

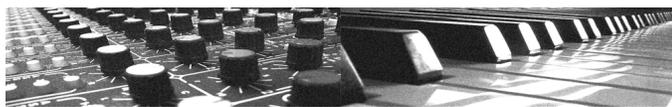


## MUSIC PRODUCTION at KEELE UNIVERSITY



In the music projects of the twenty-first century the traditional roles of songwriter, composer, arranger, musician, musical director, producer, recording technician, mixing engineer and mastering engineer are increasingly blurred.

When you study *Music Production* as part of our courses, *you* will be the multi-talented musician and engineer that drives the music creative process, in and out of the studio.



# MUSIC PRODUCTION AT KEELE UNIVERSITY

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Note: all facts concerning the Music and Music Technology courses at Keele University are true at the time of writing. Please be aware that any of the aspects concerning the cultural offer at Keele University - Music and Music Technology are subject to changes as a result of teaching and learning needs and logistic circumstances.

## LIST OF ACRONIMS USED IN THIS TEXT

DAW = Digital Audio Workstation

D/A converter = Digital to Analog converter

A/D converter = Analog to Digital converter



## 1. INTRODUCTION – Where, who, how

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### 1.1 STUDYING MUSIC PRODUCTION at KEELE UNIVERSITY

There was a time when traditional roles were separate:

- The songwriter/composer
- The arranger
- The studio session musician
- The Musical Director
- The Producer
- The Recording technician
- The Mixing engineer
- The Mastering engineer

**At Keele University music production is taught on the basis that the boundaries between these roles are increasingly blurred, thanks to both changes in working practices and the momentous effects of portable and affordable music technologies. Often the same musically and technically creative individual covers several of these roles at the same time, during the unfolding of a certain music project. If you study Music Production as part of our courses, you will be this multi-talented musician/engineer.**

Music Production is taught at Keele University as part of the established programmes in Music and Music Technology. The recording studios were founded in 1972 by Tim Souster and were setup by a team of engineers led by our current studio support manager and sound recordist, Cliff Bradbury. The current subject leader for Sound Recording and Music Production at Keele University is electronic engineer and digital media artist Dr. Diego Garro. Music Production is part of a vibrant multi-disciplinary teaching provision in creative music technology which focuses on many modern applications of analog and digital audio technologies, with particular emphasis on sound design, sonic arts, sounds for screen and interactivity.



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Currently, Music and Music Technology students can take a mini-study-path in the arts of music productions, which comprises the following modules and options:

- SOUND RECORDING - Year 1
- RECORD PRODUCTION in THEORY and PRACTICE - Year 2
- MUSIC PRODUCTION PORTFOLIO - Year 3

At Keele University we consider theory and practice equally important. Students learn the basic elements of physics and acoustics that are germane to the working principles of a microphone, for example, or the interaction between sound waves and a recording room, or the signal path in a recording studio. Students enjoy 24/7 access to our recording studios, which is tremendously convenient considering the cost of hiring a professional recording studio in the industry. Students use the considerable amount of available studio time to carry out recording experiments, apply the principles taught in class, and develop independently entire production projects, in small groups and individually.

Keele University - Music and Music Technology is a superb environment to learn the art and craft of music production and to develop your existing skills in this exciting field. You have good facilities, you have plenty of time to use them, you can work with fellow producers and musicians who are also studying in your courses. Keele - Music attracts excellent drummers every year, with its provision of competent instructors, dedicated room for drum practice and gear for drums recording, including two acoustic drum kits, two electronic drum kits and dedicated software for drum sampling, drums doubling and drums replacement. As a result of this conducive environment for drummers in recent years music production students enjoyed the session studio work of very good drummers.

Technical assistance is available at your fingertips. Cliff Bradbury (our technical support manager) is the person who sets up and maintains our recording facilities. He knows the studios inside out so he is the perfect troubleshooter for those occasions when things just do not seem to work.

**An important clarification, before we continue:** Music Production is an important (and very popular!) part of both the Music and the Music Technology degrees at Keele University, but it is not compulsory. Students who are more interested in other aspects of music and creative music technologies can opt out of studio production work if they so wish. It is also important to note that, albeit most Music Technology students at Keele University do carry out some music production, the Music Department is not purely a Sound Recording / Sound Engineering / Music Production school. This means that prospective students who are interested purely and only in a career as sound recording engineer or music producer should consider courses delivered in other institutions and compare them with the broad cultural offer available at Keele - Music & Music Technology. At Keele University you have the



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opportunity to study Music Production but you will also need to study a number of other creative audio technology disciplines as well.

## 1.2 THE RECORDING, MIXING and MASTERING STUDIOS

There are currently two medium-size recording studio areas, both centered on Macintosh DAW (Digital Audio Workstations) equipped with Logic Pro and various audio editing tools. There is a 16-channel audio link between the recording rooms and the Tascam digital mixing desks that act as signal-path hub and also as the main A/D and D/A converters. A large collection of microphones is available to students for their learning experiments and recording projects. They range from the very modern large diaphragm condenser such as the AKG C414 or Røde NT to the vintage Coles 4038 ribbon microphones. There are dedicated microphones for drums recordings, including the workhorse Shure SM57 and the AKG D112 for kick-drums. The microphone collection is enriched and upgraded on a yearly basis.

