

# Nat 5 Technological terms/ processes/controls & effects

## Technology concepts

Technological terms	Processes	Controls and effects
glitch hum cyclical/loop playlist polar patterns (figure of eight, hypercardioid) sampler signal-to-noise ratio sound card spillage/leakage toolbox transpose	beat-matching digital processor drop in/out fade in/out import/export latency locators markers multi-effects processor quantisation vocal enhancer	auxiliary in/put/out(put) (Aux) auxiliary send/return boost EQ/out EQ chorus effect and depth close mic/d dB (decibels) gated reverberation (reverb) LFO limiter noise gate pitch bend punch in/out wah-wah/envelope filter

National 5

## Question 4- 2 versions

Version 1 – no effects or processes

Version 2 – with processes

Justify your answer

This usually involves changes some of these:

- EQ – e.g. bass and/or treble boosted
- Gain – e.g. too much gain could leave the sound distorted; too little means it is far too quiet and indistinct
- Reverb
- Feedback
- Volume
- Pre-delay (*inserts an amount of time between the sound of the original signal and reverb*)

Controls on an effects processor include:

• Balance	Gate time
• Decay	Diffusion
• Depth	Pre-delay
• Mix – 'Dry/wet'	Room size
• Time	Rate



LIVE WORKSHEETS

# Nat 5 Technological Terms

glitch	A short and nasty 'click' in digital audio. This may be caused by a corruption of the digital information or a poor edit of the sound file.
hum	A low-frequency noise (50Hz) normally called mains hum. There are several causes of mains hum, such as if the earth reference voltage is different at one end of the signal path to another, or if an audio cable is run through coiled mains cable.
Cyclical/ loop	A setting which allows a selected length of a recording to be repeated automatically.
_sampler	A sampler records short extracts of audio material that can be looped or triggered from another device. e.g. A synthesizer which records sounds from actual external sounds such as instruments or non-musical sounds.
Signal-to-noise ratio <a href="https://www.youtube.com/watch?v=w4lcAkrNFn0&amp;ab_channel=SteveThompson">https://www.youtube.com/watch?v=w4lcAkrNFn0&amp;ab_channel=SteveThompson</a>	This is the level of wanted signal compared to the level of unwanted noise. An audio track recorded at a low level is likely to be affected more by the relative noise level on the output of the track. Signal is the desired object and 'noise' is the less desired object. The higher the signal in relation to the noise, the better the sound. You should therefore record the sound at the highest possible signal level, without distorting the sound. This gives you a much higher signal to noise ratio.  <a href="https://youtu.be/-Xlv2ZYeh98">https://youtu.be/-Xlv2ZYeh98</a>
Sound card	A sound card is the interface between inputting and outputting sound in a computer. Sound cards are internal and slot into the motherboard of a computer.
Spillage/ leakage	This occurs when unwanted external sounds are picked up by a microphone. Generally used to describe the unwanted sound of one musical instrument as heard by a microphone on another instrument.
toolbox	In a digital audio workstation the toolbox contains the main user functions such as the split tool, glue tool, pointer, select etc.
transpose	Transpose is the function which allows audio and MIDI data to be pitch shifted and modulated to a different key.

# Nat 5 Technological Terms - Microphones

<b>Polar patterns</b>	Microphones vary in the way that they respond and pickup sounds coming from different directions. There are 4 polar patterns (or, pickup patterns) you are required to know.
<b>Cardioid</b>	<ul style="list-style-type: none"><li>• Good for close-mic'ing a sound source</li><li>• Broad-angle pickup of sound sources in front of mic</li><li>• Maximum refection of sound approaching the rear of the mic</li></ul>
<b>Hypercardioid</b>	<ul style="list-style-type: none"><li>• Excellent for close-mic'ing a sound source</li><li>• Maximum side rejection of sound source</li><li>• Maximum isolation – pick up less reverberation, leakage, feedback and background noise</li></ul>
<b>Figure-of-Eight</b>	<ul style="list-style-type: none"><li>• Front and rear pickup, side sound rejected.</li><li>• Perfect for two-part vocal groups or across table interviews</li><li>• Used in specialist stereo recording applications</li></ul>
<b>Omni-directional</b>	<ul style="list-style-type: none"><li>• All-around pickup</li><li>• Most pickup of room reverberation/ambience</li><li>• Not much isolation (potential spillage/leakage issues)</li><li>• Low sensitivity to 'pops' (explosive 'p's, 'b's and breath sounds)</li><li>• Low handling noise</li></ul>

