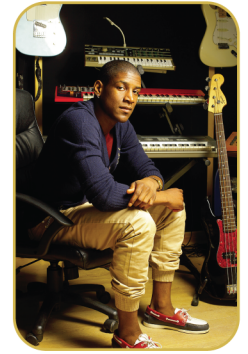




# Learners Handout

## UNDERSTANDING A MUSIC PRODUCTION STUDIO & ITS FULL POTENTIAL

Music production has changed massively over the years in terms of workstations, procedures and platforms, but essentially the theory and practice has and most likely will remain the same. If you understand the basic principles and theory to be applied you should be able to use any platform (software or hardware) for music production and make music that you want in any way.



**Your Music Workstation: What's needed to start producing music?**

### IDEALLY

**A Computer – Laptop or Desktop, PC or Mac** (Mac typically used as a music industry standard)  
**Software/DAW** – Examples: Reason, FL Studio, Logic Pro, Ableton, Akai MPC or equivalent hardware with a built in sequencer function  
**Audio Interface**  
**Midi Keyboard Controller**  
**Headphones**  
**Studio Monitors (Studio Speakers)**



### BARE ESSENTIALS

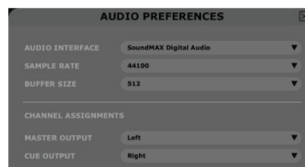
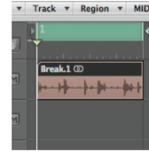
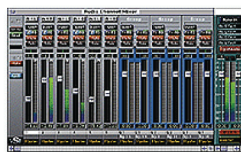
**A Computer – Laptop or Desktop**  
**Software/DAW** – Examples: Reason, FL Studio, Logic, Ableton  
**Midi Controller**  
**Headphones**



Regardless of whether you use hardware or software to produce music (software being the dominant platform to make music on these days) you should typically always be able to find and use the items/functions listed below, to help you begin using the platform chosen and creating music accordingly.

### Typical Music Studio/DAW Components:

1. Audio Interface selection
2. Mixer
3. Sequencer
4. Audio Loops
5. Sampler (Sound Module)
6. Synthesizer (Sound Module)
7. Drum Machine (Sound Module)
8. Effects Units
9. Dynamics Units



## AUDIO INTERFACE/SOUND CARD - Heart & Lungs of Studio

Probably the most important part of any studio is the ability to record and convert the sound that you can hear/create into a means to play back and hear again and again. Much like the heart and lungs of your studio an audio interface lets you pump sound around the studio reliably, much like your heart, as well as convert the sound as it records at high quality into a digital format that can then be played back time and time gain at high quality. Always invest in a reliable high quality audio interface if you can as they will have better connections and conversion rates and create less issues when recording or using your DAW typically.



## MIXER - Used to mix and allow sounds to be heard

Mixers are used to help put multiple sounds together when making music. They also allow you to control every sound's volume, placement (pan) and apply or use effects if so desired as well. Whilst mixers usually intimidate most with all their knobs and buttons they are simple to understand when you note that the same thing is happening on each channel and then you have the ability to control the volume and other functions as you see fit. See the numbers not the knobs and you will go far!

## SAMPLERS - Great for instrument sounds

A sampler is an electronic musical instrument similar in some respects to a synthesizer but, instead of generating sounds, it uses recordings (or 'samples') of sounds that are loaded or recorded into it by the user and then played back. They are highly useful and creative tools for recording sound and then editing the way you hear it back. All samplers should allow you to record, edit and play back sound.



## SYNTHESIZERS - Great for electronic sounds

A synthesizer allows you to create sounds using 1 or more electric signals (modulation). Synthesizers are used widely across Electronic Dance Music and Pop genres and have a massive world of potential for application and use. Dubstep and Trap are big users of these devices and have also reinvented their uses again for music production styles and techniques. Great for basslines, pads, leads and arpeggiated sounds particularly.