Students can borrow instruments for their recording sessions, such as Gretsch and Yamaha drum-kits, Fender electroacoustic guitars, Fender electric guitar amplifiers, Roland Synth Guitar modules and others, depending on requirements and availability. Keele - Music also has a collection of vintage electronic music gear which students can use when that 'retro' feel is needed in a particular project; these include the CMI Fairlight Computer Music System, reel-to-reel tapes, the Theremin, VCS3 Analog Synthesizer and Yamaha DX7 Digital Keyboard Synthesizer.

The recording studios are available 24/7 and can be easily booked on-line by all students who are undertaking production projects as part of their coursework. Students can enter the studios using their electronic key, which is given to all Music and Music Technology students when they enroll our courses.

Mixing and mastering are carried out either in the control rooms of the recording studios or in dedicated project studios, all kitted with Genelec active near-field loudspeakers. The DAWs are currently equipped with the standard collection of Logic Pro native plugins but also with additional tools for high quality audio editing and mixing. These include Melodyne pitch correction tools, Drumagog drum replacement plug-ins, Superior Drummer and others that are added on a yearly basis.

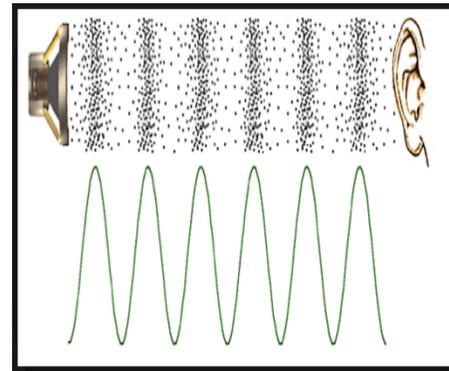


## 1.3 WHAT YOU WILL STUDY and LEARN

As part of the undergraduate modules lecturers and demonstrators cover the use of the facilities and the various recording and mixing techniques. Lecturers, demonstrators and technicians regularly discuss with students-producers the various aspects of a certain project. However, the learning of music production at Keele University is strongly student-led. Students themselves organise the recording sessions, scout the musicians amongst the many who gravitate around the Keele Music buildings and make things happen in the studios in a process of learning-by-doing. Students themselves are expected to come forward and discuss issues relevant to their production projects with the session musicians, fellow producers and academic staff. There is a vast collection of books on sound recording, microphone techniques and record production available in the Keele library, where you can also find a huge collection of recordings on CD relevant to what is being taught in the various modules.

What you will be taught, study and learn - The theory:

- Acoustics
- Auditory perception
- The principles of electroacoustic transducers
- Microphones and loudspeakers
- Analog and digital audio
- The craft of a recorded piece of music
- The soundbox
- Attributes of recorded music - timbre, tonal balance, dynamics, clarity, texture.
- Relationship between music arrangement and production.
- The layers of a recorded piece of music, their importance, their interaction.



What you will be taught, study and learn - The practice:

- Studio techniques and signal path
- Working in our recording studios
- Microphone recording techniques
- Mixing techniques
- Mastering technique
- Project management, time keeping, team work





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What you will not be taught:

- Sequencing. You are supposed to know this already, or you are supposed to teach yourself using the DAW and learning material which we provide with 24/7 access.
- Every detail of every single plugin. These can be studied using the relevant documentation.
- All the details of Logic recording and mixing. You will be shown some important aspect of signal flow and other techniques in Logic, but you are supposed to be familiar with the basic mechanics of a DAW, possibly Logic. If you are not, then you can easily catch up on your own using the DAW and learning material, which we provide.

NOTE: please note that tutors, demonstrators and technicians at Keele University - Music and Music Technology are always ready to help and discuss any aspects of your work, regardless whether or not these are taught or not. Ours is a very welcoming, inclusive and friendly working environment.

## 1.4 WHAT WE EXPECT FROM OUR STUDENTS

Students who undertake Music Production work at Keele University are expected the following things:

- They must provide themselves a good pair of studio headphones.
- They must commit to the rules of our Studio Code of Practice.
- They must have ambition, that is the desire to achieve the best they can given the time and the technology available and to always improve on their current level of ability.
- They must work regularly in the studios and develop their projects throughout the semesters (as opposed to rush to the studios late under the pressure of deadlines).
- They must network with other producers and musicians throughout their course of study, within Keele University and also outside, wherever possible.
- They must possess already musical and aural skills at intermediate level.
- They must commit to expand their musical horizons and deepen their familiarity with the musical styles they produce.

## MUSICAL and AURAL (LISTENING) SKILLS

Outstanding producers are, in most cases, very good or even outstanding musicians themselves. Producers, recording engineers, mixing engineers and mastering engineers must be able to understand the music they are working on. They are expected to be able to converse with musicians using musical terminology. They are supposed to have a firm knowledge of the repertoire relevant to the projects they are involved in. These skills can be developed as part of a degree course, but they cannot be taught from zero at University;



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you are supposed to be already musically literate upon entering our courses. A basic knowledge of music theory is expected, equivalent to Grade 5 ABRSM<sup>1</sup>.

Aural skills are also fostered as part of Music and Music Technology studies at Keele University but you must be already able to recognize pitches, frequency bands, amplitude levels, dynamic range and spatial properties of music recorded stereophonically, at least at basic level. Musical and aural skills come together and allow students to develop the following production skills:

1. Identify the main sonic characteristics of studio recording takes and sound in general.
2. Develop a critical, informed and attentive predisposition towards sound mixes.
3. Identify the aspects that characterises good and bad practice in sound recording, music mixing and audio mastering.
4. Acquire the terminology to describe sound quality of a mix and discuss mixes in collaborative creative contexts.

