Easy Ear Training

Series Sampler

Discover the wide range of ear training series available at EasyEarTraining.com

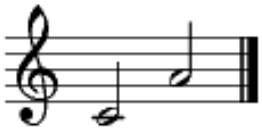
Contents

The Importance of Ear Training for Musicians

Ear training is an integral component of our musical studies. In ear training we are developing our inner ear, the ability to accurately hear and identify musical elements in our head while reading, listening to, and thinking about music. Conservatories, colleges and universities usually require students to take ear training courses as part of their music programs.

Some musicians develop what is called perfect pitch: the ability to accurately hear and identify pitches by name instantaneously. This skill seems to develop naturally especially with piano and string players who start their practice around the age of five or six, but for students that start music later in life, perfect pitch is an extremely difficult skill to learn.

Instead, most musicians develop their relative pitch. Relative pitch is our ability to discern the relative distance between notes, as well as the quality of different types of musical elements like scales and chords. Any music student can train their relative pitch. In fact, anyone who listens to music and can hear the difference between higher and lower notes, has relative pitch – that is to say, everyone.



Can you hear the difference?

Listen: Example 1

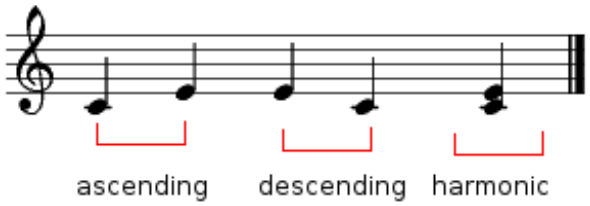
If you wanted to get started training your relative pitch, a powerful but simple technique is to simply start singing back what you hear. You can try it with the musical example above, as well as the ones that follow.

The study of ear training is usually divided into several different categories which are similar to the ones we study in music rudiments: intervals, scale types, triads, seventh chords, harmonic dictation, and melodic dictation. We also consider sight singing as an element of ear training.

Categories of ear training

Intervals

The first aural skill that a student usually works on is interval recognition. A musical interval is the distance between any two pitches. Intervals have both a size and quality, for example, a major third. The student works on recognizing both ascending and descending melodic intervals, as well as harmonic intervals, the simultaneous sounding of two notes, as in the following example:

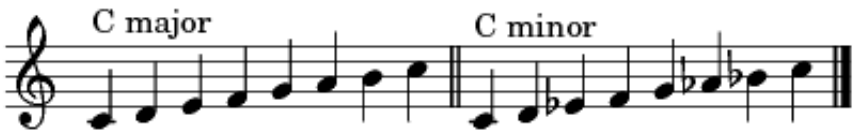


Interval Examples – Ascending, Descending, and Harmonic

Listen: Example 2

Scales

Students also learn to sing and recognize different scale types. For classical musicians, we start with major scales and the different forms of minor scales. In the example that follows, you probably will be able to hear the difference in the quality between the C major and C minor scale even though they start on the same pitch:

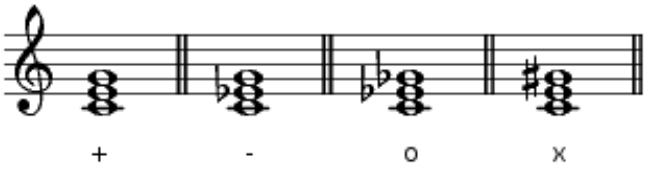


Scale examples – major and minor

Listen: Example 3

Triads

Triads are the basic buiding blocks for chords in western music. There are four basic triad types: major, minor, diminished, and augmented, presented below, here all built on the pitch C. We construct triads by stacking three pitches in thirds on a root note: C to E, for example, is a third: count C-D-E, one-two-three. Similarly E to G is a third. Each of the triads you will hear below contain Cs Es and Gs. We create the different triad types by adjusting the Es and Gs with sharps and flats. More importantly, notice that it is really not that difficult to hear that these four triads have different qualities:

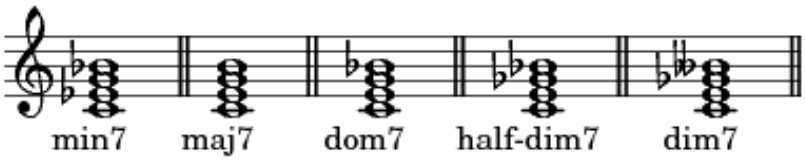


Examples of Triads – Major, Minor, Diminished, Augmented

Listen: Example 4

Seventh Chords

We can extend our ability to recognize different triads to include various seventh chords. Seventh chords add an extra third onto the basic triad. In classical music, there are five basic seventh chord types: minor sevenths, major sevenths, dominant sevenths, half-diminished sevenths, and diminished seventh chords. To identify and produce these chords, we need to have an understanding of triads and intervals. Nevertheless we can learn to hear their individual qualities:

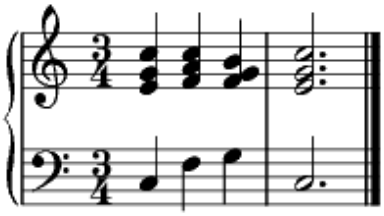


Examples of Seventh Chords

Listen: Example 5

Chord Progressions

In western music, chords are connected together to create larger musical structures, called chord progressions. These chord progressions give music a sense of direction: moving from a beginning harmony, to a point of musical tension, and its release, returning back to the opening harmony. We can learn to recognize these progressions and patterns. Below is a common chord progression in C major that is the basis for a lot of classical music. We can easily hear that it has a starting place, develops harmonic tension as it move to the second last chord, and the resolution of this chord to a place of rest in the final harmony:

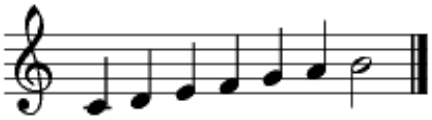


Example of a chord progression

Listen: Example 6

Melodic Dictation

Just as we can learn to recognize intevals, chord qualities, and chord progressions, we can learn to reproduce melodies that we hear, either at our instrument or even writing them down. We use our knowledge of these different musical elements, as well as our experience of what we would expect to happen to do so. Listen to the following scale:



Can you complete this musical phrase?

Listen: Example 7

It's not hard to hear that the last note creates melodic tension and an expectation: the scale is not finished. I bet you could sing the final note.

Sight Singing

Sight singing is the skill to produce all of the above musical elements with your voice. In fact, sight singing is an important tool to use in developing your inner ear. Take that major scale above as an example. With a little practice, you will be able to sing and recognize its quality as representing all major scales. With careful study, singing scales, intervals and triads teaches you how to recognize these different musical elements. You can then learn to accurately sing and hear a written melody at sight in your head, what an amazingly useful skill for a musician to have.