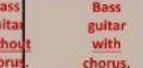
# Nat 5 Processes

beat-matching	This is a technique used by DJs to move seamlessly from one song to the next. As one song is being played, the next song is lined up. By using pitch shift on the turntable to slightly speed up or slow down the tempo of the upcoming song, the tempos are matched. The DJ then crossfades from one song to the next. This process can then be repeated.	
digital processor	A digital signal processor is a microprocessor capable of rapid analysis of a signal, which can allow it to be enhanced or modified.	
drop in/out	This is the same process as <i>punch in/out</i> - A technique in multitrack recording that lets a performer record over mistakes or change parts previously recorded by punching in and out of record mode while the machine is in playback. To perform a drop in/out the engineer will select the area to be recorded before the pass.	
fade in/out	When a track or piece of music increases in volume gradually from silence or when a track or piece of music decreases in volume gradually to silence. This has become a widespread practice in mixdown technique as a tidy way of ending a song.	
import/export	A useful function allowing file types not native to the programme to be opened and used by the programme. In a digital audio workstation the most common file types to import are audio files (.wav .aiff .mp3).	
latency	The delay between a signal going into a processor and coming back out again. While latency may occur to a small degree in most audio devices where what is being input is being simultaneously monitored, it predominates in A/D converters and D/A converters in computer-based recording setups. This is due to the time it takes for the computer to digitise and then undigitise the audio information and is directly related to the processing speed of the computer. Faster processors significantly reduce any latency.	

# Nat 5 Processes

locators	These can perform a range of functions within a digital recording. For example, they can be set to a beginning and end point to allow a section of the track to be played as a loop, or they could be used to select the in and out points for a drop in.	
markers	These can be added to recordings on a digital audio workstation to help identify and easily find key sections of the track, for example verse, chorus, instrumental break.	
Multi effects processor	A piece of hardware that offers several different effects, for example reverbs, delays and choruses. These are most used in live settings, but they are still found within a studio environment.	
Quantisation <a href="https://youtu.be/fCYVLJ4ggCk">https://youtu.be/fCYVLJ4ggCk</a>	Notes can be moved either backwards or forwards, making them rhythmically accurate. On a MIDI workstation quantising notes can be 'snapped' to a specific rhythm, for example quavers or triplets. So, quantizing means moving notes recorded into a MIDI sequencer or DAW in line with the "grid," which makes a rhythmically imprecise performance end up perfect.	
Vocal enhancer	This is can be a hardware or software multi-effects unit combining a range of functions, eg compression, de-essing, harmoniser, pitch correct, which can be used by a singer in a live or studio environment.	

# Nat 5 Controls & Effects

chorus (effect) <a href="https://transverseaudio.com/posts/how-to-use-a-chorus-effect">https://transverseaudio.com/posts/how-to-use-a-chorus-effect</a>	<p>An effect whereby short delays and slight modulations are added to a signal to make it sound as if there is more than one player. Chorus takes the original sound and creates a copy that is slightly out of tune with the original. The chorus's shifted pitch varies over time. This variance is called <i>modulation</i>, and the result is an effect that can add interest and variety to an instrument. It therefore applies a detuning effect, which can be detrimental to some instruments (for example the acoustic piano) but can be very effective on others (for example the <b>electric guitar</b>). Chorus is a common guitar pedal effect that gives a clean electric guitar a "dreamy" quality. It's also used on <b>acoustic guitar</b>, <b>bass guitar</b> and <b>electric piano</b>. On <b>strings and synth pads</b>, chorus creates a richer, more complex sound.</p> <p>Most chorus effects give you several parameters :</p> <ul style="list-style-type: none"> <li>• <b>Rate:</b> The rate dictates how fast the modulation happens. This parameter is described as a frequency (usually 0.1 to 10 Hz). The frequency actually doesn't refer to a pitch; rather, it describes how many times per second (Hz) the oscillation happens. The oscillation is controlled by the depth parameter.</li> <li>• <b>Depth:</b> The depth parameter controls the amount of pitch modulation that's produced by the chorus. This determines how deep (or far) the sweep of the delayed sound will be, essentially setting limits on how far the modulation will reach. This gives the sound a <b>phaser-like characteristic</b>.</li> <li>• <b>Predelay:</b> The predelay setting affects how far out of time the chorus's sound is in relation to the original. This setting is listed in milliseconds, and the lower the number, the closer the chorused sound is to the original in time.</li> <li>• <b>Feedback:</b> The feedback control sends the affected sound from the chorus back in again. This allows you to extend the amount of chorusing that the effect creates. This setting can also be called stages in some systems.</li> <li>• <b>Effect Level/ Mix/ Dry&amp;Wet :</b> The effect level controls how much effect is sent to the aux return bus. This determines how much of the original sound will be mixed with the affected sound</li> </ul>	  <p>Bass guitar without chorus. DRY</p> <p>Bass guitar with chorus. WET</p> <p>Listen to the guitar which has a chorus effect</p>
dB (decibels)	The measurement of the amplitude of a sound wave. The greater the amplitude, the louder the volume.	
gated reverberation (reverb)	<p>An effect whereby a noise gate is applied to the output of a reverb processor. The natural decay of the reverb is therefore cut off sharply, resulting in a rather startling unfinished sound. The effect is most <u>often used on drums</u>, to make them sound powerful and "punchy," while keeping the overall mix clean and transparent-sounding.</p>	