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<sup>1</sup> ABRSM is the UK Associated Board of the Royal Schools of Music. It is an examinations board and registered charity based in London, UK, which provides examinations in music at centres around the world.



## 2. MUSIC PRODUCTION and ITS STAGES

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In the following pages you will find a summary of terminology useful to discuss the art of Music Production.

In the music industry often the 'mix' is carried out by specialised mixing engineers, under the guidance and artistic supervision of the music producer and or artist(s) and or musical director. Sometimes these roles are covered by the same person, but often they are not. As part of your University projects you will be required to carry out various stages of a Music Production project. Although this is highly formative (and fun) you should be aware that each of these different passages require specific skills. You will be directly involved in the following activities as part of your music production projects:

- **Pre-production** - the draft of a musical idea (a song, a jingle, a soundtrack) and an assessment of the resources needed to produce it. Decision upon key, song structure, lyrics. Discussion about arrangement (what to play) and 'orchestration' (who plays what). Draft of a basic song outline, for example guitar and voice, or by means of computer sequences. Scouting of the musicians needed for the project and their initial coaching on the music to be played (Musical Director). Evaluation of studio time and studio facilities required. Scouting of technical help for the various stages. These aspects are delicate and extremely important; often the failure of a mix is caused by inappropriate choices in pre-production, rather than technical mistakes during recording and/or mixing.
- **Studio production** - the creation of audio recording takes needed to bring the musical ideas to life. This is done through one single or (more often) multiple studio recording sessions. Increasingly, artists and producers carry out part of this stage in home-studio situations and part in professional recording facilities. Production often involves the writing and implementation of MIDI sequences that are crafted to complement the musical arrangement emerging from the recording sessions.
- **Editing and pre-mixing** - choice of the recording takes to be used in the mix. Comping. Pitch correction. Tempo correction.
- **Mixing** - the combination of tracks and parts to create the final stereophonic (or multi-channel) song/piece. It involves various complex choices related to the frequency spectrum (equalization, filtering), relative amplitudes of the various



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parts, dynamics (compression/expansion), spatial arrangement in the stereophonic field, artistic sound effects and sound textures.

- **Mastering** - the detailed assessment of the mix's sonic properties and its finalisation in view of a particular use (soundtrack, dissemination on CD, Internet streaming, radio broadcast, etc.). This stage typically involves fine-tuning of equalization, compression and stereophonic imaging.

Although modern computer technology allow a particular user to carry out all the above stages using the same workstation and indeed the same project studio, in many professional applications the various stages are carried out by different specialists, each with specific expertise, experience and dedicated technology. These individuals may or may not be part of the same team. Mixing engineers may acquire materials developed elsewhere by recording studios and carry out the mixing, often in different, specifically designed, studios. Mastering engineers often acquire the 'mix-down' and subject it to detailed scrutiny using specialised sound monitoring environments and dedicated software and hardware tools. For example they may use extremely sophisticated mid-field loudspeakers to assess every nuance of the sound texture and tonal balance but they may also play the mix on cheap loudspeakers, headphones and earphones to assess how the mix will sound on common consumers playback systems (living room Hi-Fi, portable players, radio sets, car stereos, etc.). The mastering engineer may decide to produce different mixes, with different equalisations and dynamics for different purposes.

### MONITORING - ASSESSING SOUNDS, PARTS and THE MIX

Sound monitoring is the activity of listening to sounds and sound mixes attentively and critically in order to assess its quality, sonic attributes and artistic potential. It requires good quality sound equipment, concentration and training. Assessing the quality of a mix is more difficult than assessing the quality of a single sound, or a single track, because not only it requires focus on the sounds that form the mix but it demands continuous attention shifts between microscopic detail of the individual sounds and macroscopic properties of the overall sound texture achieved as a result of mixing the various sounds; both aspects are equally important.



## 3. ARTISTIC and TECHNICAL CREDO

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There are various schools of thought when it comes to producing music. The Internet has provided endless forums for people of various extraction and ability to disseminate their real or alleged wisdom. Producer themselves, even commercially successful ones, are sometimes carriers of very sensible and technically sound advice; oftentimes, though, their practice and recommendations are technically wrong, or taken out of the appropriate context, or based on myth rather than facts. In the following paragraphs you will find explanations as to the technical and artistic credo that inspires the teaching and practice of Music Production at Keele University. These are not prescriptive guidelines, but they provide an important framework of references for prospective and current students to understand the philosophy adopted in our institution. As you read through these notes a few things will become very clear:

- You need to acquire an understanding of the theory underpinning acoustics, recording technology and auditory perception. This means attending lectures, studying and discuss with your tutors all aspects that are unclear and controversial.
- You need to break the closed-circle of your current practices and humbly interact with musicians, producers and tutors to understand where you can improve.

### 3.1 Some tips on MONITORING

- Do not use earphones for sound monitoring. Never. Although diverse in quality and price, earphones are generally poor transducers and strain your hearing system, channeling huge amount of acoustic energy directly to your eardrum. Mastering engineers may evaluate the sound of a certain mix on earphones as part of their craft and task, but recording and mixing engineers should always strive to monitor with better transducers.
- Avoid monitoring only with headphones. Headphones (very good quality ones) may provide an intimate response especially useful to evaluate sonic and spatial details, especially in the mid-high frequency range, but overall they provide an artificial



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sound staging and will never give the same broad frequency response that good loudspeakers can provide. Having said that, headphones are possibly the most common consumers' sound playback technologies so both mixing and mastering engineers should use them to assess the mixes. Mixing engineers should always use high quality studio headphones. Mastering engineers should use both high-end studio headphones to craft the master, and cheap headphones to test the response of low-budget consumer equipment.