The importance of ear training

The study and practice of ear training develops our musicianship. We begin to build an active understanding of the music we listen to and produce. We can learn new music faster as we start to recognize and anticipate its different elements. If we are interested in writing music, the more sophisticated our understanding of musical sounds, the easier it is to translate our ideas to the score.

Training our relative pitch takes time and patience. It tends to develop as our other musical skills develop. A long term project for sure, but a very rewarding one.

This is the first article in the series on pitch and harmony. We'll take you step-by-step from the basics through to some advanced scales, chords and harmonies, with plenty of examples and exercises for you to work on.

→ Read the full Pitch & Harmony series at EasyEarTraining.com

What is “playing by ear”?

Can you play by ear?

That’s a common question in musician’s circles, a phrase that’s often used.

“He’s a great musician, he can play by ear”

“I’ve been learning my pieces… but I wish I could play by ear instead!”

“I can’t read music – I just play by ear”

Do these sound familiar? If you hang out with musicians they probably do… But have you ever stopped to ask yourself if you really know what people mean by ‘play by ear’?

Playing by ear vs. reading music

Depending on who you ask, “playing by ear” can mean the highest musical ability: a sign of true “natural musicianship” – or it can be a dismissive phrase: a sign that someone’s winging it without really playing carefully or having the classical musical chops expected.

Musicians will often categorise themselves as one or the other: a sight-reader or someone who plays by ear. The funny thing is that both camps tend to be slightly jealous of the other! Both envy the ability they don’t have, and a lot of the condescending bluster is just an attempt to pretend they don’t wish they could do both…

What is ‘playing by ear’?

So let’s start by asking: what does it mean?

Put simply, “playing by ear” means: **You can play what you hear.**

In fact, Jermaine over at HearAndPlay.com would say: *if you can hear it, then you can play it.*

Okay, that’s a good start. But if I play xylophone, clearly I can’t replicate a full orchestral symphony or a techno club track! So what do we *really* mean?

I think what we tend to mean is “you can play whatever you hear in your head”. The mind’s ear is a powerful tool, and I’ve written in the past about how important it is to musicianship.

We can all imagine or remember music in our head. Aural skills can be seen as a way to *understand what we imagine hearing*, and to connect it with the real world – bringing it out on our instrument, or recognising it when we hear it in real music.

So to “play by ear” then really means “play by mind’s ear”. Or to put it a different way, to “recreate what we imagine hearing, in the real world”.

Can you bring the music you hear in your head into the real world?

When we hear a pop song, we create a mental model of what we hear. This might be the chords, or the melody, or the drum beat, depending on our instrument of choice and our musical expertise. But to take that mental model and bring it back out into the real world using our instrument, that's "playing by ear".

Although we often talk about it as an all-or-nothing ability, (the same way we do with the "magical" ability of absolute pitch, or 'perfect pitch'), it is of course a spectrum of abilities.

In the next article we'll be exploring the different ability levels of playing by ear. If you've ever asked yourself "why can't I play by ear" or "how do you play by ear", you'll definitely want to stay tuned for these articles. You'll have a chance to test your own ability, and we'll be teaching you how to get started on improving it – no matter what level you're at now!

→ Read the full Learn To Play By Ear series at EasyEarTraining.com

What's 'frequency training' all about?

Hey audio professional....yes you....picture this scenario!

You've been working quietly at your boss' studio. You know, the daily drudge; setting up microphones, setting up drum kits, getting the vocal mic ready for the latest singer dreaming of stardom. Hey, you even double up duty as the "lunch grunt". Still though, by watching, imitating and learning, you have even managed to be able to cobble together a good mix of the recorded instruments. Nice and clear, not clouded and muddy. You can hear each instrument clearly. Good for you. Now, how exactly is this done? Or more to the point, how do you do it? The mechanics, the math…you know, the step by step methods? If you can't answer, don't be embarrassed. Read on!

Now, let's get back to our scenario. Your boss calls you in and announces that the studio picked up a major artist. Let's call her "Jill". Your boss' best friend in Nashville referred her to your quiet town, where she can cut her latest opus in peace, away from the shutter bugs. Your boss' friend has faith in him, and so everyone is onboard. (The label, the band, and our starlet "Jill".)

Naturally, your boss expects your "A" game. No problem. Jill's musical director who also doubles as her guitar player flies in a couple weeks ahead of schedule to handle pre-production duties with you. You are handed lists of songs, instruments to be recorded for each song, possible additional instruments for "sweetening" and other details concerning placement of sounds and instruments in the sonic field. You discuss the best way to blend Jill's voice with a clean electric guitar. You discuss her foray into the world of heavy metal. She wants to cut a new song with a dense, drop tuned, and heavily distorted guitar sound. And, not just one layer… she wants three of those guitar sounds. Guitar man fills you in on the type of bass sound they want. Now come the drums. They have very specific sound they are seeking; one that will work with those death drone guitars as well as with the opposite extreme; Jill's tender piano duet with her cousin, the contralto.

Alright, these are demanding professionals. They know what they want musically. Now let's go back to the original question. How exactly is this done? Or more to the point, how do you do it? The mechanics, the math…you know, the step by step methods?

How do you process that guitar so that it doesn't interfere with Jill's articulation? That distorted guitar takes up a lot of space. Jill's voice also takes up a lot of space. How do you strike sonic peace between two opposite sound sources fighting for dominion? That's only two instruments. How do you blend in the bass player who uses that nice heavy "marble" sound? Balance all this with a ten piece drum kit? Don't forget the miscellaneous percussion. Oh, I almost forgot……Don't forget to blend in all of the keyboards/pianos. Piano? Lots of sonic real estate required there!

Well? How do you pull it off? How do you fit everything in AND make it sound clear, AND make to sound natural….oh, AND the most important….how do you make it sound pleasing to the ear? After all, this music is being recorded for people right?

If you answered **proper EQing**: Congratulate yourself! You are correct. Alright, what do you EQ? What frequencies? What Hz do you cut, boost, or alter to correct that overly booming guitar? How do you EQ Jill's voice to bring out clarity with out sibilance? Which frequencies need adjusting? See a pattern developing?


Sha Sha Chu

As an audio recording engineer/producer, it isn't enough just to know proper recording levels, or signal to noise ratios, or what microphone is best for vocals as opposed to violin, or lap steel. You need to know and recognize the exact frequency of all of the sounds you record and mix. Musicians know frequencies in the form of pitches. You need that knowledge too!

