EQ REVISION PACK

SHORT QUESTIONS

Most EQ questions will relate to an audio file. You are required to demonstrate your critical listening skills as well as having an in-depth knowledge of this topic.

Identify the filter added to the synth chords at the start of **bar 10**.

Put a cross ☒ in the correct box.

(1)

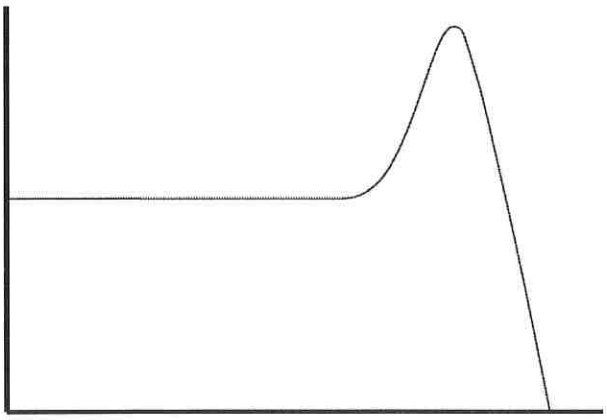
- ☐ **A** Band pass filter
- ☐ **B** High pass filter
- ☐ **C** Low pass filter
- ☐ **D** Notch filter

(e) The graph below shows the filter on the synthesiser in **bars 2–9**.

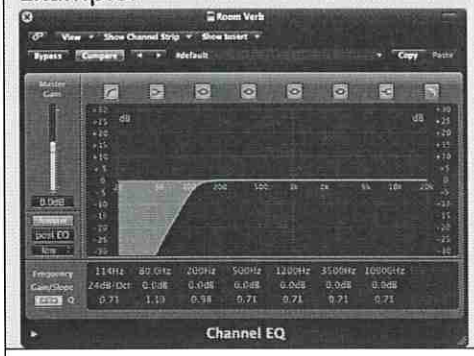
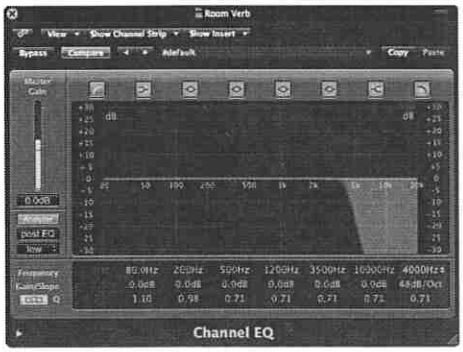
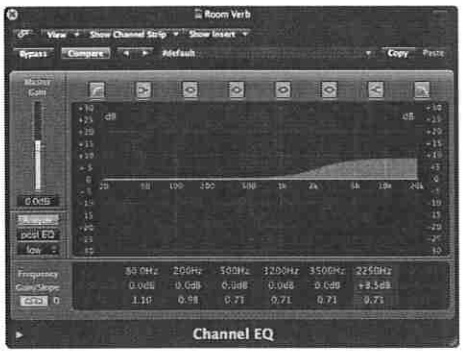
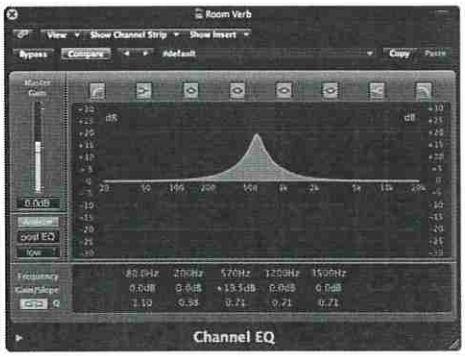
(i) Identify the filter used.

(1)

- ☐ **A** Band pass filter
- ☐ **B** High pass filter
- ☐ **C** Low pass filter
- ☐ **D** Notch filter



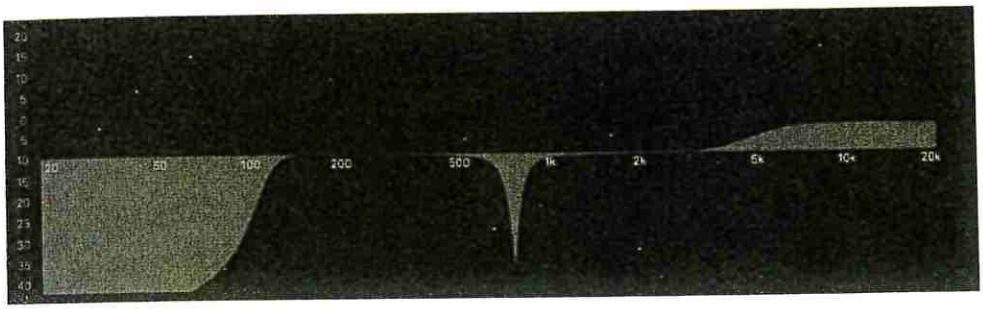
TABLES

	Filter	Describe what this filter does
Example: 	High-Pass Filter	Progressively reduces level of frequencies below a specified frequency(cutoff frequency)
	(1)	(2)
	(1)	(2)
	(1)	(2)

Question 5

Equalisation

The parametric EQ plugin below has been used to process a vocal part.



***a.** Describe three benefits of using a parametric EQ over a graphic EQ. (3)

1. _____

2. _____

3. _____

***b.** In the table below, explain why the three EQ changes shown above have been chosen to process a lead vocal part. (6)

Change	Justification
(1)	(1)
(1)	(1)
(1)	(1)

***c.** Identify the centre frequency of the middle EQ change. (1)

_____

Total for AS Level: 10 marks/Total for A Level: 10 marks

GRAPHS

Exam board favourite. Analysing a sound and drawing the frequency curve. Remember you have Logic to help you out on this one. Pull up a Channel EQ and check the labels of the axis.

(c) EQ has been applied to the bass. On the graph below, illustrate the two EQ curves used on the bass.

(i) Label the two axes.

(2)

(ii) Draw the low shelf EQ.

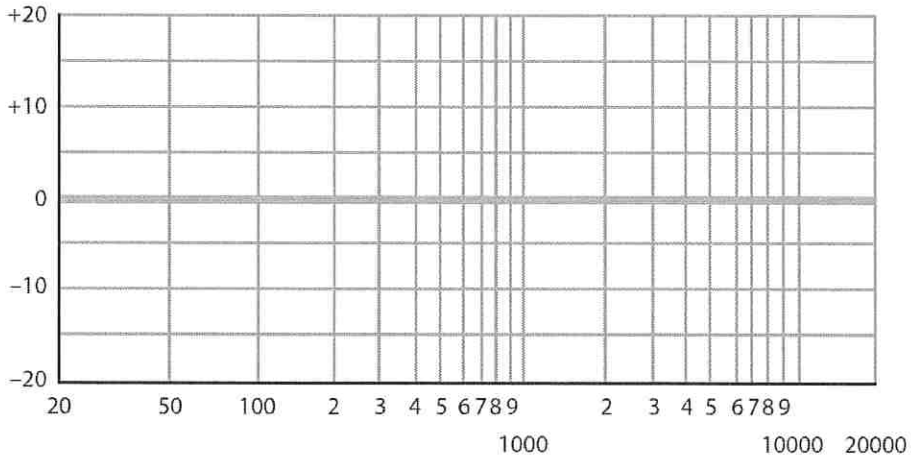
(3)

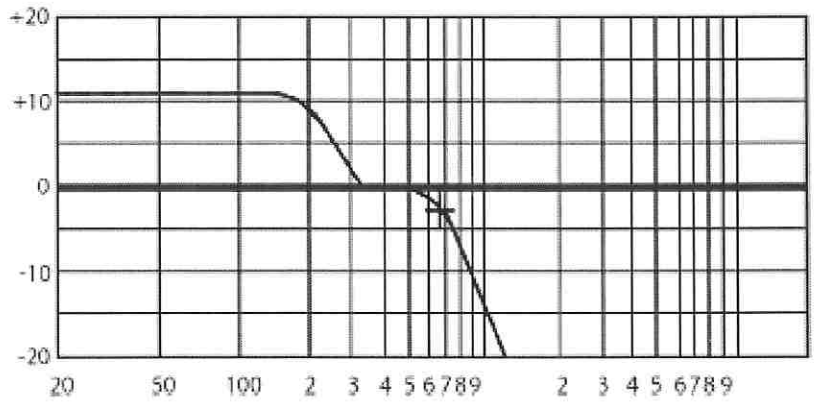
(iii) Draw the low pass filter.