## DRUM MACHINES - Great for percussion and drum sounds

Drum machines were invented by rhythmless people in the 70's to aid and replace the need for a drummer to be present in a studio when recording. They are designed specifically for drum and percussive programming and require no rhythm typically to programme them. More advanced drum machines (MPC, Machine, MV8000 etc) allow you to tap out your own rhythm using pads which have been revolutionary in terms of drum programming techniques in recent decades.



## LOOPS - Great for quick ideas and added twists

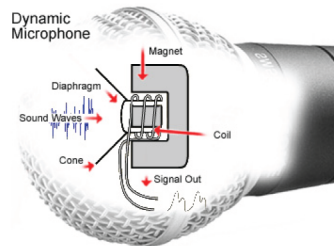
A loop or loop player is a specific piece of equipment or audio that has been prepared to be played over and over again as a looped sound and can be altered in tempo at any point. They are incredible for the beginner or someone suffering from writers block as they could offer an idea that can be expanded upon or reworked again. It is advisable to make sure you use a royalty free loop if you plan to push the song and avoid extra royalties being split and allocated. Sometimes they can also be used to add that last missing ingredient to add that final touch to a song too.

## HOW A MICROPHONE WORKS

A microphone is a transducer that converts sound (air vibrations) into an electric signal that can then be amplified, transmitted or recorded. Microphones all work around the same principle, a section of the mic will detect and read the air vibrations and then send that information into the next part of the sound circuit (usually a desk or a compressor) as an electrical signal. Although there are many types of microphone available, there are 2 main types that are commonly used for home and professional studios alike.

## DYNAMIC MICROPHONE

The most common microphone is the dynamic microphone. Dynamic mics are used heavily for the live performance industry though they are used extensively in studios as well. Their strength lies in their durability and the fact that they do not pick up too much spillage from other sound sources (Crowd, earphones etc). However dynamic mics do not usually have a large frequency response (the range of frequencies that the microphone can reproduce).



Gold Plate



## CONDENSOR MICROPHONES

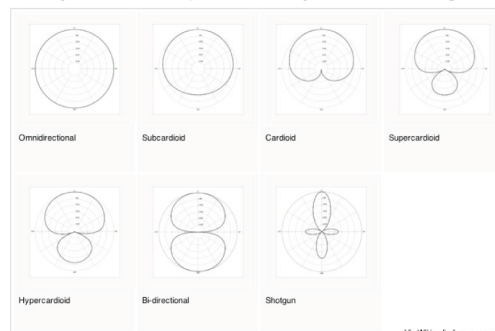
For those wider frequency needs engineers tend to use condenser microphones. Condensers work by recording the sound vibrations on a very fragile (usually gold) plate inside the microphone. Due to its fragility this type of microphone is rarely used for live applications but is used extensively in studio situations.

## POLAR PATTERNS

Another key aspect of microphones is their polar pattern. The polar pattern is a visual representation of the directions from which sound is best picked up by that particular microphone. Some microphones even have a pattern changer so you can vary it's polar pattern to best fit your recording needs. Microphone recording techniques depend on what you are trying to achieve in terms of the sound you want to capture, where you are recording, what instrument you are recording etc.

The Five Classic Microphone Polar Patterns

	0°	0°	0°	0°	0°
	270°	270°	270°	270°	270°
	180°	180°	180°	180°	180°
	90°	90°	90°	90°	90°
Pattern	Omnidirectional	Cardioid	Supercardioid	Hypercardioid	Bidirectional
Acceptance Angle	n/a	131°	115°	105°	90°
Maximum Rejection	n/a	180°	126°	110°	90°
Distance Factor	1	1.7	1.9	2	1.7



Via Wikipedia free commons

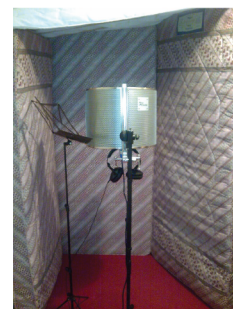
## MICROPHONE TECHNIQUES

The basic technique is to keep the microphone about 12 inches from the mouth/instrument and use the appropriate type of mic. For a powerful sound like a snare drum you would normally use a dynamic mic, but for a guitar you would probably use a condenser with a good overall frequency response and a cardioid polar pattern. Also if recording hard punchy vocals you might find it necessary to use a pop shield to filter out punch sounds and spikes in the recording.