Where is Jill's low midrange point? Is it 250Hz? 325Hz? Don't know? Well, how can you reduce that overly wooly sound in her voice? How about that death guitar? Is it really prominent at 700Hz? 1000Hz? Or is it rumbling a mess at 185Hz? If you don't know, how can you move it out of the way of the main vocal, while still keeping it in the mix?

Audio engineering is more than just "panning", or the physical placement of sound in the mix. It is the intimate knowledge of each sounds' frequency that allows careful manipulation. This isn't just musicians' knowledge…this is for YOU!
Of course, with our above scenario, a "throw it against the wall" trial and error method could work, but, be realistic: That type of experimentation would waste an enormous amount of time, not to mention budget, which would lead to Jill and company taking their business elsewhere. That would probably result in you losing your job! This information is not optional. As a pro, you need it.

So, what is frequency? What is Hertz (Hz)? What is a sound wave? And the big one….how do I learn all of this?

Well step this way, and hopefully you can write a successful ending to our little "scenario".

This way please……..

→ Read the full Frequency Fundamentals series at EasyEarTraining.com

Distortion Effects, Part 1

Ahh, it's time for all things filth! Overdrive, distortion, fuzz, soft clipping, hard clipping, and limitless other descriptions to describe one of the most dramatic sound effects ever!

If dynamics effects are to claim the prize of being the most controversial and misunderstood effects; then the coveted prize for most popular, certainly (and with no competition) goes to anything that has the words 'overdrive', 'distortion', 'fuzz', or any variant in its descriptive moniker! While originally intended for guitar players (you'll understand once you learn the history of this effect), no other effect has been so widespread throughout all of music production. Everything from vocals to drums, keyboards, and everything in between has been distorted, overdriven or fuzzed up at one time or another.

Listen to a distorted guitar

I'll move it one step further. **Distortion** (unless otherwise specified, for simplicity I'll refer to this topic generally as "distortion" from now on) actually makes up about **85-90% of the effects market**. Now, I'll be the first to admit that occasionally I use a made up expressive term like "cajillion" to make a point about enormous quantity; BUT, concerning distortion, no such exaggeration is needed – as there are thousands (and I mean that literally) of distortion devices being produced right at this moment.

I'll bet that you, reading this right now, have at least a few distortion effects lying around!

I know that I certainly own… well… let's just skip that number for now! Put it this way: I will never again make fun of, or criticize my girlfriend's penchant for owning innumerable pairs of shoes!

However you slice it, distortion is the big card game in town and everyone wants a seat at the table; either as a consumer, or an opportunist manufacturer who boasts about delivering a new spin to all things crunch!

Why distort your signal?

Now on to more pertinent queries. Why on earth would you want to purposely distort a signal? After all, aren't we taught by Hi-Fi manufacturers that the lower the signal distortion the better? Why the exception here?

Of course the answer is a subjective one; but considering the popularity of everyone's favorite effect, I would dare say, subjective or not, the people share the same opinion! And that opinion is this:

Distortion makes your sound exciting!

It brings out the sonic flavor! It is a like a good hot sauce in a bowl chili: it amplifies the flavor already present. Culinary metaphors aside, that last sentence has scientific backing! When you distort or overdrive a signal, you amplify the harmonics present in the signal. (Refer back to the Frequency Fundamentals article dealing with harmonics) Actually, the more you distort, the more all of the harmonics start to become more and more prominent. Even the faint ones start to come to the forefront! Now, a clean single-note guitar line turns into a fat, harmonically rich, singing and fully satisfying lead passage. It no longer possesses the tinny, meek and inherently unsustainable sound. It now has girth, the brass fatness of horns, and the sustain of strings. A complete sonic metamorphosis!

Eddie Van Halen playing 'Eruption'

Here's the skinny: Distortion (and remember, we're bundling in related effects like overdrive, fuzz and so on) came about partly by accident, and partly through necessity. Let's look at the latter first:

Sustain

Strings, and horns (among other instruments) possess nearly infinite sustain as an inherent part of their nature. Horns have instant sustain on command, according to the lungs of the player. String players have the same, courtesy of the bow.

BUT! Guitar, although also a stringed instrument, is played with a pick, fingers, or both. Inherent sustain is not part of its nature.

A wonderful percussive sound? Yes.

A clean, haunting drone? Also yes.

A miniature orchestra capable of sophisticated works of music by masters in the talented hands of a classical virtuoso?
Absolutely!

Infinite sustain like the long held notes of a saxophone, or the never ending cry of bow against string?
Sadly, no.

Fret not though, (pun intended) help comes in many, many variations of distortion. Sustain for days!

Power

In addition to the sustain gained (also pun intended), distorted sounds are simply powerful! This is some thing I doubt I have to preach on. Certainly, clean sounds have their place. Listen to the precise articulation of a classical master performing Mozart. How about the dark, smooth, yet crystal clear sound of Joe Pass blasting and bopping through chord comps and chord melodies at an insane tempo? How about the wicked country chicken pickin' of Danny Gatton, or Albert Lee? Examples abound, but these artists' preferred method of travel is the sparkly clean sound. And make no mistake, MONSTERS these are!

Watch Joe Pass playing 'Satin Doll'

Now, how about the other side of the tracks? Let's discuss Hendrix. Purple Haze without fuzz? HAH! Van Halens' Eruption without the famous "brown sound". Yngwie zipping and gliding his harmonic minor runs without the sonic onslaught of his Marshall-generated sound. Talk about violin? How about Eric Johnson, with whom if you close your eyes, you can actually almost hear the virtual rosin of the bow against his strings – Again, courtesy of his highly tweaked distortion!

Listen to ex-Scorpions guitarist Uli Jon Roth, and you'd swear he just stepped out of the 18th century, violin in hand. Only in place of a Stradivarius, a Stratocaster; and in place of a bow, a highly distorted amplifier! A combination, in hand with Mr. Roth's well developed technique, that produced (and continues to produce to this day) some of the finest, beautiful, and most soaring lead lines this side of rock-n-roll! Once again, examples abound, and I'm sure you get the point.

Now, lest you get the impression that I'm turning this into a guitar sound tutorial… well, you're right, I am! Don't you know we guitar players rule the world?

Actually, of course I'm kidding around, but there is a reason for the onslaught of guitar talk. Distortion was primarily the result of guitar players. Logic dictates that it should have stayed there. The left hook that no one saw coming, was, like I said before: everyone wants in! Doesn't matter what musical style, or instrument. Everyone wants to play with distortion, overdrive, or fuzz at some point!

With that in mind, here is a brief walk through of the origin of the world's most popular and widely used effect...

The Distortion Discovery

This section covers the 'accident' part of discovering distortion.
Section omitted for this overview but you can read it online.