(3)

(iv) On the curve you have drawn for part (iii), draw a cross to indicate the low pass filter cutoff frequency.

(1)



Question Number	Question	Mark
2(c)	EQ has been applied to the bass. On the graph below, illustrate the two EQ curves used on the bass: (i) Label the two axes. (ii) Draw the low shelf EQ. (iii) Draw the low pass filter. (iv) On the curve you have drawn for part (iii), draw a cross to indicate the low pass filter cutoff frequency.	9
	Acceptable Answers	
	(i) Frequency/Hertz/Hz (1) Amplitude/magnitude/volume/dB/gain (1) (ii) **Curve:** Low shelf boost. (1) **Gain:** boosts between 5-20dB (1) **Frequency:** Mid point of slope 100Hz and 400Hz.(1) Max 1 if any additional cuts below 0dB (iii) **Curve:** LPF (1) **Slope:** LPF is steep, not vertical curve that is steeper than 45° AND hits -20,with no resonance (1) (don't allow HPF) **Frequency:** LPF starts on x-axis 150-900Hz but must be higher than the low shelf (1) Max 1 if any additional boosts above 300Hz. (iv) Cutoff marked between -1dB and -5dB on the filter (for part (iii)) curve (1). Allow correct cutoff if part (iii) is incorrect.  	

(ii) How can you tell from the graph that resonance was increased?

(1)

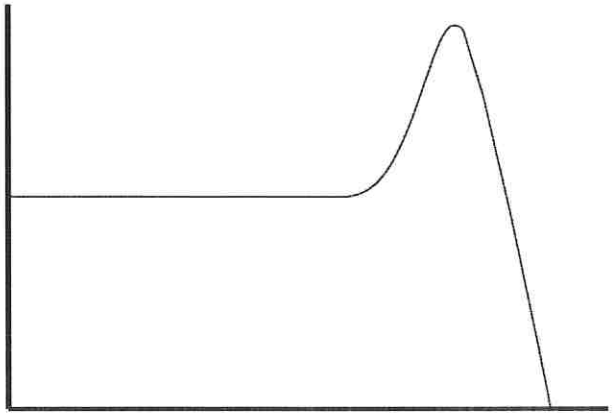
.....

(iii) Label the two axes.

(2)

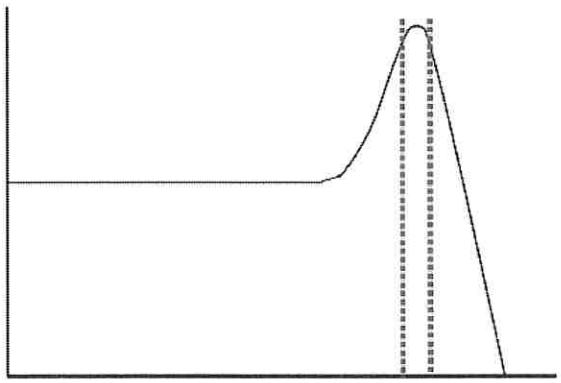
(iv) Draw a cross to indicate the cutoff frequency.

(1)



Question Number	Question	Mark
1(e)(ii)	How can you tell from the graph that resonance was increased?	1
	Acceptable Answers	
	Any description of the peak / bump / boost (at cutoff frequency) (1)	

Question Number	Question	Mark
1(e)(iii)	Label the two axes of the graph.	2
	Acceptable Answers	
	y-axis: amplitude / gain / volume / dB (1) x-axis: frequency / Hz / kHz (1) [Ignore capitalisation for both] Apply SONC	

Question Number	Question	Mark
1(e)(iv)	Draw a cross to indicate the cutoff frequency.	1
	Acceptable Answers	
	Accept anywhere in the range shown by the dotted lines. 	

ESSAY

What is EQ? Describe the following types of EQ found on a software plug-in: high pass filter; low shelf; band; high shelf; low pass filter. Give **one** practical use for each type. Describe the differences between parametric EQ and graphic EQ.

EQUALISER

Bell Labs had an issue with high frequency loss of longer cables in the early telephone days. The voice would sound dull and muffled on the other end of the line. They designed an electronic circuit to boost the high frequencies so that the sound was **EQUAL** on both ends of the telephone line. Hence, equaliser.

An Equaliser(or EQ) can be described today as an audio processor which uses a combination of different **filters** to alter the balance of frequencies in an audio signal.

EQ HALL OF FAME

John Volkman's external equalizer design from the 1930s featured a set of selectable frequencies with boosts and cuts, and is sometimes considered to be the first operator-variable equalizer

50s and 60s Langevin designed the Model EQ-251A, which used sliders to cut and boost a fixed frequency. Considered to be the precursor to a graphic EQ

1967 Saul Walker designs the API 550A a 3 band OEM modular EQ. A module that is still in production today

1971, Daniel Flickinger invented an important tunable equalizer. His circuit, known as 'sweepable EQ'

1972, Burgess MacNeal and George Massenburg designed, the 'sweep-tunable' EQ with 3 parameters for each band(frequency, gain(cut and boost) and Q(bandwidth). This is became known as the parametric EQ

- Other industry standard EQs: Pultec and

MovieTime

DON'T TAKE MY WORD FOR IT...LET'S ASK GEORGE

GRAB YOUR POPCORN, SIT BACK AND LET THE LEARNING HAPPEN

TALKING ABOUT EQ...KEY TERMS

EQ is process of filtering(amplifying and attenuating) a range of frequencies

GRAPHIC, PARAMETRIC and PARAGRAPHIC(or Semi parametric) are types of EQ

What is a Graphic EQ
An equaliser which uses a large number of regularly spaced, fixed-frequency filters, each with an individual gain fader

Amplifying(increasing the gain) a frequency band is called BOOSTING

Attenuating(decreasing the gain) a frequency band is called CUTTING

HIGH PASS, LOW PASS, SHELVING AND PEAK are types of filters

An OCTAVE is DOUBLING the Frequency e.g. octave above 200Hz is 400Hz

What is a filter?
A circuit which alters the level of a limited range of frequencies.