- When you use headphones, take breaks every 20min maximum.
- Use good near-field studio monitor loudspeakers as much as possible to monitor your sounds.
- Look after your hearing. Use portable players with earphones sensibly using the 50-50 rule (no more than 50min a day, no more than 50% volume level). Keep the volume low to avoid prolonged direct blasts of energy into your eardrum. Do not expose yourself to loud noises/music for long stretches of time. If you work in noisy environments (including music clubs!) wear protective ear-defender headsets.
- Beware of listening fatigue. Take breaks. Beware of over-exposition to your under-construction mixes. Sometimes over-exposition causes you to overlook some major faults to which you become 'blind'. Sometimes over-exposition causes you to focus stubbornly on subtle details that are almost un-noticeable by the average listener. Moving away from a project for a day or two, if possible, can be beneficial. Listening to the opinion of other people (classmates, tutors) is very important because it can give a fresh perspective on the work you are carrying out.

### 3.2 Issues related to SOUND QUALITY

Students and tutors at Keele University are demanding. The 'quality' of sound mixes is a very important factor in the culture of our courses. Some professional contexts have sought 'roughness' as a trade of a certain style. For example some say "punk rock mixes are supposed to sound rough" which invariably means that they are poorly crafted and sound pretty bad! Unfortunately this has given rise to and justification to generations of producers who use such, and similarly superficial, aesthetic statements as an alibi for poor production practices and unprofessional attitudes towards the crafting of music. We believe that even a 'rough-sounding mix' must have the necessary sonic attributes required to enjoy and appreciate the music in all its artistic and technical aspects. Style and quality must always go hand in hand. Stylistic references, which are often based on myth and exaggeration



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rather than reality, must not be used as excuse for a slack approach to the crafting of a music product. For example, drowning a mix in a deluge of loud distorted electric guitars cannot be justified by stylistic references “...it is supposed to sound like this”. We believe that even hardcore metal mixes, to give just an example, must project sufficient clarity of the lead vocals and articulation of the drum parts, despite the emphasis given to distorted guitars in this particular style of popular music.

**IMPORTANT!** Regardless of any alleged ‘common’ or ‘good’ industry practices, which may be spelled out in various books or Internet fanzines or forum, the mark of good handling of dynamics/compression in production projects carried out at Keele University is assumed to be the following:

- All musical parts must be audible in the mix, according to their role within the musical arrangement, without excessive compression or limiting.
- The overall mix must be crafted applying to the whole mix only mild compression and limiting, or none at all. Examiners normally scrutinise this aspect listening to the mixes and assessing the mix using a wave editor.
- The mixes submitted by students for assessment must have 3dB of real headroom (no artificial headroom introduced with negative gain or limiting is allowed).

If you carry out mastering, examiners will compare mastered and non-mastered versions at equal loudness to ascertain what your mastering choices have added to the sound quality of the mix.

Please, be aware that replicating arrangements, production techniques and mixing strategies of a commercially successful track will not necessarily lead to high marks. Examiners will still make an independent judgment on the quality of production and post-production of your work, and may still award low marks to mixes that sounds identical to a million-copies hit. On this respect, please be aware that commercial success does not equate to a good quality production. In fact a significant amount of commercially successful music is ghastly produced. For example, overpowering your mix with unnecessarily loud distorted electric guitars may be common in some current metal productions, even commercially successful ones, but it still remains a poor production practice, which will be marked down. If in doubt, go and discuss your draft mixes with your tutor early on in the semester.



## 4. DEFINITIONS and FURTHER POINTS

In the following pages you will find a summary of important sonic attributes related to the quality of studio recordings, mixes and masters, along with further clarifications on the philosophy followed at Keele University - Music Production.

### 4.1 SPATIAL PROPERTIES – STEREO IMAGE

The design of the virtual sound of any arrangement (stereo, surround 5.1, etc.) is entirely the responsibility of the student-producer, who is expected to craft this important element of the music with choices that are stylistically and technically appropriate.

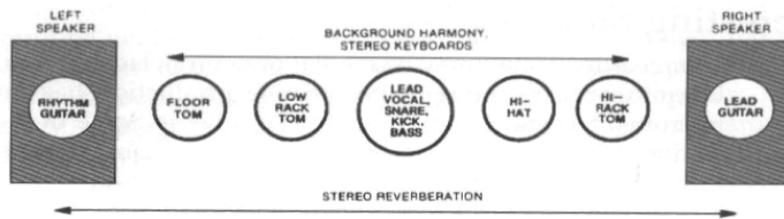


Fig.3.1 Placement in a popular music stereo mix using the so-called 'diagonal mix'  
Source: Bartlett B., Bartlett J.: Practical Recording Techniques, Focal Press, 2005.

In popular music the mixing engineer and the producer decide, for each track, the characteristic of the virtual sound stage as well as the spatial behaviour of each single sound featured in the mix. In most cases, this means deciding the location and the image width of each instrumental and/or vocal part.



Manipulating and controlling the spatial properties is an essential skill for all producers, mixing and mastering engineers.



### Spatial Properties - Good practice and bad practice



There should be some variety in the location, stereo image and movement of the musical parts you use in a project. At least some parts (instruments) should occupy different areas of the virtual sound stage.