# Nat 5 Controls & Effects

auxiliary in(put)/out(put) (Aux)	<p>The aux in/out are functions of a mixing desk allowing the signal from a channel to be bussed. In a studio application the signal could be bussed to an effects unit/plugin, or sent to a separate headphone mix for an artist recording.</p> <p>In a live application the aux out can be sent back to the stage for monitoring.</p>	
auxiliary send/return	<p>A mixing desk function allowing a signal or group of signals to be sent to a separate output – an auxiliary output – for either monitoring or processing.</p> <p>In the case of monitoring a <b>pre-fade</b>, <u>send</u> will be used. For effects processing a <b>post-fade</b>, <u>send</u> will be used and the signal with the process added to it will then be <u>returned</u> to the mixing desk.</p>	
boost EQ/cut EQ	<p>EQ is an in depth way of adjusting the treble and bass controls.</p> <p>A <b>Low Frequency boost</b> is where the lower frequencies of a pitch are boosted, reducing the treble frequencies. This makes the track <u>"meaty"</u> and <u>"punchy"</u>. <b>Too much</b> can make it <u>unclear</u>, <u>woolly</u> and <u>distorted</u> and <b>cutting low EQ</b> can make it <u>weak</u>.</p> <p>A <b>high Frequency boost</b> is where the higher frequencies of a pitch are boosted, reducing the lower frequencies. This makes the track <u>sharp</u> and <u>bright</u>. <b>Too much</b> can make it <u>thin sounding</u> and give <u>too much hiss</u>. <b>Cutting</b> it can make it <u>unclear</u> and <u>'muddy'</u>.</p>	
close mic'd	<p>When a microphone is positioned between 2 cm and about 30 cm from an instrument, it is said to be close mic'd. Close mic'ing helps to reduce problems with leakage from other instruments nearby but can lead to other problems related to sound level and the proximity effect. It can also mean that performers may hit the microphone or that the microphone will also pick up the sounds of the instrument being played (e.g. keys on a flute moving).</p>	