TYPES OF EQ

GRAPHIC

- Fixed Frequency each with vertical fader gain control
- Easy to see the frequency curve
- Useful in live sound applications
- Limited studio use because of lack of flexibility

PARAMETRIC

- Selectable frequencies
- Bandwidth can be adjusted(Q value)
- Huge amount of flexibility which makes it the Eq of choice in studios
- Other types of Eq are SemiParametric or Paragraphic

TYPES OF FILTERS

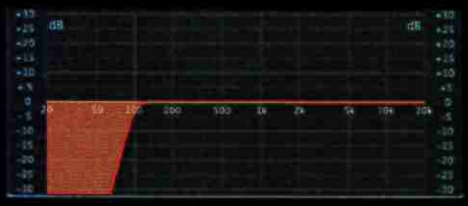
	HIGH-PASS FILTER	Progressively reduces level of frequencies below a specified frequency(cutoff frequency)
	LOW-PASS FILTER/HI-CUT	Progressively attenuates frequencies above a specified frequency(cutoff frequency)
	HIGH AND LOW SHELF FILTER	A filter designed to alter the level of all signals beyond a certain frequency by a userdefinable amount
	PEAK FILTER/ NOTCH FILTER	Peak filters are used for more advanced application where it is necessary to target specific frequency bands with greater accuracy. Q(also know as bandwidth or resonance) value allows more precision when dealing with localised frequency problems such as hum, noise, or vocal sibilance


LOGIC PRO CHANNEL EQ
HPF
Low Shelf
Peak Filters
High Shelf
LPF
Parametric EQ with all 4 filter types
FREQUENCY-selectable Frequencies across the audio spectrum(20Hz-20kHz)
Gain/Slope- cut and boost selected frequencies
Q- change the bandwidth of a peak filter
EQ selection
Gain
Q(bandwidth)
EQ Display
Analyzer


TALKING ABOUT EQ APPLICATIONS....
REMOVE NOISE
Hiss/Rumble/Hum/
INSTRUMENT SEPARATION
prevent masking
BALANCING THE FREQUENCY SPECTRUM
SHAPING THE TIMBRE OF INSTRUMENTS
/Fat/Thin/honky/muddy/ clean/dirty/bright dull
ADDING DEFINITION
intelligibility to instruments/bringing it forward in a mix
CREATIVE USE
Frequency sweeps, telephone FX etc.

DESCRIBE HOW YOU WOULD ELIMINATE LOW FREQUENCY NOISE/RUMBLE ON A VOCAL RECORDING.

Apply EQ to the Vocal/Use a High-Pass Filter/ Set cut-off frequency between 80-100Hz/Set a steep slope(48dB/octave)



DESCRIBE HOW YOU WOULD REDUCE THE HISSING NOISE ON AN ELECTRIC GUITAR RECORDING.

Apply EQ to the guitar/Use a LPF/ Set the frequency around 3kHz/set a gentle slope(12dB/octave)

DESCRIBE HOW YOU WOULD REDUCE THE HISSING NOISE ON AN ELECTRIC GUITAR RECORDING.

Apply EQ to the guitar/Use a LPF/ Set the frequency around 3kHz/set a gentle slope(12dB/octave)

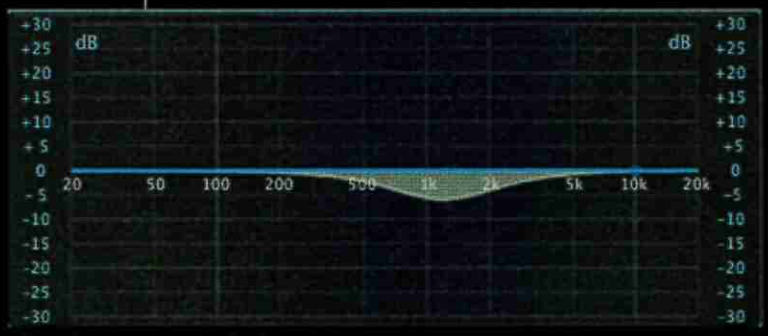
YOUR ELECTRIC GUITAR RECORDING IS TOO HONKY. USE THE GRAPH TO EXPLAIN HOW YOU WOULD EQ THE GUITAR

1) Label the axis
2) Clearly label the centre frequency and level of attenuation or amplification
3) Draw the filter you will use

YOUR ELECTRIC GUITAR RECORDING IS TOO HONKY. USE THE GRAPH TO EXPLAIN HOW YOU WOULD EQ THE GUITAR

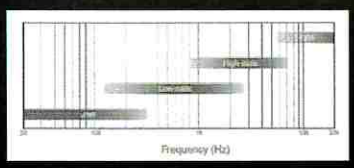
1) VERTICAL AXIS-DECIBELS/LEVEL (1) HORIZONTAL AXIS-HERTZ/FREQUENCY(1)

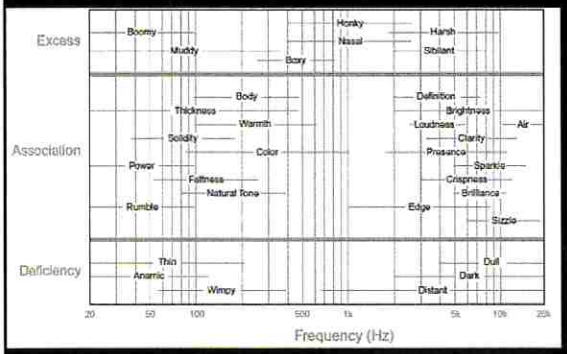
2) CENTER FREQUENCY= 1KHZ(ACCEPTABLE RANGES 900HZ-3KHZ)(1)
CUT BETWEEN -3DB TO-6DB(1)
3) PEAK FILTER WITH A WIDE BANDWIDTH/Q(1)



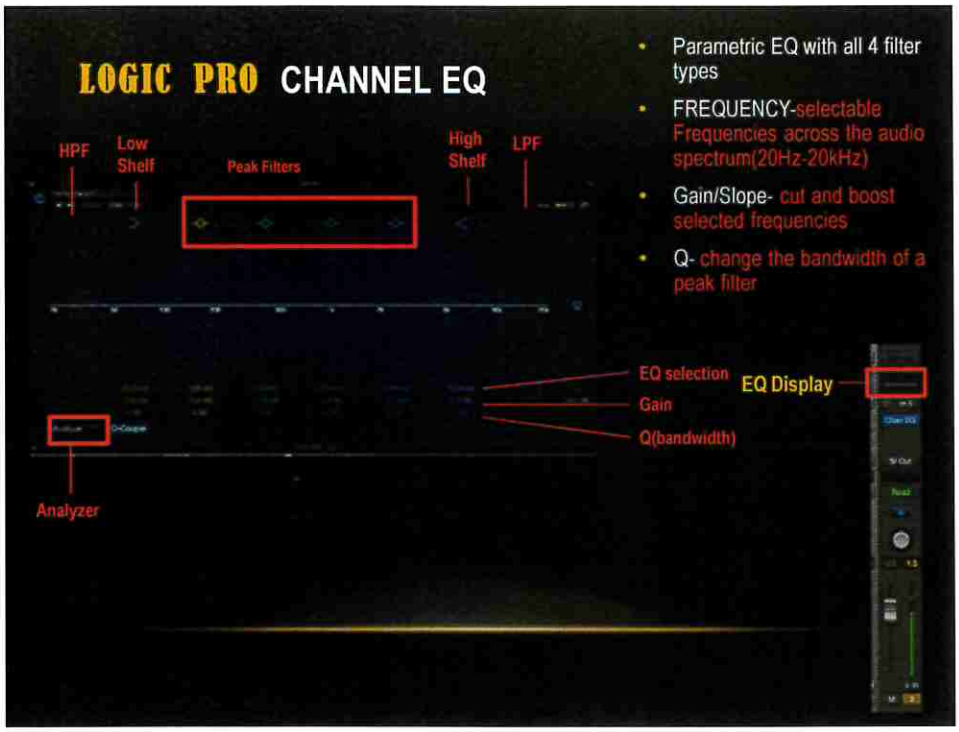
EQ

EQ CAN SHAPE THE SOUND OF AN INSTRUMENT, FOCUSING IN ON A SPECIFIC FREQUENCIES RANGE AND HELPING EACH INSTRUMENT TO CUT THROUGH A MIX. EQ CAN ALSO DECREASE UNWANTED FREQUENCIES AND NOISE. INSTRUMENTS IN THE SAME FREQUENCY RANGE CAN OFTEN MASK EACH OTHER AND EQ CAN BE USED TO ENSURE ALL INSTRUMENTS ARE HEARD IN THE MIX.