A balance between mono/central and lateral positions should be sought.



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 A balance between sounds/parts with narrow stereo image and sounds with wide stereo image should be sought.

 In music mixes, it's good to be experimental, but you should be aware of the mainstream practices with regards to sound placements and stereo imaging.

 The overall sound stage of a mix should, wherever possible and applicable, be 'wide' and 'deep', hence exploiting the full width of the stereo range and the full depth and contrast between (virtual) proximity and (virtual) distance. Some sounds should suggest the idea of 'depth' in the proximity/distance axis. Therefore there should be at some point in the mix a contrast between louder and 'dry/drier' sounds (they will feel close-up, 'right on your face') and quiet/quieter and/or 'wet'/'wetter' sounds with reverberation (they will suggest the idea of depth, space, ambience).

 Several sounds all located centrally: bad practice; tiresome; hinders separation between musical parts and clarity.

 'Narrow' stereo image of the mix. The sound texture remains focused in the middle, the extreme case being a monophonic mix ('mono') that seems to come from a point in the middle.

 In music mixes, the sounds of vocals, musical instruments and parts do not normally dramatically move/pan across the stereo range. This is in general considered an artificial and distracting behaviour. Keep these movements to a minimum and use them only when there is a clear artistic imperative, possibly on sound effects rather than musical parts.

### Examples of good sound staging

- Folk/Acoustic music: Ian Anderson - *The Flower Girl*
- Jazz music: Norah Jones - *Don't Know Why*



- Electroacoustic Music - Rob Ratcliffe - *Labyrinth*
- Pop: Justin Timberlake - *Rock Your Body*
- Rock: Kings of Leon - *Supersoaker*

## 4.2 DYNAMIC RANGE / COMPRESSION

It indicates the range of amplitude levels of the mix, from the softest to the loudest. Some sounds, once immersed in the mix, may need compression otherwise their quietest parts are masked by other sound in the mix. Sometimes compression is necessary to ‘tame’ spikes of amplitudes emerging from the recording process, for example a lead vocalist who recorded a part with some notes that, for various reasons, are undesirably louder than others, even within the same passage/verse.



Fig.4.2.1 - Compression in Logic Pro X

Compressor-Expanders can be used to change the dynamic range of a part/track.

- ‘Wide’ dynamic range indicates a big span of amplitudes, where the quietest parts of a sound are very quiet compared to the loudest parts.
- ‘Narrow’ dynamic range indicates a small difference between the quietest and the loudest parts.

‘Compression’ indicates a procedure by means of which the dynamic range of a mix is reduced. Essentially this is achieved by raising the level of the quietest passages and/or reducing the level of loudest ones. ‘Multi-band Compression’ is an even more useful and powerful tool that operates different dynamic compressions in different frequency bands. The user can decide the boundaries of these bands and the properties of each compression separately applied. Compression can be carried out by outboard stand-alone units, but in digital audio mixing compression is carried out by real-time software plug-ins or audio file processing.

The effect of dynamic compression can be achieved by manually altering the level of certain notes or passages using tools other than compression units or compression plug-ins.



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Breakpoint curves of a track amplitude and/or editing tools such Melodyne or Pitch-Flex can be used to surgically correct the amplitude of specific notes/passages. These are actually advisable if only a few notes need correction, because they allow far greater control and predictability than compression plug-ins.

Compression is widely used, and often over-used or mis-used, in various strands of popular, rock and metal music mixes. Mixing and mastering engineers try to create an allegedly 'punchier' impact as a result of the fact that the overall acoustic energy of a compressed mix is higher than the uncompressed one. In doing so they fail to understand that it is always the listener who ultimately controls the playback level; if an over-compressed track sounds very loud, they will simply turn the volume down and this will result in a flattened track that lacks any rhythmic punch and contrast.

 The immediate effect of a compressor may be rather seductive because it creates an immediate sense of 'surge', 'energy' and 'edge' in the mix. Beware that compression can boost some properties of a mix when used subtly and sensibly but can easily destroy many positive aspects of a mix, for example burying the contrast in levels that makes some mixes appealing during repeated visits, smearing the clarity of the attacks of many musical gestures and generally subjecting the listener to prolonged stimuli at a flat, high acoustic energy levels which may produce listening fatigue and discourage repeated visits of the same piece of music.

Unfortunately, over-compression is becoming ubiquitous. Everybody uses it, and often mis-use it or over-uses it: radio, TV, commercials, record productions, films, etc. At Keele University we expect students to assess the suitability of compression at equal loudness level: you and your examiners will decide whether or not the compression is useful comparing the tracks/mixes with and without compression, but at equal overall loudness level. If you want your listener to be hit by louder levels, please refrain from indiscriminate compression and trust the fact that he/she will simply turn up the playback level of their players, if and when they feel that the music is not coming through loud enough. You do not decide on behalf of the listener how 'energetic' the music is; they decide that themselves using the volume control.