## THE BASICS

When recording vocals it is highly likely that you will learn something new every time, because every voice, every mic and every recording environment is different from the last. When setting up to record vocals, you want to make sure you set your mic up in a room where there are no sharp edges, hard walls or reflective surfaces such as mirrors and windows. You want to find a place where you can dampen the reflectivity of walls or a room in order to stop the mic from picking up too much of the room's acoustics. The diagram below help highlight means to treat a room for accoustics to record vocals



## REMINDERS:

1. Make sure the mic is set up correctly so that the voice of the artist is directed straight to the central part of the microphone (different mics, different techniques)
2. A pop shield although not a requirement, should generally be used to avoid distortion on certain sounds during recording. Particularly B's P's & S's in any speech/lyrics.
3. A typical set of vocals for a verse would include a main vocal, a backing vocal/stab (not all words but the ones you may need to back) and a set of adlibs (further vocal animation to the lyrics recorded). Choruses can add more layers for the main vocal and backing vocals but do not add too many.
4. Getting carried away with too many layers of each artists vocals will muddle the overall sound of the vocals when you mix them. Use different tones and ideas for each recording. Avoid duplicating the same tone and energy.



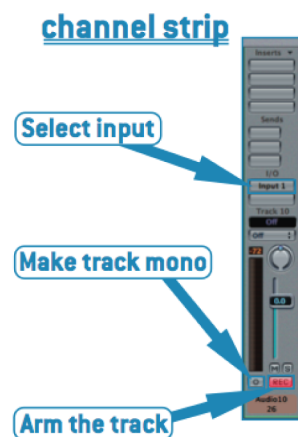
## EQUIPMENT REQUIRED:

In order to only record vocals you will need a microphone, mic stand, a pop shield and a computer with an audio interface and sequencing software with audio recording capabilities and a pair of headphones.

## HOW TO RECORD VOCALS

The example below uses Logic pro and an audio interface with just a stereo out (1 and 2 output) and a simple stereo in (1 and 2 in) but is applicable to any DAW.

- 1- Plug your microphone into input 1 on your audio interface.
- 2 - Turn on your computer and start Logic Pro (or your audio software).
- 3 - Create or open a song arrangement you want to record vocals onto. Save this immediately to ensure all audio is recorded to one central location.
- 4 - Ensure you have created audio tracks to record to (20 audio tracks recommended as a usual amount to enable you to have lots of space to record to)
- 5 - Select the audio track you would like to use to record vocals to
- 5 - On the mixer, the channel for the track you have chosen must have input 1 selected. Make sure this channel is also a mono track. Finally arm that track for recording by pressing the R Button on the bottom of the channel strip.
- 6 - You should have a sound signal coming through now and will need to adjust the gain for input 1 for your microphone signal on your audio interface so that your recording signal does not peak (go into the red). Dont be afraid to also push the artist to perform with power to ensure you have good recording levels that never peak.
- 7 - Put a loop around the section of the track that you want to record to and then when the artist is ready, press record on the transport bar or the letter r on the keyboard, space bar or the stop button will then stop the recording.
- 8 - Review the recording with the artist and make sure you think they have performed to the best of their ability. Push and critique accordingly but always constructively.
- 9 - Repeat this process for any other audio tracks that you want to record.



## OCTAVES

An octave is a series of eight notes occupying the interval between (and including) two notes, one having twice or half the frequency of vibration of the other. For example all the notes between C3 & C4.