Key Words
Highs
High-Mids
Low-Mids
Sibilant
Definition
Honky
Nasal
Body
Muddy
Thin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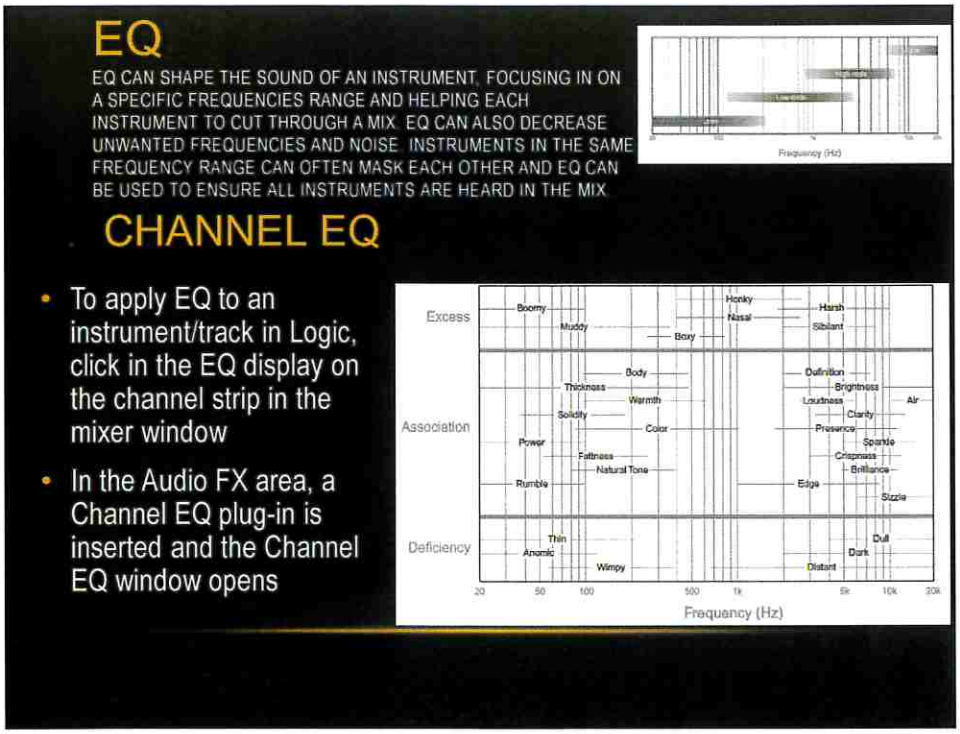
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CHANNEL EQ
To apply EQ to an instrument/track in Logic, click in the EQ display on the channel strip in the mixer window
In the Audio FX area, a Channel EQ plug-in is inserted and the Channel EQ window opens
Excess
Association
Deficiency
Boomy
Muddy
Honky
Nasal
Boxy
Harsh
Sibilant
Body
Thickness
Warmth
Solidity
Color
Power
Fattness
Natural Tone
Rumble
Definition
Brightness
Loudness
Air
Clarity
Presence
Sparkle
Crispness
Brilliance
Edge
Sizzle
Thin
Anemic
Wimpy
Dull
Dark
Distant
20
50
100
500
1k
5k
10k
20k
Frequency (Hz)

COMPARE THE DRUM MIX

- Place the songs in a specific decade-challenge name the band and the release date.
- Which drum mix do you prefer and why? Be specific.
- How do you think the drums were recorded. Multi-mic, 4 mic set up, 1 microphone.
- Which mix is an appropriate reference mix for your C1 coursework and why?

DRUM MIX PREP

ARRANGE YOUR DRUM TRACKS

e.g.

- Track 1-Kick
- Track 2-Snare Top
- Track 3-Snare Bottom
- Track 4-Hi-Hat
- Track 5-Rack Tom
- Track 6-Floor Tom
- Track 7 –OH L
- Track 8-OH R

CREATE A STEREO DRUM BUS.

Shift click on all the drum parts>ctrl+click(right click) and create a summing stack track> name is Drum Kit

- This allows you control all drum parts with one fader.
- Apply overall drum processing e.g. Bus compression, EQ or Reverb

CHECK FOR PHASE ISSUES

Insert a GAIN plug-in on all your tracks. This will allow you to invert the phase. If you have 2 kick drum mics or 2 snare drum mics. Invert the phase of one of the tracks. You listening for a loss of low end or a hollowness. Check the phase between Kick and OHs and snare and OHs

PANNING

Place all the parts in the stereo field.

Place Kick and Snare centre

OHs panned L and R. Not all the way hard L and R

Listen to OHs and find the placement of the Hi-hat and Tom

TASK 1: DRUM MIX PREP

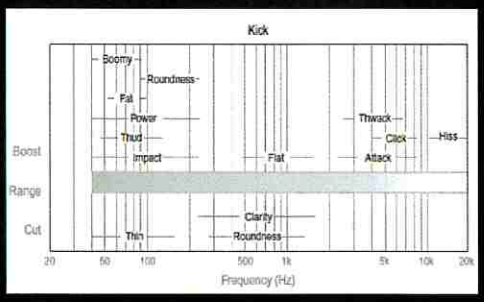
- Arrange your tracks logically
- Create a stereo drum bus using stack tracks
- Check the phase of all your tracks using the Gain plug-in
- Pan drum parts to place it in the stereo field
- Check all the input levels to ensure they are strong enough to be processed and not distorting. Use the Gain plug-in to boost or attenuate the level.
- Adjust fader levels for a static mix. Remember the Kick and the Snare is the foundation of your drum sound and they have to be audible at all times.

MAGAZINE ARTICLE QUIZ

Pen and pad time write it up…

1. What is a good first step when mixing drums?
2. Explain why a slower attack on a compressor is used on the kick drum.
3. How would you use **EQ** to add definition to your **kick**?
4. How would you use **EQ** to add "crispness" to your **snare**?
5. What would you treat the OHs for a vintage sound?

Kick Drum



- EQ on a kick drum is a creative decision and the way use EQ is dependent on the style of music. There are 2 main components-the impact(low frequencies)and the attack(high mids).

Example:

Dance and Hip hop will benefit from more "oomph"(around 60Hz).

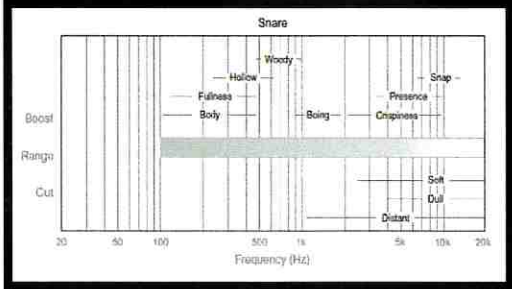
Rock and Pop uses more thud(around 90Hz)

Heavy Metal requires more click(around 8kHz)

It's important to have a reference track when shaping your kick sound.

Also, check how your kick interacts with your bass as they will compete for the low end space. This will effect the way you EQ your kick.

SNARE

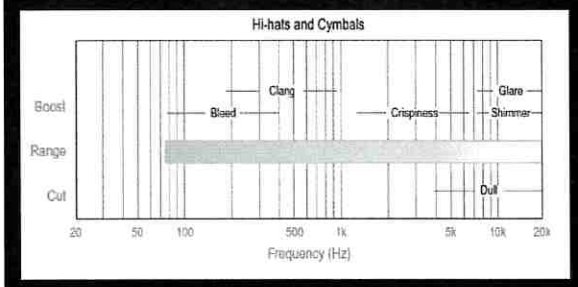


Start by sorting out the issues for example excess rattle or resonant ring. The frequency range differs from snare to snare, therefore you need to use the sweep technique to identify the problem frequency(or frequencies).