Homework: Get to know the key amps

First things first: you must get to know the basic "building block" distortion tones produced by some of the main amps that started it all. Amps that are considered a staple in every studio and players arsenal. Even though the amp industry has sprouted just as many branches as the distortion effects industry, we can likewise trace the roots back to a few key pieces.

The audio clips were done by yours truly in my studio. Some of the amps I own and some were recorded using amp simulators/modeling. This, in and of itself is an entirely new bag of chips, as there is some fierce debate there! The amp simulators' sounds were however dialed in to be as accurate to the originals as possible.

Anyway, our purpose here is for you to get the basic "mojo" of each tone to prepare you for Part 2 where we'll have all kinds of distortion/overdrive/fuzz sounds (and a couple of surprises!)

For now, listen and try to familiarize yourself with each amp's basic characteristic. If you like, you can find plenty of history, pictures, and details galore online with some simple searching by amp name, to give these clips some context.

If you have access to a frequency analyzer (see this post for more information), then download each clip and analyze the dominant frequencies present, as well as all secondaries and so forth. Now compare each amp. Write your comparison results down for later evaluation – you'll be doing the same for the Part 2 clips and it will be instructive to compare the two.

Fender Bassman

1: Fender Bassman, loud and compressed. Slide blues licks.
Pros: Loud compressed tone. Fat and full, perfect for blues, especially slide!
Cons: Not enough drive for "modern" needs.
2: Fender Bassman, all the way up.
Pros: Can still hear all the notes of each chord. Nice loose crunch
Cons: Low notes get flabby; sloppy sound at high settings. Very difficult to control in very intricate music.

Marshall JTM 45

3: Marshall JTM 45, mild crunch. Dominant 7th chord vamp
Pros: Mild Crunch. Basically the amp's comfort zone. Great for old school rock, and blues.
Cons: Same problems as the 2nd Bassman example. (This WAS a variation on that circuit in the first place!)
4: Marshall JTM 45: all the way up. Basic open chord progression with suspended voicings.
Pros: Even at max distortion, chords and their extended (in this case suspended) voicings are distinguishable!) Low end is a little more distortion friendly.
Cons: Same problems as the 2nd Bassman, although not nearly as bad due to Marshall's better low-end control.

Vox AC30 top boost

5: Vox AC30 top boost, chimey and bright. Clean little ditty
Pros: Chimey and bright, loud and compressed. Great for anything not needing distortion!
Cons: Can get a little "spiky" on the high end when played clean and loud!
6: Vox AC30 top boost, full up crunchy. Basic open chord progression with suspended voicings
Pros: The spiky tendencies are smoothed out. Nice light crunchy tone that has great chord definition and works well in most pop styles. (Even hard rock and metal benefit from using this type of sound as contrast, or even layered behind the heavy stuff!)
Cons: Not enough distortion for the gain hungry out there.

Marshall late '60s plexi amp

7: Marshall late '60s plexi amp, full up. Basic chord progression with suspended voicings
Pros: The blueprint for distortion. Lots of gain, while retaining clarity. Loosey goosey sound.
Cons: Loosey goosey sound. Not enough tightness and control for aggressive metal styles that turn on a dime.

Marshall early '70s superlead

8: Marshall early '70s superlead, full up. Ebmi hard rock riff
Pros: More gain and tighter sound than '60s plexi. Well suited to many styles. Great range of distortion.
Cons: Very inconsistent. Some were great some weren't. Quality control wasn't as strict… plus, the amps were built with whatever parts were on hand which led to a lot of variances.

Marshall JCM 800

9: Marshall JCM 800, full up. Ebmi hard rock riff
Pros: The quintessential '80s hard rock sound. Smooth tight distortion. Plenty of sustain for long lead lines.
Cons: A honky midrange spike in the middle frequencies similar to a "wah" pedal (more on those in the later articles!) stopped in mid sweep, which cannot be dialed out easily.
Extra info: That sound was actually built in purposely in the JCM800 series to duplicate guitarist Michael Schenker's main tone. He actually used to put "wah-wahs" in front of his amps as an "EQ" of sorts to get that mid spike purposely in order to be able to cut through the mix!

Mesa triple rectifier

10: Mesa triple rectifier, mega distortion 1. Typical metal riff using 4ths, 5ths & more
Typical metal riff using 4ths and 5ths, but also a couple 9ths and suspended voicings to show that extended voicings are possible if set right.
Pros: THE modern metal tone. Endless sustain. MASSIVE amounts of distortion.
Cons: Can get muddy and inarticulate rather quickly if you don't dial carefully.
11: Mesa triple rectifier, mega distortion 2. Another metal riff using 4ths, 5ths & more
Another metal riff using 5ths and 4ths, but also a couple 9ths and suspended voicings to show that extended voicings are possible if set right.
Pros: THE modern metal tone. Endless sustain. MASSIVE amounts of distortion.
Cons: Can get muddy and inarticulate rather quickly if you don't dial carefully.

That's it for this article. Make sure you familiarise yourself with the amp sounds above before we move on to all the wild and wonderful distortion effects next time!

→ Read the full Hearing Effects series at EasyEarTraining.com

How to Choose Headphones

Earlier in the series we covered playback sources, discussed options for amps and speakers, and looked at ways to judge improvements to your setup by listening. This week we're focusing on the more compact alternative to a room full of hi-fi gear: Headphones.

Headphones Saved My Life

So here's the deal: You'd love to have super high fidelity sound for ear training, but you've got noisy neighbours, no space and you're flat broke. If this sounds like you then **headphones** are the answer. Nothing reveals the detail of well recorded music like a good pair of headphones and without a doubt it is the best way to get 'champagne' sound on a 'lemonade' budget!

Headphones come in all shapes and sizes. If you want to find the right headphones for you, you need to ask yourself a few questions:

- How portable do you need them to be?
- Will you be using them in a noisy environment?
- Are you worried about annoying the person next to you on the bus?
- What will you be driving them with?

The first decision when choosing a pair of headphones is: **in-ear** or **external**.

Kick It With Cans

External headphones are composed of two speakers on a headband which sit outside the ears. Full size headphones cup and enclose the ear (called "circumaural" by audio geeks and "cans" by everyone else). Full size headphones are usually designed for home/studio use but it's become quite fashionable to wear them out and about (at least for Craig David fans) and you can find fold-up models if that's what you need them for.

Headphones with an **open** mesh back rather than a fully enclosed plastic shell are the ultimate in sound quality – but think carefully before buying a pair; they have very little isolation and too much spill to be used on public transport, or when recording vocals in the studio (where the microphone may pick them up).