## MUSIC THEORY

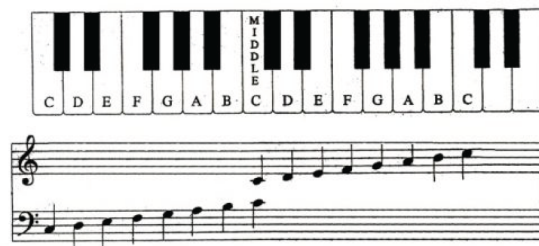
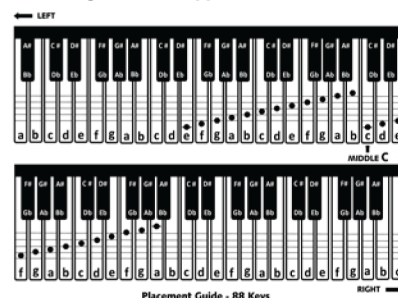
Music theory helps you to write music with a basis and musical structure and often makes composing very quick and logical when applied. There are 3 main components to music theory: The Key, The Scale and then Chords.

## KEY

Key dictates the root notes used for all composition. This can be anything from A to G including both flat and sharp notes.

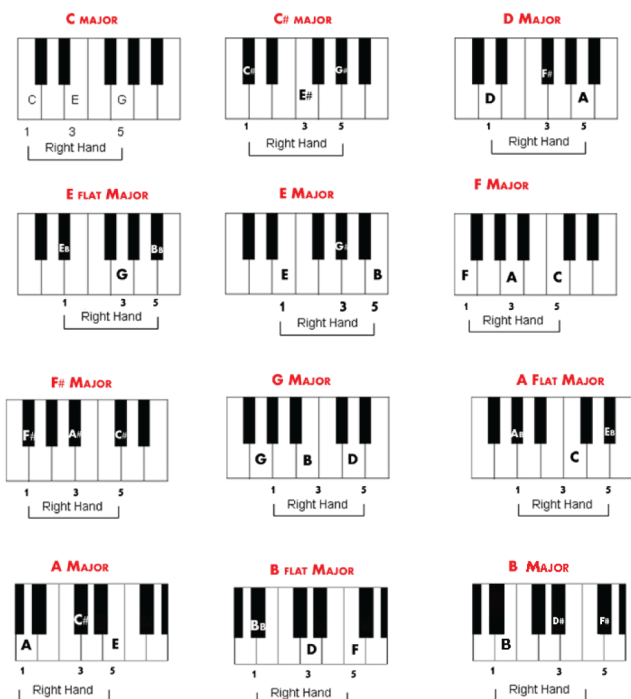
## SCALES

Scales are a series of played notes in a row up or down within an octave of the previously mentioned 12 notes based on the Key chosen i.e. C. There are then two commonly used scales, the major scales and the minor scales.



## CHORDS

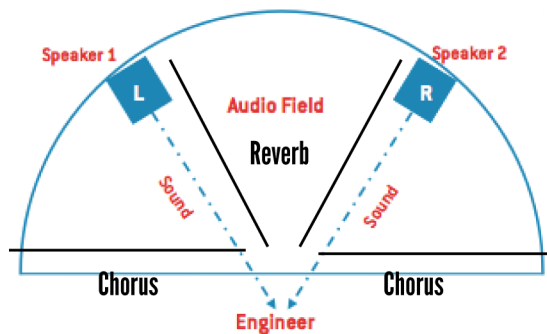
The notes that a major key uses normally build 'bright/happy' chords and a sound to them. Music in minor keys has a different sound and a more painful and emotional feel. Music that is in a minor key is sometimes described as also sounding more solemn or sad. The biggest difference between major and minor chords and scales are the intervals of the note patterns and the actual patterns of the notes used. Minor scales sound different from major scales mainly because they are based on a different pattern of intervals which changes the mood of the overall sound. There are lots of resources to be used for scales and chords online these days. Google away and look for your dream chords!!



## MIXING EXPLAINED BETTER

Mixing should transform your music from a basic balance of sounds into a planned and creative blend that is both creative and specific to what you are trying to achieve. Mixing does not just involve balancing volumes so that you can “hear” everything, instead it is both the creative aspect of planning and placing all the sounds on your song sequence into a single stereo file. There is also an art of fixing audio problems such as unevenly recorded vocals, adding of effects for creative rather than corrective purposes and creating space between your sounds to make them clearer and more present in your mix.