Snares often need more snap and crispness and can do with a high-mid frequency boost.

HI-HAT

Hi-hats are you brightest element in your mix and plays a big part in our perception of how bright the mix is. Use a HPF to filter most of the low frequency content. Ensure you add shimmer rather than making it too bright or brittle. A gentle high frequency boost and HPF should do the trick.

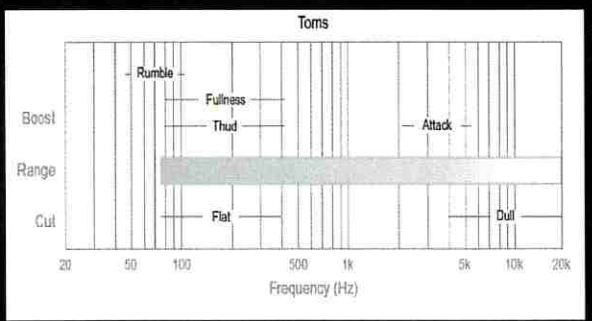


TOMS

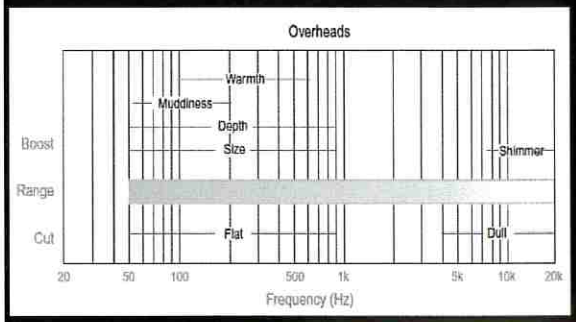
TOMS often need a bit of thud around the higher lows(200Hz or so) and attack around the high-mids(around 3kHz).

If they not recorded well it is best to use the OHs for their sound.

Pay close attention to the floor tom as the low frequency resonance can be messy and difficult to control.



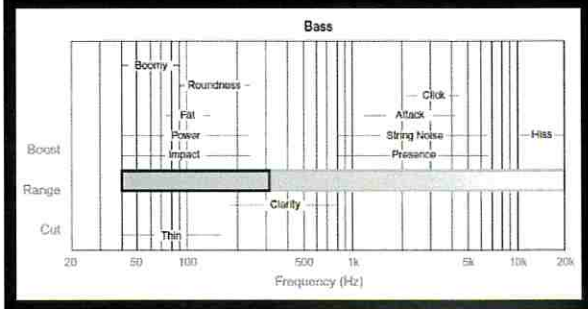
OVERHEADS



The way we EQ the OHs is dependent on the way we recorded it. There are 3 general approaches:

1. Main stereo pair-the OHs are responsible for the majority of the sound and, just the kick and snare mics help reinforce the sound. This a typical jazz set up and you should apply little or no low-end filtering.
2. Equals-the kick and snare share the sound with the OHs. This is common with contemporary production with prominent kicks and snares. HPF will be used just to clear up the low-end for the kick.
3. Cymbals only and bad room ambience-If you using the OHs just for your cymbal sound and if you trying to reduce the ambience of the room, a HPF with a high cutoff frequency is required.

Bass Guitar



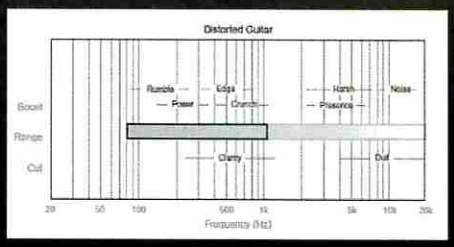
Bass is one of the trickiest instruments to mix, whether it's synth or bass guitar. In addition, different genres have distinctive bass sounds.

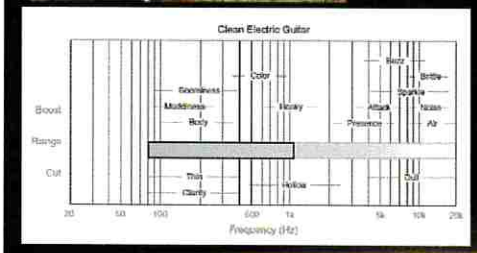
There are 2 principle aims for a good bass sound: power from solid lows and definition.

Too much lows=a boomy mix
Too little lows= a thin mix

There is very little content above 5kHz. If you need to add extra definition an enhancer or some distortion(pedal or amp) will do the trick.

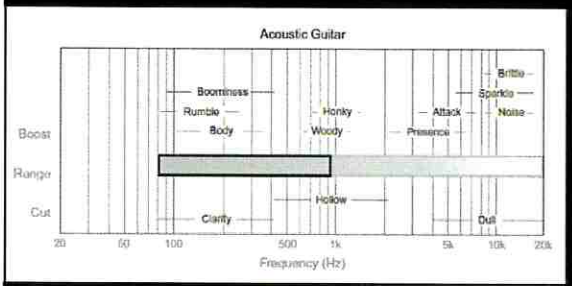
Electric Guitar





Often electric guitar is recorded with some form of EQ(pedals/amps), therefore, your aim is to have a well defined sound and avoid masking other instruments. A good start is a HPF to clean up the low end.

ACOUSTIC GUITAR

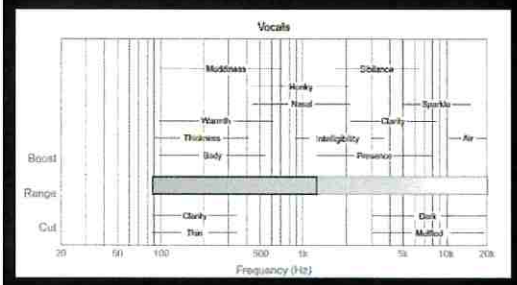


Acoustic guitar has various roles in a mix:

1. The main instrument(along with the vocals)-you want the sound to rich and full bodied. Therefore, keeping the low-mids is preferable
2. To reinforce the rhythm and harmony-often treated with a HPF(cutoff around 80Hz) and remove some of the body(approx. 200Hz0 of the guitar. Some commercial recordings remove all of the body for a more rhythmic role.

The very high frequencies are sensitive to boost. Proceed with caution as a small boost around 10kHz can make the sound thin and cheap

LEAD VOCALS



Vocals is the key element in many production and must be the most prominent. The way you EQ a vocal is dependent of the range of the singer(male or female).

Start by eliminating the errors or issues:

Muddiness-gently attenuation(-3dB to -6dB) around 300Hz and 500Hz.

Honky/Nasal-a narrower bandwidth is require to reduce nasalness. Use the sweep technique to find the problem frequency, between 500Hz and 4kHz.

Sibilance-ideally you will use a de-esser but you reduce it by gently attenuation around 5kHz with a wide bandwidth(Q).

Always use a HPF to clean up the low-end. A steep slope(-48dB/oct) around 100Hz should do the trick

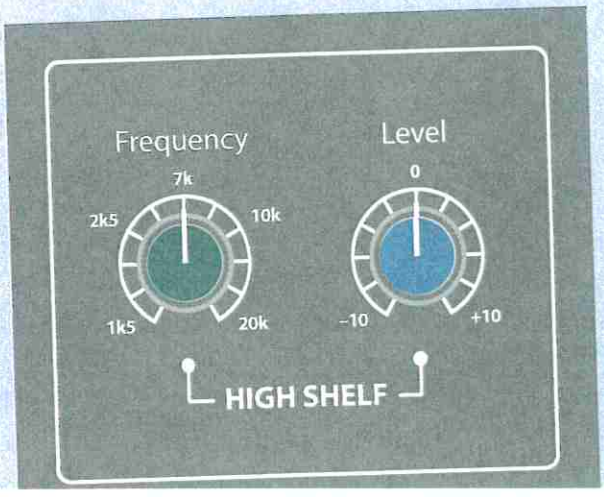
Hi-mids are very sensitive to boosts. Just the slightest of boosts around 1kHz-3kHz can make the vocal sound cheap.