As well as pure sound quality, comfort is important. Spend some time wearing cans before you buy them. I can wear my favourite Sennheiser HD650s for hours, but other pairs can give me a headache after a few minutes. Some portable players can struggle to drive full size headphones so make sure you try the phones with your player too.

Don't be tempted into buying the 80's style headphones which sit on the ear as they offer a worst-of-all-worlds combination of poor comfort, sound quality and isolation!

Some over-the-ear headphones can be folded for travel

I Feel Just Like (Ear)Buddy Holly

In-ear headphones will never sound as good as a decent pair of cans but when it comes to portability they can't be beat. Most portable music players on the market ship with *ear bud* headphones which are, almost without exception, of appalling quality. Spending a few pounds on upgrading your ear buds will reap big sonic benefits.

Canalphones take the ear bud concept a step further by forming a seal in the ear canal the same way as an ear plug. This improves isolation and creates a sealed chamber in the ear which provides a better frequency response, but the idea of pushing something into your ear puts a lot of people off. Most higher end canalphones are available with a choice of tips and making the right choice is the key to comfort. When walking you may find rubbing noise from your clothes is transmitted up the cable into your ear. I counter this by running the cable up and over the top of my ears to provide some isolation.

There have been a few scare stories in the press about canalphones potentially leading to hearing damage. I find this slightly bizarre as using canal phones on the London Underground allowed me to significantly drop the volume of my MP3 player because of the excellent isolation available! Use them sensibly and you shouldn't have a problem.

Come On Feel The Noise

Several companies offer **noise-cancelling** headphones. These work by listening to the ambient noise and playing an antiphase signal to cancel it. Though it sounds like an appealing prospect they only work well with low frequency rumbles like the engines of a passenger jet, and introduce nasty artefacts to the sound – meaning they are of little use for ear training. Couple this with high cost and a battery pack and it is hard to recommend them.

In a similar vein, Bluetooth headphones offer the convenience of not having to worry about getting tangled in cords but the sound quality leaves something to be desired.

Shut Up And Drive

When choosing a set of phones you have to take into account the source you will be driving them with. This is most critical with full size headphones. Some popular audio sites claim it is essential to spend 50% of your headphone budget on a separate headphone pre-amplifier; however I have found the headphone outputs of most decent hi-fi amps to be quite adequate. PC soundcards are a different matter though, as I mentioned in the first article of this series.

Portable players sometimes have trouble driving high end cans because of something called impedance. This isn't an electronics site so I don't intend to cover impedance in depth (especially as Sound On Sound already have already written an excellent article), but there is a fair amount of nonsense floating around the internet on the subject so I will mention it briefly.

Your source and your headphones both have a property called impedance, measured in Ohms Ω. Most sources and cheap consumer headphones have a low impedance while the impedance of professional headphones is muchhigher. When impedances are similar the headphones are driven with maximum power, but are hard for the source to control accurately. On the flipside, a pair of high impedance professional headphones will give more accurate sound reproduction, but may not be as loud. Any good headphones should state the impedance on the box and some models are available in multiple impedances. This is another good reason to try before you buy.

If you do buy some posh cans don't be worried if you have to turn your iPod up to nearly maximum volume to get a decent listening level. Firstly, because of the impedance difference mentioned above they won't actually be driving maximum power, and secondly because music players sold in Europe are artificially limited to comply with French regulations on headphone volume. The quick-witted amongst you will have realised this is a ridiculous law since a pleasant listening level on high impedance cans would be eye-wateringly loud on low impedance canalphones!

Hooked On Phonics?

For budget hi-fi, headphones can't be beaten. Spending £100 on speakers will get you a decent quality set of entry level stand mounts – but will net you an excellent pair of headphones. Even if you have a great set of speakers they are only one part of a system which includes the room and their position within it. So unless you have access to a studio and some top quality speakers, headphones will give you the ultimate in detail.

So are headphones the be all and end all for high fidelity audio?

Unfortunately not. When you listen to a pair of loudspeakers the signals from each blend and phase in the air to create a unique mix at each of your ears, giving you the perception of a continuous stereo soundstage rather than a pair of wooden boxes.

Headphones on the other hand deliver each channel to a single ear. The vast majority of music is recorded assuming that you will be listening to it on loudspeakers, meaning headphones can't give you the stereo image the producer intended you to hear (if you seek them out special "binaural" recordings are available intended for headphones). Most modern music is recorded without extreme panning so it still sounds acceptable, but older tracks can sound quite strange – try listening to 'Taxman' by The Beatles on headphones, for example.

When working in a home studio it can be quite tempting to listen entirely on headphones because of the convenience and ease with which you can hear fluffed notes and glitches, but make sure you spend time using loudspeakers when mixing or mastering or you will produce something that sounds wonderful on headphones, but terrible everywhere else.

You don't need a fancy sound system do effective ear training, but good sound quality can inspire your creativity and reveal unheard detail in a familiar recording. Learn more about all the equipment you need in the rest of this series.

→ Read the full Wired For Sound series at EasyEarTraining.com

Listen Close to “Mehu Moments” by K-X-P

I like to think of myself as an open-minded music fan with varied tastes to match. But if you were to open up my iTunes and scan through the genres, you’d find that my eccentricities, no matter how expansive I wished they were, actually don’t stretch all that far. I’m probably the same as a lot of folks: I know what I like, and don’t often see the point in deviating from the reliable.

I can honestly say that I try my best to not to prejudge a piece of music based solely on how it’s labeled. A good song is a good song. But if you had told me a few weeks ago that I’d become obsessed with a track from an electronic/synth outfit from Helsinki, Finland, who, according to their label, mix “electronics, krautrock, noise, and even rockabilly into a hypnotic and minimal motorik groove,” I would have politely scoffed.

But here we are. And here is this track, which, despite its six-minute-plus running time, lack of vocals, and full-on embracing of lo-fi buzz (all things it had going against it from the get-go, as far as I was concerned) has been on repeat in my headphones for 10 days now.

Listen: K-X-P – Mehu Moments

So, what is it about this song that keeps me coming back? On paper, it shouldn't have affected me the way it does, and I think that's intrigued me even more. I decided to break it down—to quit worrying about what it's not, and instead focus on what it is. And more specifically, how its individual parts work together to form such a rock-solid whole.

What makes it work?

There's a thick, foreboding buzz that fires up when the track begins, but as the first pulsing synth note kicks in, it almost completely falls away, lingering only slightly in the form of what seems like a light tape hiss running throughout the song. This may be nothing more than an unintentional byproduct of the recording equipment used, but it gives the track a stern warmth that never lets up. It's the backdrop for all the rhythmic buzzing and vibration that follows, and it gives the impression of a machine that's been powered up, or of a program that's been launched and is quickly revving towards full speed.