### STEREO SPREAD



### THE STEREO SPREAD

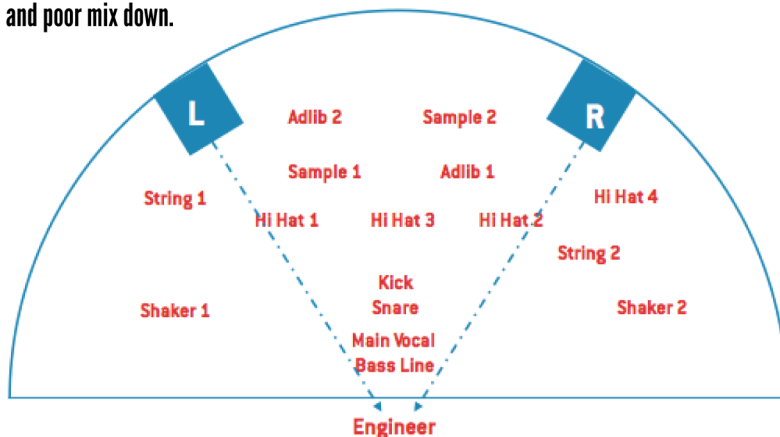
This is a simple outline of the sound spectrum you can use for a stereo mix. There is always 180 degrees of possible stereo spread when creating a mix. This means if you pan a sound fully to the left, you will only be able to hear that sound out of the left speaker when you play it back. The pan however only applies to the spread of your sound from far left to far right. If you want to design and control the size of your 180 degree space you have to add reverb. Reverb gives you this ‘space’ or depth by adding slight delays and reverberations that mimic the natural effect of different environments on sound.

### PLANNING A MIX

Below is an example of a basic mixdown plan, the shakers and high hats are spread out in the 180 degree spread to create a wider stereo spread. The adlibs are also at the back in order for them to act as backing to the main vocal which together with the bass, the kick drum and the snare drum tend to always be set as mono sounds. The reason for this is that normally there is only one of them (i.e mono, only one voice, one kick drum etc) as well as the fact these elements tend to be the driving force in a track. However they can sometimes be stereo or spread from left to right in order to create an effect you desire.

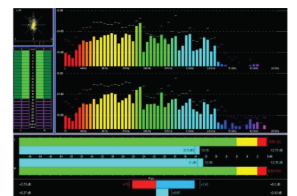
Part of the mixing process is using EQs and other audio processing units such as compressors. Typically audio/signal processors are used in mixing for correctional purposes such as rolling the low end frequencies off a high hat or a female vocal. However as with the panning these are guidelines and these processors can be used creatively as an effect in order to create a specific and planned result for your sound.

The mix down process is a creative one with infinite possibilities, so you should not necessarily be locked into guidelines. However, it can not be over stressed how important planning your mix down and sticking to it is, otherwise you can easily get lost with reverbs, eq’s and effects and end up with a confusing muddled and poor mix down.



### MASTERING

Mastering is where you take your audio mix from -3db to 0db. Once again and like mixing mastering is also a creative process and an experienced mastering engineer should be able to add new qualities to a mix during the mastering phase as well as a noticeable new tonal and audible qualities ie increased bass, stronger mids, more glow to a vocal etc. It’s also a vital process to ensure that songs can be played on sound systems without potentially damaging them from poorly recorded and balanced audio.



### Hints and tips

- Make sure your output does not peak when you record/bounce down your track, try to keep it to or below 3 Db (Peaks cause distortion)
- Try and keep the main vocal, snare and kick drum and bass line centred in your panning.
- Turning up sounds is not the only way to make a sound clearer, use EQs in order to clean, accentuate or cut out frequencies and make certain sounds more audible
- Vocals and snares are the main sounds that can be used to create space, so apply correct reverb to these elements.
- On vocals you should roll off the low end frequencies to avoid resonance and also give the high mids a slight boost.
- Do not double or triple your main vocals. It will NOT make them sound “BETTER”. All it will do is muddle it and create unwanted noise.
- Do not start adding effects units for the sake of experimenting. Use your plan and stick to it otherwise you will end up creating a mess.
- Do not normalize a track just because it will make it sound louder, you will destroy the dynamics of your song.