Equalisation
Equalisation, which is abbreviated as EQ, is the function that alters the frequency content of the audio. Mixing desks will almost always have some form of EQ available and DAWs will offer EQ as a plugin to be added where it is needed.

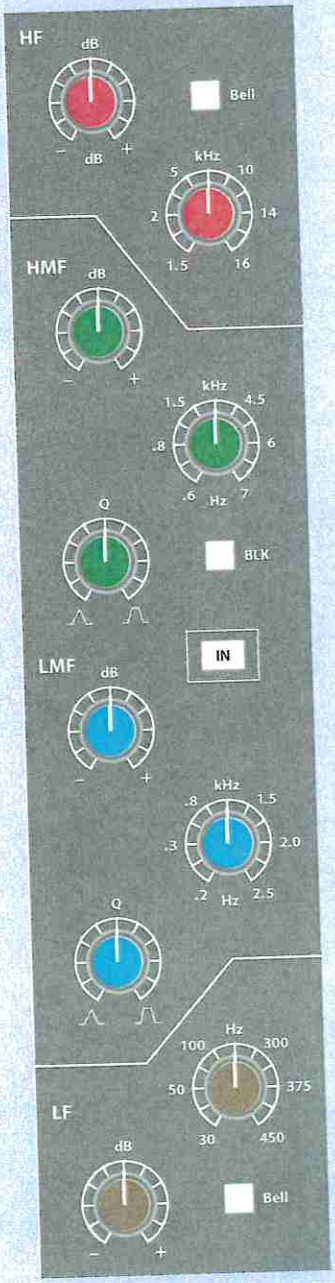
There are numerous types of equalisation, but the types that you're most likely to come across are:

Fixed EQ
This type of EQ has a fixed frequency band that the control affects. You might have seen this as Treble, Mid and Bass on a sound system or car stereo. Treble represents the higher frequencies, Bass the lower frequencies, and Mid is everything in between.

Shelf EQ
This is a type of EQ which enables the sound engineer to alter all frequencies above or below a set frequency. A high shelf is for high frequencies and a low shelf for low frequencies. In parametric EQs, the frequency will be adjustable.



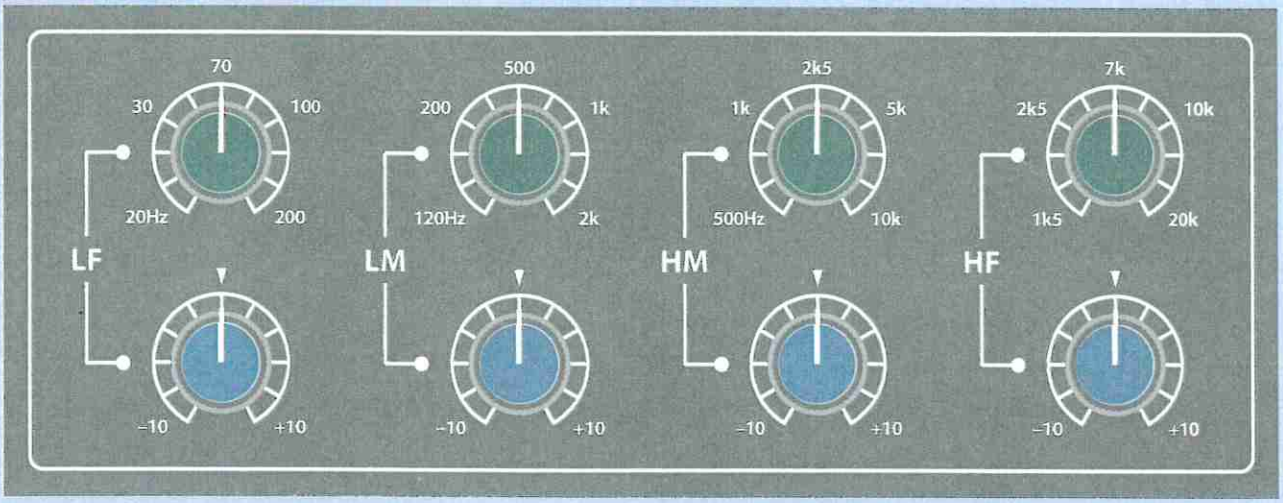
Parametric EQ
This is a kind of EQ which enables the sound engineer to really focus the equalisation to the chosen frequency band. Three controls are provided, frequency, gain and Q (short for quality). This makes it very similar to Semi-Parametic, but with the addition of Q.



The Q control enables the EQ to focus in on the chosen frequency. When a high Q setting is used, the frequency band is very narrow, meaning you can really find that problem frequency which you want to remove. If you use a low Q setting, the frequency band is wide, resulting in a

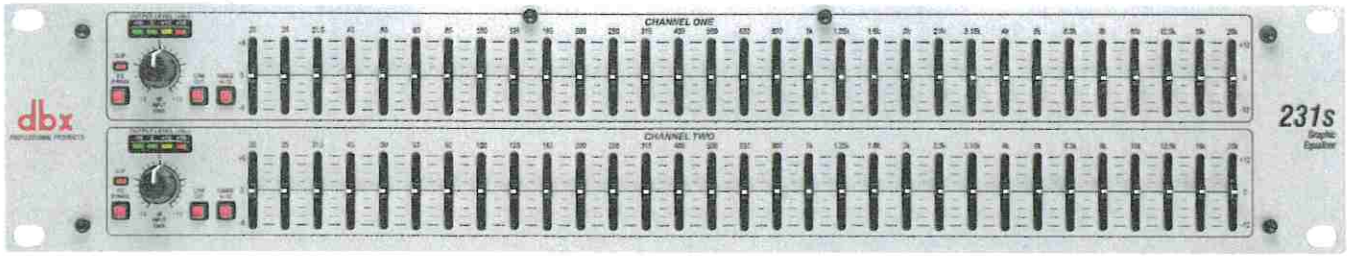
weep / Semi-Parametric EQ

his is a kind of EQ which enables the user to set both the frequency to be affected and how much it is affected by. here are two controls, frequency and gain.