Clip 1 (start) - Thick, foreboding buzz

The synth pulses that start the groove moving couple with an eerie, driving bassline that, like the main synth, doesn't strive for complexity. It's precise and initially unmoving, and when the drums kick in over the top, it forms the backbone of the song. Peripherals are there too: airy bursts swirl around the edges and sputter, and a deeper, sluggish, synth warbles in the back. The drums, while excitable, aren't much more than a simple loop.

Stacked together, these elements are head-noddingly catchy, but they're repetitive, and the band knows this. So at around the 1:15 mark, other things start fluttering in. Some echo-y, delay-heavy glasslike sounds appear. A higher-toned, more prominent bass line slips in at around 1:20. It remains for the rest of the song, and though it stays on course with one main groove, the slight changes that it makes throughout the song are noteworthy. Nothing fancy, but very intentional.

Clip 2 (1:15) - Glasslike sounds and extra bassline

The same can be said for almost all the elements on this track. When given a cursory listen, the song may seem repetitive, like it's barely more than a fuzzed-out, club-ready jam. But it's the slight manipulations of the main elements, and the major manipulations of the solo-ish parts—the ones that jump in and out during the middle five minutes—that make the length of the song not only

acceptable, but necessary. Around the three-minute mark, the groove is defined, some individual instruments have been slipped in over the top, and things start to feel comfortable. At around 3:02, a shredded-sounding organ fades in, giving the track an uneasy feel, like it's leading to something.

Clip 3 (3:02) - Shredded-sounding organ starts the build-up

At 3:17, an off-beat synth solo starts, feeling both playful and awkward. It's directly contrary to the steadiness of the computer-perfect bass groove, and for a minute it feels like the song is disassembling itself.

Clip 4 (3:17) - Song seems to start disassembling itself

Over the next two minutes, that feeling continues, threatening not to resolve itself. It's not until the five-minute mark that things ease off and return to the warmth that the song began with. From there, the wind-down begins, with the drums finally breaking course with their loop (at around 5:35) and stutter-stepping toward an eventual close. It's here that you can feel the song powering down.

Clip 5 (5:35) - Drums break loose, song starts to power down

Everything has been slowly rising for the duration of the track, and now the machine is starting to ease itself back to where it began. At no point does it feel like it's losing steam—it's all as loosely calculated as the rest of the song has been up to this point. The way the drums fade away, instead of simply stopping, lends even more to that feeling. There's no shut-off—the structure is more like a bell than a triangle.

Clip 6 (end) - Smooth careful finish

The buzz from the beginning is there at the end, and it sounds like completion. Or like something has been resolved. Or like something got revved and ramped up and took flight and then executed a solid landing.

It's tough to make an almost-seven-minute song—with no vocals and no major structural or tempo changes—that can hold the attention of a notoriously picky listener like myself. But this trio has definitely done it. And they make it sound easy.

You can listen to "Mehu Moments" and other tracks on K-X-P's MySpace page, buy the album from Amazon (CD, MP3) or listen on Spotify.

So, did you hear more on closer listening? Are you coming back for another play because it's been stuck in your head all week?

→ Read the full Listen Close series at EasyEarTraining.com

Open Your Ears to Tuvan Throat Singing!

A friend sent me a link this week to a video which blew my mind… via my ears! I've often heard of 'throat singing', normally among musicians as the punchline to "Well, it's not like you can just sing both notes, is it?"

Standard response? *"Not unless you do Mongolian throat singing!"*

I laughed, along with the other musicians, with only the vaguest idea of what that might be. This video I'm going to share below was the first time I'd actually seen and heard it for myself. Without further ado, check out Alexander Glenfield's wonderful demonstration of different types of throat singing:

A demonstration of seven styles of Tuvan throat singing by Alexander Glenfield

What Alexander is demonstrating in the video above is '*Tuvan*' (i.e. from the Tuva region of Siberia) rather than *Mongolian* throat singing, but the principles are the same. Both are forms of what's scientifically referred to as overtone singing.

Once you've watched the video once (and probably gone *"wow… what the$%£ $?!"*) – watch again! The first time I watched it I heard enough to impress and confuse me. But repeated listenings revealed far more detail. It can take a while to tune your ear into the overtones. Close your eyes and listen carefully, dissecting what you hear in your mind.

What is 'throat' or 'overtone' singing?

'Overtone singing' is a general term for a variety of sophisticated singing styles which create multiple pitches at once, by manipulating the overtones of the main sound. If you're a student of our Frequency Fundamentals series, you will have learned about harmonics which is another term for 'overtones'. You'll know that manipulating those harmonics has a significant effect on the overall sound. But you might not have known that they can be used to actually create additional heard pitches!

How is this possible?

Taking the example of a drone of C, we know that the overtones/harmonics of C will be a multiple of its frequency.

We also know that doubling a frequency will give the same note an octave above, which accounts for multiples like 2, 4, 8, 16, etc. of the original note (overtones #1, #3, #7, #15). But what about the other multiples? For C:

Overtone	Frequency (Hz)	Note (approx.)
Fundamental	130.81	C
1	261.62	C
2	392.43	**G**
3	523.24	C
4	654.05	**E**
5	784.86	**G**

So already we can see that some overtones of C are at the notes of E and G! Normally these blend in with the fundamental as part of the timbre of the instrument, but if you can emphasise particular overtones audibly…

Most of the seven styles demonstrated in the video consist of a pair of parts: A low bass 'drone' which generally stays on the same pitch throughout, and a higher part which varies in pitch to create a melody. The low drone is created in approximately the normal way, by singing: making the vocal chords vibrate as air passes by them, to create a pitched sound. The higher part is the overtone part, created by changing the shape of the resonant cavity which is your mouth and throat. Different shapes and sizes will

resonatewith different overtones, amplifying them. Learn to amplify the right ones, and you can make them distinctly audible to your listener as notes!

There are many varied styles of overtone singing, from different countries around the world. Tuvan and Mongolian are probably the most prominent styles, but there are folk traditions in numerous countries, and a rising popularity in learning overtone singing. See the links at the end of this article for more information.

What can you hear?

I'm going to talk a bit about what I hear in the video. Hopefully this will help you discover things you perhaps hadn't noticed before, and give you an idea of the kind of things to listen for in future. But I must preface all of this with two disclaimers:

1. As with the article on Burmese music, I have to confess to a lack of knowledge! As I said above, this was my first contact with real throat singing, and most of what I now know I've learned to write this article! If there are any experts in the audience, please leave a comment with any corrections or additions below.
2. This isn't intended to be a guide to each style – just some notes on this particular demonstration of each style. The comments are intended to help teach active listening, not throat singing!