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## *The Loudness War*

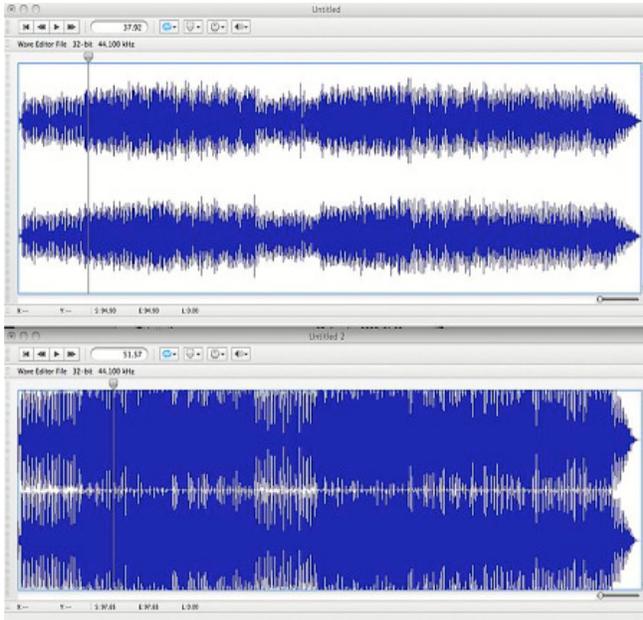


Fig.4.2.2 - Victim of the Loudness War: a music track that originally had a balanced dynamic contrast is bloated up and distorted using compression, only for the sake of 'feeling louder'.

Everybody squeezes up the dynamics and in the attempt to capture the listeners' attention. The result of this 'loudness war' is that the contemporary sonic landscape is unnecessarily loud, intrusive, overpowering and lacks musical subtlety, contrast and sonic detail, which are the true flavour of recorded music.

At Keele - Music & Music Technology we are pacifists! We want to put an end to this senseless loudness war. We encourage our students to create mixes which utilise a wide range of dynamics, using compression cautiously, tastefully, only when it is musically and technically advisable. Compression for the sake of compression is frowned upon.



## **Dynamic Range - Good practice and bad practice**

It is difficult to provide general rules on correct approaches to dynamic range processing, because these are strongly dictated by the particular context of a certain track. It's mostly a trade off.



A wide dynamic range in a mix can provide pleasant variety and contrast. But when it is *very* wide be aware that the quiet parts may be too quiet to be fully appreciated in normal listening situations. Conversely, the amplification required to appreciate the quietest parts may prove devastatingly loud when the loudest parts kick in!

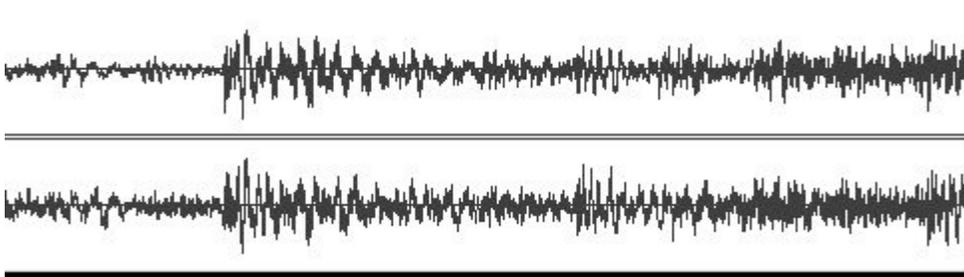


Fig.4.2.3 - Acceptable dynamic range of a mix-down (source: [www.tweakheadz.com](http://www.tweakheadz.com)).

 Over-compressed mixes, where often aggressive compression is applied after the mix-down, is generally poor practice. Although it makes the mix ‘punchier’ (until your listener decides that playback feels too loud and turns the volume down) it is most likely very tiresome to listen to, with a harsh sonic texture, little clarity, lack of contrast and smearing of the sharper sound attacks, typically kick-drums and snare-drums. The groove is negatively affected.

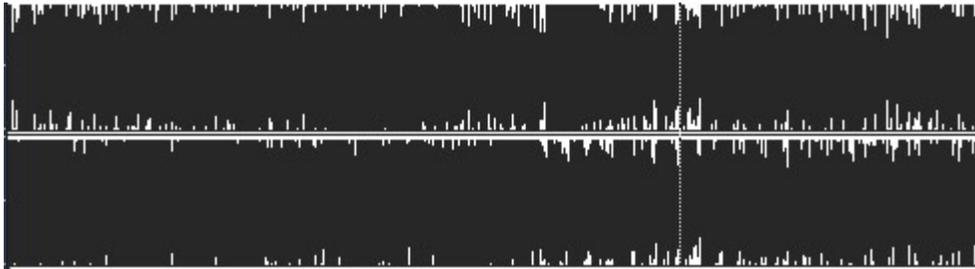


Fig.4.2.4 - Over-compressed dynamic range of a mix-down (source: [www.tweakheadz.com](http://www.tweakheadz.com)).

 If you feel that in order to ‘come through the mix’ various parts all need to be substantially compressed, you are on the wrong path, possibly because there is simply too much energy on your music and it is impossible for all of it to come through. Most of the time this is a problem that is not caused by problem with your mix but is, instead, cause by poor arrangement. For example, it is unreasonable to expect a proper mix from a screamo-metal chorus where the lead vocalist is yelling like a maniac, the drummer is hitting like a gorilla on the entire kit, two guitarists are blasting loud distorted guitars and the bass player is working his way through a 16<sup>th</sup> notes riff. There will be not enough dynamic range and no spectral width for all of that to come through clearly in the mix, regardless of your acrobatics with fancy plug-ins... It is not going to work. Not because the plug-ins are wrong, not because you need more of them, but because the music is wrong to begin with. **Correct musical arrangement is the first, essential step to a good mix.**