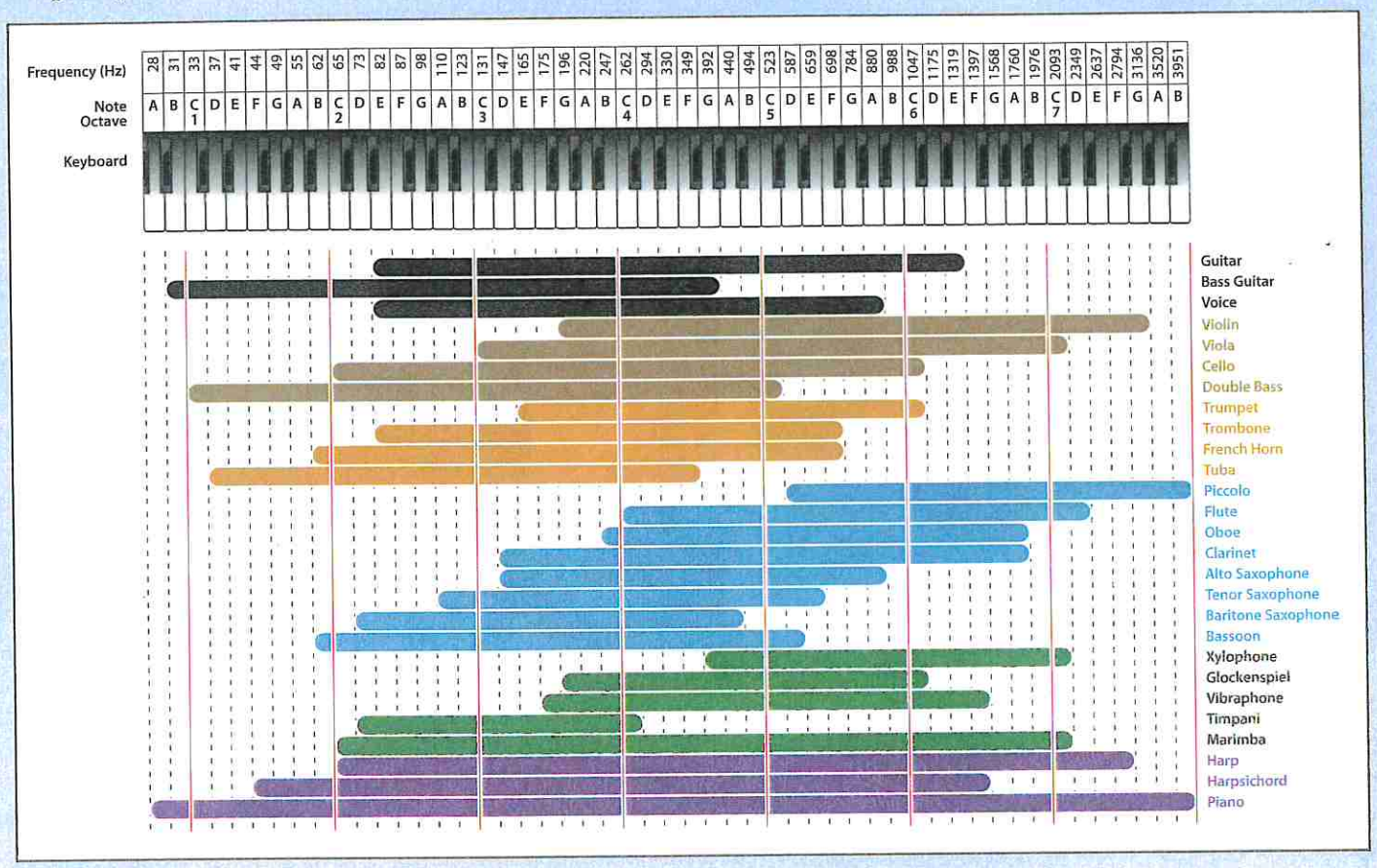


raphic EQ

his is an advanced type of fixed EQ. A good quality graphic EQ will have 31 bands of frequencies which you can either oost (make louder) or cut (make quieter).



Frequency Content Of Instruments Diagram



Equalisation

When working with multiple mixes, even from the same producer/engineer, it is quite common for there to be a difference in tonal balance. It would then be the mastering engineer's role to ensure consistency. These differences may be very subtle, so will require a very keen ear, and subtle adjustments, to the EQ settings.

It's worth remembering that any changes to tone have a counter effect. If a mix sounds dull it could be one of two things causing the problem:

- The mix doesn't contain enough high frequencies
- The mix contains too many low frequencies.

Try cutting the lower frequencies before you add high frequencies and listen to how it sounds. Experience will help you identify which it is.

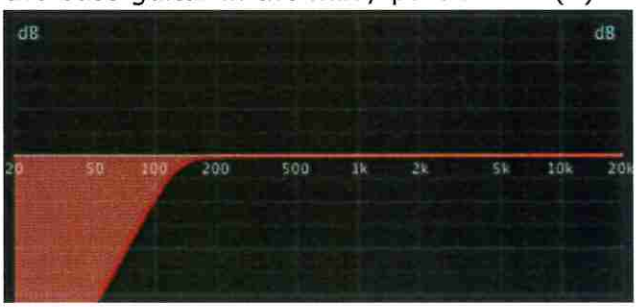
It's also important to carefully monitor the bass frequencies within the mix, particularly in bass heavy music styles. It's possible that there could be bass frequencies in the mix that you can't hear because they're too low in the spectrum for your hearing. These frequencies are particularly problematic, as any compression or limiting you apply will be triggered by the high level in the bass, even though you can't hear what is pushing the signal over the threshold.

A high pass filter may be appropriate to keep these extremely low frequencies under control.

Compression

Dynamic control should be taken care of at the mix stage, however, some subtle compression using a high quality compressor may help tighten up a mix and match it to the expectations of radio, TV, games or other broadcasters.

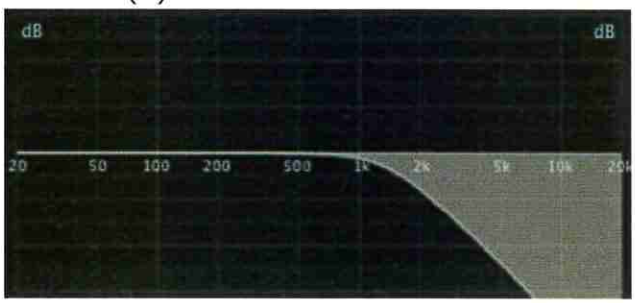
Question Number	Question	Mark
4a	What is EQ? Describe the following types of EQ found on a software plug-in: high pass filter; low shelf; band; high shelf; low pass filter. Give **one** practical use for each type. Describe the differences between parametric EQ and graphic EQ.	16
	Acceptable Answers	
	Underlined technical terms must be spelt correctly (allow American spellings) Description of EQ: Equalisation / equalise (1). Change volume of / boost or cut (1) frequency / frequencies (1) Spectral mixing (1) Description of where it can be found, e.g. PA system / mixer / hi-fi / car stereo / portable stereo (1) Frequency measured in Hz / kHz (1) Loudness measured in dB (1) Switch to bypass / turn each section on and off. (1) used to compare between before and after (1) Master output / makeup gain (1) to keep volume consistent between input and output (1). Boosting could cause clipping / hiss (1). Can affect phase / linear phase EQ (1) Analyser (1) **For all EQs:**	

	Gain (1) Cutoff / centre (frequency) (1) which is variable / sweepable (1). Q / quality (1) slope / roll-off (1) measured in dB per octave (1) alters the bandwidth / range of frequencies affected (1). Resonance / resonant peak (1) Applications must not be generalised. These would be too generalised for credit: • removing background noise (because type of background noise not specified) • makes mix bassier (because aspect/instrument in mix not specified) For each graph: correct shape (1) Labeled axes should not be credited for many graphs. x-axis: Hz/Frequency (1). Appropriate numbers ranging from 20 to 20k (1) y-axis: dB/volume/gain (1). Appropriate numbers: allow +-6 to +-40(1). **High pass filter** Removes / decreases low frequencies / cuts below Fc (1) Credit any valid example of use: e.g. usually around 20-120Hz / remove rumble / remove hum / plosives / reduce proximity effect / telephone effect / dynamic swells / filter sweeps / thin voices / crossover / multiband processing / remove sub-bass / overheads to remove kick drum boom / remove bass from reverb / remove LF / LM from acoustic guitars / make space for the bass guitar in the mix / part of BPF (1)  	

Low pass filter

Removes / decreases high frequencies / cuts above Fc (1)