Here are my notes on what I hear in each segment of the video. If you're having trouble hearing the overtone melodies and have an instrument handy you might find it useful to play the notes mentioned, to help your ear know where to expect the melody. 'C4' is middle C, 'C3' is the C one octave below, 'C5' one octave above, etc.

1. Khoomei Style (00:10)

- Low, croaky bass drone
  (note is B2 – about an octave below middle C)
- Overtones create a kind of whistling melody above
  (using C#6, D#6, F#6 – about 2 octaves above middle C)

2. Sygyt Style (01:08)

- Higher, more nasal drone than Khoomei
  (F#3 – in the octave below middle C)
- Overtone melody still a whistling/wood flute timbre, but higher than the Khoomei
  (in the octave running up from C#6 – 2-3 octaves above middle C)

3. Dag Kargyraa (02:12)

- VERY low croaky drone
  (B1 – about two octaves below middle C)

- Melody harder to hear than the previous styles. Lower in pitch
  (using B3, C#4, D#4 and F#4 around middle C)
- Drone's vowel sound noticably changes as the pitch of the melody changes

4. Steppe Kargyraa (03:12)

- Higher croaky drone
  (C#3 – about an octave below middle C)
- Melody hard to hear again, but low (around middle C), similar to Dag Kargyraa style

5. Ezenggilleer (04:05)

- Really different bass drone, with vowel sound changing rapidly
  (C#3 – about an octave below middle C)
- High melody
  (in the octave from C#5 to C#6 – 1-2 octaves above middle C)
- Overtone pitch likewise changing more rapidly than before

6. Khoomei Borbangnadyr (04:47)

- Low croaky bass drone, like Khoomei, but then lips start vibrating rapidly, creating a third tone!
- Now there's:
  - a bass drone
    (B2 – about an octave below middle C)
  - a middle note one octave higher
    (B3 – just beside middle C)
  - and the high melody
    (around C#5 – about an octave above middle C)
- The three notes span about 2 1/2 octaves at once! Listen at 05:30 for the three Bs together.

7. Chylandyyk (05:33)

- VERY low drone again
  (B1 – about two octaves below middle C)
- Overtone melody is now not so high! It has a different timbre: broader, airier
- It sounds like it's around B3 (beside middle C), so still two octaves above the drone

Your turn!

What can you hear? Have I missed something, or misheard something? Do you disagree about the octaves of the pitches?

Some other things to think about while listening:

- What's the *timbre* of each part of the singing?
- How many different notes can you hear being used in the overtone melody?

- What type of scale is used for the melody? (hint: count the notes)
  Is there a relationship with the bass drone note?
- If you've been doing Frequency Fundamentals, can you identify which octave bands are primarily being used for each style?
  Where's the drone? Where's the high melody?
  Can you hear noise in any other band (hint: listen high up!)
- Can you hear a relationship between vowel sounds in the drone, and the pitch of the overtone melody?

I'll leave you with this fun video which playfully combines a few impressive vocal techniques, and prominently features overtone singing:

Overtone Singing Music Video

Learn more

- Good overview article from The Guardian
- "The Web's Most Comprehensive Site for Throat-singing [and more]"
- Some overtone singing CDs
- Article and links on throat singing at Interesting Thing of the Day

Hopefully this short look at some examples of throat singing has inspired you – both to find out more about this remarkable vocal technique and art, and to keep listening actively whenever you hear something your ears aren't familiar with.

→ Read another Open Your Ears article at EasyEarTraining.com

Singing and Childhood

Children love to sing. Listen to a group of schoolchildren at the playground, and you will hear a mix of imagined songs, favorite nursery rhymes, and popular tunes intermingled with giggles and laughter. Making music seems hardwired to our DNA since childhood. Even as adults, we sing loudly in the shower or car when we think no one can hear. Music is an expression of life.

Singing gives children the freedom to express themselves in unique ways. A child can immerse herself in a made-up song about rainbows, or a young boy can remember his mother by singing a favorite nighttime lullaby. Children socialize through songs and dance, learning how to interact with others through silly nonsensical song play. While you might not understand why your child wants to sing "B-I-N-G-O" or "Baby Beluga" fifty times in a row, at least you know that your child's singing will increase her communication and vocabulary.

Singing to your child helps you pass down an important part of your own childhood and history to a new generation. Singing not only benefits your child but helps relieve stress and allows you to express emotions deep within.

Don't forget to check out Music & Life: Rockin' Baby Lullabies for great information about singing lullabies to young children and babies.

10 ways to enliven your days with song

Try some of these practical ways to add singing to your life and your child's everyday experiences:

1. Sing your favorite childhood songs

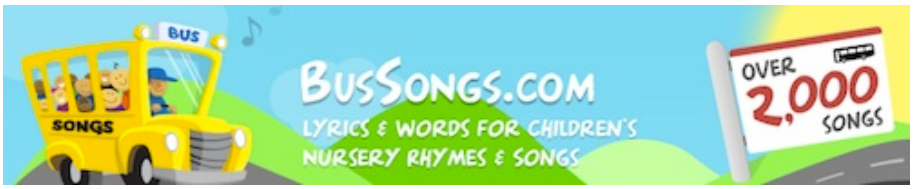
Share fun songs from your childhood. Whether you sing Kermit's "It's Not Easy Being Green" or The ABC Song, your child will learn about singing in tune while sharing some of your favorite tunes.

2. Clap your hands!

As you sing, add fun gestures like stomping, clapping, waving your arms, and dancing.

3. Learn new songs together

Explore singing with your child by learning a new tune. You can find exciting lyrics and music at BusSongs.com.



4. Practice singing intervals

Check out these familiar songs that feature different intervals:

Songs for Interval Recognition

With younger children you don't need to teach them which intervals are being used – their ears will benefit just by getting familiar with the different sounds.

5. Do-Re-Mi

Remember the "Do-Re-Mi" song from the Sound of Music?

Teaching your child solfege will help train their ear to hear pitch. You can learn more about intervals here with our Pitch & Harmony series. Also take a look at Ricci Adam's MusicTheory.net where there are fun games and easy exercises to test your ears.

6. Children's Choir

Many community centers, schools, and religious institutions have children's choirs. Your child will not only learn how to sing, but he or she will practice ear training and may even learn solfege.

7. Sing a song together at the piano

Even if you don't have great piano skills, learning at a keyboard helps your child train their ears to hear how your voice matches the pitch of the piano. You can print free sheet music online at Making Music Fun.

8. Add drums

Teach your child about melodies and rhythm easily with a drum. You can make your own out of an oatmeal can or bring in real instruments. Remo has a great affordable line of kids drums.

