music, with the exception of metal and some other genres. The sparser the mix is the more reverb you can put on the voice without turning things into mud. However if you

have a lot going on in the mix, say 2 guitars, horns, key, bass and drums, a lot of reverb may remove some of the definition of the song. To set up a reverb you should create an auxiliary or FX track, insert a reverb plugin and select a preset. I like plate reverbs for vocals, but the decision of reverb depends on the song. Set the input to the auxiliary track to an open bus and then using a send from the vocal track, increase the volume sent to the reverb until a good balance is met. I will often EQ out the low end from the reverb signal as it can get really muddy fast. Refer to the manual for your software for exact details on setting up a send effect.

Setting up a vocal delay can often take more tweaking and adjusting than a reverb, but achieves a very different effect. Use the same set up as the reverb for the delay but insert a delay plugin instead of reverb. At this point there are many options as to what kind of a delay to use. One common setting is a slap echo made famous by people like Elvis and Jerry Lee Lewis. Most plugins will have a preset for this, just adjust to taste. Ping pong delays are also very popular. Here the delay ping pongs back and forth between the left and right speaker. There are so many options with delays it is impossible to cover them all with this clinic so I will give you some basics to work from. Delays will sound very obvious and cheesy if the delay is not in sync with the song. If you have been recording to a click track you can use the sync function or just punch in the tempo of the song otherwise you can use the tap tempo function (if your delay has one). Once you have it in sync you can try increasing the delay time by 20-40 ms so that the delay falls a little on the backside of the beat. Increasing the feedback control will extend the length of the delay, making things sound larger. Be careful with this setting as you can muddy up a mix really quickly. You can also try using the delay only at the end of sections by automating the bypass feature of the plugin. Have fun with delays, while they are not as easy to get sounding good in a mix the results can be worth the effort.

### *Automation*

The final touch on the vocal track is automation. When I speak of automation and vocals I am talking about automating the volume. You can automate nearly anything in most DAWs, but how each DAW handles it will vary so read the manual on automation. They will likely use volume automation as an example as it is the most basic. The purpose of automating the volume is to ensure that each syllable is audible and intelligible. Go through and listen for any words that are not as clear as others and raise the volume on those words. Also pulling down loud words and syllables can even out the performance and allow you to get a little more overall volume from the track. Once you have finished this. Play back the track and take a listen. They walk out of the room and listen again, by leaving the room you can often hear things that stick out or are hiding better than when you are in front of your computer. Make any changes to the vocal part as needed and continue on with the rest of the song.

As you continue to record more and more song your skills will grow, so don't be discouraged if your first couple tries don't work out the way you wanted. Just try and try again!