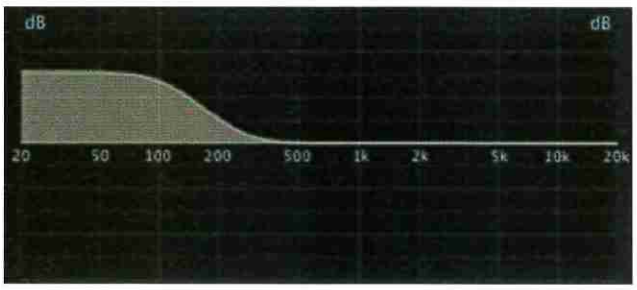
Credit any valid example of use: e.g. reduce hiss / filter sweeps / subby bass guitar / crossover / multiband processing / part of BPF / reduce spill from cymbals on kick mic (1)



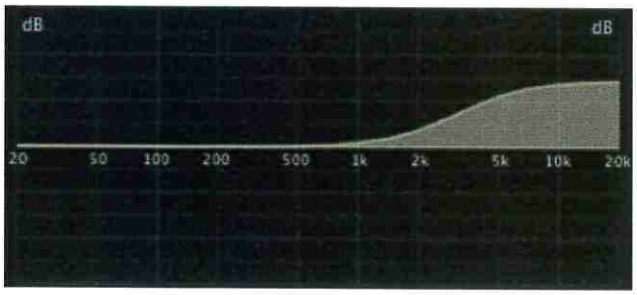
Low shelf

Low frequencies / bass / <200Hz (1)

Credit any valid example of use: e.g. Bassier kick drum / bass guitar / loudness curve / increases perceived loudness (1)

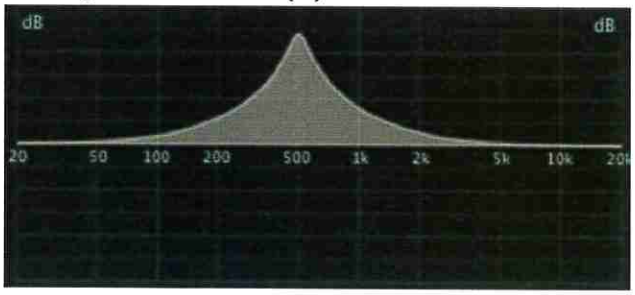


High shelf
High frequencies / treble / >2kHz (1)
Credit any valid example of use: e.g. bring something (vocal / reverb / acoustic guitar) forward in the mix / clarity on overheads / correct lack of HF response from dynamic mics / gentle high-shelf boost for mastering / loudness curve / increases perceived (1)

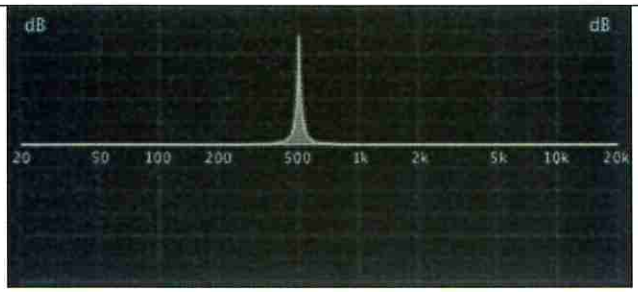


Band EQ (NOT BPF)
Mids (1)
Notch filter (1)
Credit any valid example of use: e.g. cut to reduce a troublesome resonance or node / snare drum ring / boost at around 2kHz to bring out the beater of a kick drum / mid-band scoop on a distorted electric guitar / reduce LM to make mix less muddy / reduce sibilance (1)

Low Q = wide band (1):



High Q = narrow band (1):



Graphic EQ differences:

More bands (1)

Amps/pedals 5-10 bands (1)

Studio / PA use 25-31 bands (1)

3 bands per octave / 1/3 octave equaliser (1)

Fader / Slider (instead of knob) (1) for each frequency (1)

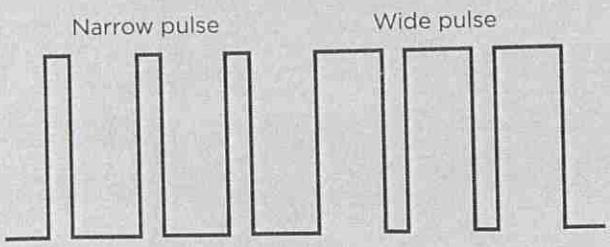
Positions of sliders resemble a graph of the frequency response (1)

Bands have fixed Q / bandwidth (1)

Bands have fixed frequency (1)

Normally used for live use (1) to correct the frequency response of a room / speaker system (1). Reduce feedback (1)

ii. Diagram should demonstrate a pulse wave with a changing pulse width.
Here is an example:

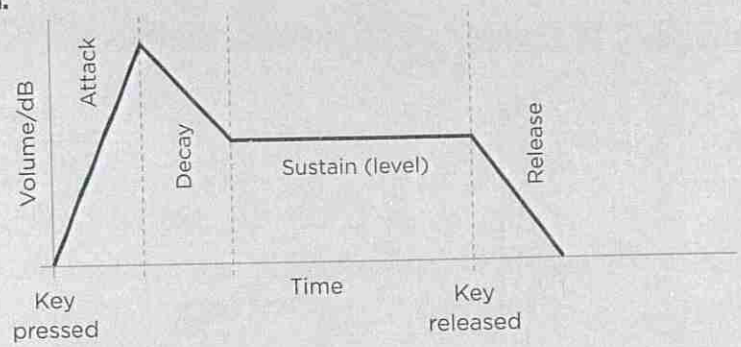


Award 1 mark for a pulse wave
Award 1 mark for a demonstration that the width/mark-space ratio changes

Question 4

Synthesis – Envelopes

***a.**



Label correctly:

i. A/D/S/R (1 mark for each stage)

ii. Volume/dB (1) time axis (1)

iii. Key pressed/released labelled correctly (1 mark for each)

b. Acceptable answers

- Starts muffled and gets brighter/attack means that cut off increases gradually (1)
- The cut off frequency then slightly decreases (1)
- It holds at the sustain level (1)
- And then decreases so the sound is muffled again after the key is released (1)

[max. 4 marks]

Question 5

Equalisation

***a.** Acceptable answers:

- Flexibility to draw a curve rather than use individual band filters
- Variable Q/bandwidth
- Variable frequencies for each filter
- Store presets/revert to a previous setting
- Can be automated/MIDI controlled
- Better signal to noise ratio

- Better frequency response
- Multiple instances

[max. 3 marks]

***b.** Acceptable answers:

Change	Justification
High pass filter (1)	Remove rumble (1)
(Narrow) parametric EQ cut (1)	Room resonance/standing wave/ unwanted single frequency (1)
Presence boost/high shelf filter (1)	Bring forward in mix (1)

***c.** Accept answers between 700 and 800 Hz (1)

Question 6

Delay

***a.** Acceptable answers:

- Can be automated/MIDI controlled
- Stereo/more inputs and outputs
- Ping-pong/each tap can be panned differently
- Tempo sync
- Improved accuracy of delay time
- More parameters
- Better signal to noise ratio
- Better frequency response
- Presets
- Multiple instances with different parameters
- Greater number of taps available
- No maintenance issues/cleaning/new tape

[max. 5 marks]

***b.** Acceptable answers:

- Bucket brigade delay (pedal)
- Solid state delay (pedal)

Accept appropriate models/brand names, e.g. Electro-Harmonix Memory Man, MXR Analog Delay, Boss DM-1 **[max. 1 mark]**

c. Acceptable answers:

Parameter	Function
***Peak level**	Will illuminate if the signal clips/distorts (1)
***Repeat rate**	Delay time/the amount of time between each repeat (1)
***Input vol**	Used to set gain for a good signal-to-noise ratio (1)
Intensity	Feedback amount/number of repeats (1)

[max. 4 marks]