## Examples of good handling of dynamics

- Jazz: *Come way With Me* - album by Norah Jones
- Rock: *The Dark Side of The Moon* - album by Pink Floyd
- Pop: Paolo Nutini - *Candy*

## 4.3 TONAL BALANCE

The tonal balance of a mix indicates the sense of equilibrium between sound colours that comes as a result of the choice of different parts/tracks and their polyphonic arrangement. The tonal balance of a mix is affected by the recordings, the choice of sounds utilised in the mix, the way these were equalised or processed, and further equalisations or processing carried out during the mixing and mastering stage. All these aspects affect the **spectrum** of the mix, i.e. the way in which the acoustic energy is distributed across the frequencies. More or less energy in different frequencies or frequency ranges gives a mix a particular tonal character. The following illustration gives a simplified view of this relationship:

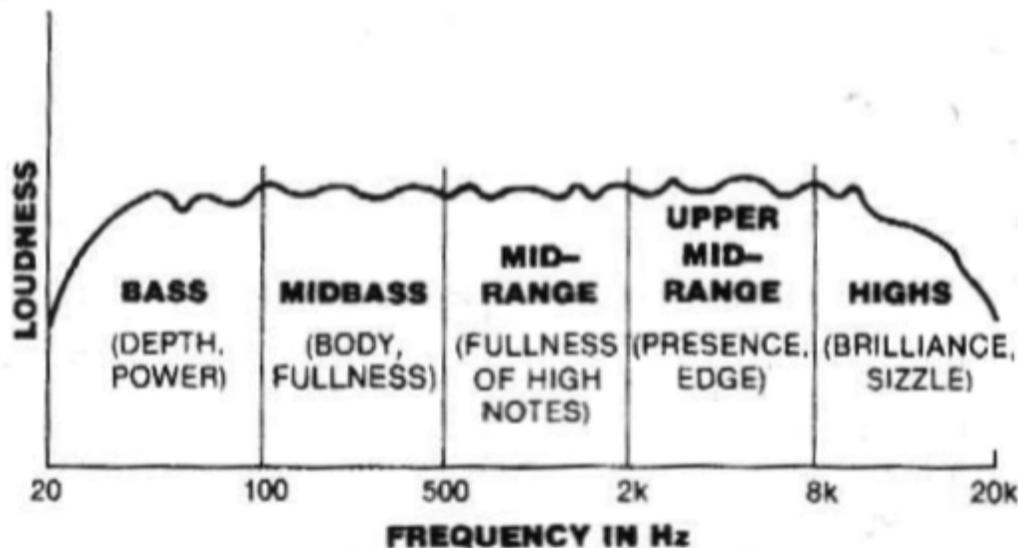


Fig. 4.3.1 Relationship between frequencies and tone-colours. Source: Bartlett B., Bartlett J.: *Practical Recording Techniques: The Step-by-Step Approach to Professional Audio Recording*, Focal Press, 2005. Page 320.



The tonal balance of a mix must be evaluated carefully, starting with the mid-range because this is the range that carries the most important information: vocal articulation, strings and woodwinds in an orchestra, guitars and central octaves of the piano in popular music, attack of most percussive sounds. The mid range must be clear but not over-emphasised ('screamy', 'over-present'). Using the mid-range as reference, the low frequency range should add some body and depth, whilst the high frequency range should provide some brilliance to the mix, without jeopardising the clarity and the impact of the mid-range. The overall tone of the mix should be smooth, pleasant, clear and warm, with a firm but not overpowering support on the bass and a hint of lightness in the high range without becoming sibilant.



## Tonal Balance - Good practice and bad practice



Popular music mixes should feature instrumental and/or vocal parts with different spectra, hence some sounds with rich spectra and some with narrower spectra. There should also be contrast between overlapped sounds occupying different frequency ranges, for example bass sounds and mid-high range ones. The aesthetic appeal of a mix is often related to the presence of material with various degrees of spectral complexity. Much of aural redundancy from electro-pop from the 1980s, for example, is caused by the indiscriminate use of many spectrally rich parts all played by digital synthesisers.



A mix that is 'boomy' throughout is considered poor practice. Unfortunately many DJs and home-producers of dance, techno, Electronica, dubstep have developed the idea that 'boominess' is an intrinsic part of the idiom of that particular style. This is not necessarily true. Persistent 'boominess' deprives a mix of tonal balance and floods the lower range with lots of acoustic energy to the detriment of the listener's ability to appreciate sonic detail in the low range and also in other frequency ranges (typically the mid-high range).



Mid range must be clear and detailed but mixes with over-emphasis on the mid-range tend to sound harsh and tiresome because those are the frequencies we are most sensitive to. Some careful equalisation can be used to attenuate those frequencies.



Mixes that have lots of energy on the upper-mid-range or high-range may convey some interesting sonic details and ‘sizzle’ but they also tend to be too shrill or very sibilant and harsh. Use only high-quality loudspeakers and headphones to assess this. Find the right balance when equalising. Ask for feedback if you are in doubt.

## 5. TYPICAL REQUIREMENTS for MUSIC PRODUCTION PROJECTS

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(please note that these are only examples valid at the time of writing and that submission requirements do change from time to time in response to various teaching and learning demands and logistic circumstances)

The music genre is left up to the student’s choice. The tracks to be recorded are normally left to students’ choice; both covers and original songs are accepted.