## Nat 5 Controls & Effects (cont)

<b>LFO</b> <a href="https://blog.la-ndr.com/how-to-use-lfos/">https://blog.la-ndr.com/how-to-use-lfos/</a>	<p>Stands for Low Frequency oscillation. This low frequency creates a rhythmic pulse or sweep which is used to modulate synthesisers and create audio effects such as vibrato, tremolo and phasing. LFOs are sound waves that vibrate at much lower frequencies – less than 20 times per second (so below 20 Hz). LFOs are not used as sound sources – they're signals used to modulate other sounds. LFOs <u>don't</u> make sound. <b>They make sounds move.</b></p> <p><a href="https://www.youtube.com/watch?v=YEHnd9b79Uc">https://www.youtube.com/watch?v=YEHnd9b79Uc</a></p>
<b>Limiter</b> <a href="https://blog.la-ndr.com/limiter/">https://blog.la-ndr.com/limiter/</a>	<p>A <b>dynamic processor</b> that stops a signal from going over a predetermined limit. Essentially a limiter is a compressor with extreme settings: a <u>high ratio</u> and a <u>very fast attack time</u>. The Limiter goes on the MIX BUSS to increase the overall volume without clipping. Unlike compressors, which are best used for obtaining a more consistent level by reducing louder parts of the recording without squashing the peaks, limiters are best used for <u>reducing peaks or spikes</u> in the recording <u>without</u> affecting anything else. Limiters are used in live sound as protection devices. If there is a sudden spike in a signal, the limiter can react quickly and prevent loudspeakers getting damaged. The <b>threshold</b> sets the level where the limiter will begin work. Bring this down until the limiter begins stopping the signal where you want it. The <b>attack</b> and <b>release</b> settings control the timing of the gain reduction—how fast or slow it comes in or out. <a href="https://www.youtube.com/watch?v=e7nNN5tJOIg">https://www.youtube.com/watch?v=e7nNN5tJOIg</a></p>
<b>noise gate / 'gating'</b> <a href="https://www.youtube.com/watch?v=Plhecyoi4bM&amp;ab_channel=Rays hanSanoon">https://www.youtube.com/watch?v=Plhecyoi4bM&amp;ab_channel=Rays hanSanoon</a>	<p>A device used in recording to reduce background noise. It only allows sound through when it is above a specified volume threshold. It can be set to automatically mute or cut the signal during parts of the audio track where the instrument is not being played, and unmute again when the instrument is being played. If a signal reaches a preset threshold, the noise gate opens and allows the signal to pass through. If the threshold is not met, the gate stays shut, eliminating any lower level noise or hiss.</p> <p><i>e.g. you may have recorded a great guitar part but during the parts of the song where you are not playing the guitar amp hums. A noise gate is an effective solution as it will simply shut during these parts and open again when triggered by the guitar playing again.</i></p> <p>Noise gates usually have five main parameters: <b>threshold</b>, <b>ratio (reduction)</b>, <b>attack</b>, <b>hold</b> and <b>release</b>.</p> <p><b>Threshold</b> – this sets the level at which the gate opens to let the sound through.</p> <p><b>Ratio</b> – the balance between the original sound and the gated sound. For example, instead of using the gate to totally mute the background ambience on a vocal track, you could allow some of the ambience to still be heard if so desired.</p> <p><b>Attack</b> – sets the time it takes for the gate go from a closed state to an open state.</p> <p><b>Hold</b> – allows the gate to be held in an open state after the signal level has fallen below the threshold.</p> <p><b>Release</b> – use this to set how long it takes for the gate to go from fully open to fully closed. A fast release quickly cuts off the sound whereas slower release is more like a fade out. <i>Beware not to set the release too fast as it will include clicking sounds.</i></p>



**LIVE WORKSHEETS**

# Nat 5 Controls & Effects (cont)

pitch bend	<p>Changing the pitch of a note, for example by pushing a guitar string upwards. Keyboards and synthesisers can also pitch bend using a control wheel or level to send control messages.</p> <p><a href="https://youtu.be/03RgDTqyoAA">https://youtu.be/03RgDTqyoAA</a></p> <p><a href="https://youtu.be/dl2qnavDzng">https://youtu.be/dl2qnavDzng</a> (singers changing their pitch of their 'meow' in famous 'Cat duet')</p>	
punch in/out	<p>A technique in multitrack recording that lets a performer record over mistakes or change parts previously recorded by punching in and out of record mode while the machine is in playback.</p> <p>Punching in can be performed by an engineer pushing the right buttons at the right time or the performer hitting a foot switch at the required point. Similar to a drop in/out.</p>	
wah-wah/envelope filter	<p>In electronic music, wah-wah effects are produced by controlling tone filters with a pedal, or via an envelope filter circuit – sometimes called auto-wah. The effect constantly changes the volume (amplitude) of harmonics in a sound. This alters the sound of the signal making it sound similar to a human voice saying "wah".</p> <p>Most often thought of in connection with the <a href="#">electric guitar</a> in Jazz Funk music.</p>	<a href="https://www.youtube.com/watch?v=88o13DJ8zno">https://www.youtube.com/watch?v=88o13DJ8zno</a>