9. Melody Match

Learn music through matching in the Melody Match app, available through iTunes.

10. Tappy Tunes

The iPhone app, Tappy Tunes teaches kids familiar songs like "B-I-N-G-O" and "The Twelve Days of Christmas" with a fun and simple interactive screen. Added bonus? Tappy Tunes Lite is free!

References

- Netherwood, C. (2007). Music to your ears. Australian Parents, 64.

- Honig, A. (2004). Communicating With Babies Through Music. Early Childhood Today, 18(5), 24. Retrieved from MasterFILE Premier database.
- Moreno, S. (2009). Can Music Influence Language and Cognition?. Contemporary Music Review, 28(3), 329. Retrieved from MasterFILE Premier database.
- MacKinlay, Elizabeth and Felicity Baker. “Nurturing Herself, Nurturing Her Baby Creating Positive Experiences for First-time Mothers through Lullaby Singing.” Women and Music: A Journal of Gender and Culture, Vol. 9., University of Nebraska Press. 2005.
- Schellenberg, E. (2005). Music and Cognitive Abilities. Current Directions in Psychological Science (Wiley-Blackwell), 14(6), 317-320. doi:10.1111/j.0963-7214.2005.00389.x.

Playing Bass With Precision

In the first Bass Tone article we looked at the daddy of all basses: the upright. Though it has many wonderful strengths as an instrument, there are some frustrating limitations, particularly for the non classically trained musician. We left off in the early 1950s, when a man called Leo Fender stepped in…

Fender Precision Bass

Released in 1951, Leo Fender's "Precision" bass revolutionized bass playing. Its radical design maintained the tuning of the upright bass, but reduced the scale length from a whopping 42 inches to a manageable 34, added guitar-style frets

on a bolted-on neck, used a sleek solid ash body, and flipped the whole thing on its side. A mark of Leo Fender's genius is that the design decisions he made on the Precision have become the de facto standard of bass design. With only minor revisions, the Fender P-Bass—as it is affectionately known—is, along with its sister, the Fender Jazz (or J-Bass), still the most popular bass guitar in the world.

Listen: Electric Bass: E-A-D-G

In this clip the open strings of an electric bass are played from E to G.

The innovative construction of Fender's electric bass revolutionized music. Suddenly, the bass became portable and affordable, and any guitarist could quickly learn to double on bass. He chose the name "Precision" because the fretted neck allows for **perfect pitching of notes** every time, even for beginners.

This had two immediate effects:

1. The bass became a pretty easy instrument to pick up, leading to the popular trend of bands putting the cool one with no musical ability on bass.

2. A skilled bass player could now tear up the fret board like a guitarist! It isn't an exaggeration to say that modern musical styles such as funk and metal simply could not exist without the high-octane low end enabled by Fender's magical melding of wood and wire.

Fender Jazz Bass (Photo: cdsessums@Flickr)

Bass Pickups

The P and J basses have a very similar construction, with the main difference being the P Bass's unusual Z-shaped humbucking magnetic pickup, which gives this bass a fat rock sound. The strange shape was allegedly chosen to throw Gibson off the scent, as they still held the patents for this type of pickup and could have demanded licence fees! The J Bass features a pair of single-coil pickups, which produce a more articulate sound.

The following clip demonstrates a bass with a switchable pickup, changing from single-coil to a dual-coil humbucker sound. Notice, when switching from single-coil to humbucker, the volume, especially in the low frequencies, increases.

Listen: Electric Bass: Single Then Humbucker

If you are listening on headphones, you may notice some background noise on the single-coil sound. Single coils are notorious for picking up electrical noise from nearby equipment. The humbucker was invented to prevent this (see the Humbucker Wikipedia article if you want to know the science behind that).

The sound a pickup produces depends on other factors in addition to how many coils it has. The type of magnet, the number of wraps of wire, and the pickup's size all are important. Most musicians consider so-called "alnico" magnets to sound the best. Bass players typically do not prefer the super-high-output, overwound pickups that most rock guitarists do, because active basses already produce very high output (more on that in a moment). If you like the feel of your bass but want to improve the sound, fitting a different kind of pickup is the best option.

The two pickups—one near the bridge and one near the neck—of a J Bass have individual volume controls. This innovation came about because bassists wanted to blend the more articulate sound of the bridge pickup and the fatter sound of neck pickup to produce a sonic sweet spot. The desirability of these in-between tones lessened the importance of switching from one to the other, so basses usually feature either individual volume controls or a blend control that fades input from one pickup while boosting it from the other.

Listen: Electric Bass: Blend

In this clip, listen for the fading in and out of the bridge and neck pickups while I play a phrase several times.

"Active" Basses

Bass players tend to be more accepting of modern technology than guitarists are (though there is still a huge market for retro designs). Modern bass guitar designs are typically "active", meaning they have a battery-powered preamplifier built in, which boosts the output level for a cleaner signal, and can provide two or three bands of equalization.

In these clips, I adjust the bass and treble controls of an active bass while playing a repeated phrase. Listen for how boosting and cutting the treble affects the sound, and then compare with boosting and cutting the bass.

First, the phrase is played with maximum treble cut. The control is then slowly moved to a neutral position, and then to maximum boost. A bass with more treble will stand out more in the mix, but notice how more treble also increases the amount of unwanted string noise.

Listen: Electric Bass: Treble Tweak

Next the phrase is played with maximum bass cut. The control is then slowly moved to a neutral position, and then to maximum bass boost. At maximum cut the bass sounds weedy and lacking in low frequencies, but at maximum boost it becomes muddy and indistinct.

Listen: Electric Bass: Bass Tweak

With both of the above clips, listen and try to identify where you think the ideal balance is.

Even if your bass has only one pickup and no tone controls, you can alter your tone by your choice of fingering. Unlike a piano, where each note comes from only one key, on the bass you can play the same note in more than one position.

For example, using a higher fret on a thicker (lower) string will result in a fatter sound.

Listen: Electric Bass: Same Note, Different Strings

In this clip, I start by playing the open G string, and follow by fingering the fifth fret of the D string, the tenth fret of the A string, the fifteenth fret of the E string, and finally the twentieth fret of the B string. Notice the change from bright articulation of the open G to the thumpy fatness when I play the same note on the B string.

Now you have an idea of the range of tones which the electric bass itself can typically provide, and the kind of flexibility the electric bass offers over its hollow-bodied father, the upright!

We'll continue in the next article with how different playing styles can affect the tone of the bass, and the innovative ways famous bass players have eked out new sounds from their instruments.

→ Read the full Bass Tone series at EasyEarTraining.com

Explore all the Ear Training Series

available for free through

EasyEarTraining.com