Some parts of production projects, including those valid for assessment (marks), are normally carried out in small groups. This is especially true in year 1 and year 2. Typically, pre-production and studio recordings will be carried out in groups of two-four students-producers each. Editing, mixing, mastering and supporting reports are carried out individually. In final year production projects, normally students-producers can be allowed to work individually as main producer and/or main engineer. Please note that team-work is the norm in the music industry; it is an indispensable training to carry our music projects as a team.

Students are normally required to record with microphones substantial parts of a certain project. They may, or may not, be allowed to sequence some parts of the musical arrangements. The focus is primarily on recording using microphones in our studios and interacting with musicians.

Please note that students taking Music Production modules at Keele University are taught and assessed as *producers*, so they are expected to **take responsibility for all aspects of the projects they carry out: musical, technical, artistic.**



### *Marking criteria for Music Production projects typically include:*

- Compliance to various project requirements outlined in the assessment briefs.
- Quantity and quality of the studio recordings.
- How well planned the project is in terms of relationship between work to be done and resources available.
- Overall sound quality of recordings, mixes and masters.
- Clarity and tonal balance of the mix. How well the single musical parts can be heard making a musically harmonious contribution to the mix.
- Spaciousness. The design of the soundbox and how it contributes to the overall technical and artistic quality of the mix.
- Evidence of having successfully applied some (or all) of the techniques covered during relevant modules.
- Appropriateness of the preparation work (pre-production).
- Musicianship, musical taste and skills, stylistic awareness, as evidenced by the material submitted. Remember: our music production modules are taught in a Music & Music Technology Department so the music and the sound of it are equally important.
- Musical imagination. Originality of the approach to arrangement and crafting of the mix. Originality in the design of the track's timbre and sound texture.
- Musical handling of the arrangement and the mix, sense of musical variety and progression within the song, sense of sonic and expressive growth and contrast between sections.
- Quality and quantity of musical direction skills demonstrated in the project.
- Contribution to group work, evaluated by means of peer-assessment and self-assessment.



## 6. What student will I be?

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WHAT SHALL I DO TO PREPARE MYSELF FOR MUSIC PRODUCTION at KEELE UNIVERSITY?

- If you are studying already in a Music Technology course at A-levels or BTec or similar, we encourage you to follow your teachers and learn as much as you can from them.
- We strongly advise you to get the ABRSM Grade 5 Music theory certificate, or equivalent in the country/context where you are.
- Play, play, play! (or sing). Both on your own and with other musicians. Play/sing out of your comfort zone, meaning different styles, different eras of popular, rock, jazz music.
- Listen, listen, listen to ALL type of music. Listen how the recorded tracks were put together. Can you hear ALL instruments/vocals well? Where are they placed in the stereo range? What is the virtual sound stage ('soundbox')?
- Improve your aural skills. Learn to recognise pitches and frequency bands. For example use this app: <http://quiztones.com/>
- At the time of writing, Logic Pro is the DAW of choice in our studios and labs. You are encouraged to become familiar with it. Go here: <http://www.cambridge-mt.com/ms-mtk.htm>. Download the audio stems of a simple track and try to mix. Experiment with the signal path in Logic Pro, for example create a headphone submix, independent from the production mix, comprising only kick-snare-piano to be fed to a sax player in the recording room. You don't know how to do it? Try to learn; go on YouTube, experiment...
- Purchases: you don't need anything; at Keele University we have everything you need in our studios and labs, which you will be free to access if you are attending our relevant modules. But, you do need to buy a very good pair of studio-quality headphones. Go for reputable brands, AKG, Sennheiser, Beyerdynamic. Don't buy anything cheaper than £100.



## References:

Bartlett B., Bartlett J.: *Practical Recording Techniques: The Step-by-Step Approach to Professional AudioRecording*, Focal Press, 2005. Chapter 14 - *Judging Sound Quality*.

White, P. *The Producer's Manual*. Sample Magic, 2012.

Moylan W.: *The Art Of Recording - Understanding and Crafting the Mix*, Focal Press, 2002

Katz B.: *Masternig Audio- the art and the science. A Plain and Easy Introduction to Practical Sound Composition*, Focal Press, 2002

Audio Mixing Tutorial, by Dan Kury, Garritan Inc. <http://documents.mx/documents/audio-mixing-tutorial.html>

The Journal on the Art of Record Production (JARP). <http://arpjournal.com/>

## Recommended listening - exemplary recordings/productions:

### Popular Music:

- *Thriller*, by Michael Jackson; engineer, Bruce Swedien; producer, Quincy Jones
- *Avalon*, by Roxy Music; engineer, Bob Clearmountain; producer, Roxy Music
- *Smile*, by Brian Wilson; engineer, Mark Linett

### Rock Music:

- *90125*, by Yes; producer, Trevor Horn
- *Synchronicity*, by The Police; producer, Hugh Padgham and The Police
- *Dark Side of the Moon*, by Pink Floyd; producer, Alan Parsons
- *The Wall*, by Pink Floyd; producers Bob Ezrin, David Gilmour, Roger Waters

### Jazz / Fusion / Blues:

- *Come Away With Me*, by Norah Jones; engineer, Jay Newland
- *Genius Loves Company*, by Ray Charles; several engineers
- *Give*, by The Bad Plus; engineer, Tchad Blake
- *Live in Paris* and *The Look of Love*, by Diana Krall; engineer, Al Schmitt

### Folk / Acoustic:

- *The Secret Language Of Birds*, by Ian Anderson; engineer/producer, Ian Anderson
- *The Mystery*, by Tommy Emmanuel; engineer/producer, Kim Person