Prof.Sound's Drum Tuning Bible v3

Home

Pocket DTB

Woods

Construction

Tuning & Seating

Kick

Snare Drum

Snare Tuning

Snare Unit

Buzzing

Concepts

Equipment

Buying Drums

Buying Cymbals

BIO

Acoustics

Contact

Author and Site Owner: Prof.Sound

Start Here

This site is refered to more often than any other source available for tuning drums. Why?

First, and most likely because its free! A close second would be because it works.

You DO NOT have to read this page. If you think you know the basic concepts of how a drum works, just go to the left and pick a section. the Tuning section is probably why you are here, but I will tell you that even the most seasoned drummer has found the "other" information very helpful, so I think you'll be back to read this page at some point....at least I hope so?

One last point. The concepts on the Tuning page are essential. For the Snare drum and Bass/Kick drum, you must go to the sections for the Snare Drum and Kick Drum.

This version of the Drum Tuning Bible is the 3rd iteration. Time has shown that many want to know more than I tried to explain, which is considerable and maybe overload to some. SO…..

With this 3rd iteration, it has unfortunately become lengthy to cover all levels of readers. With every iteration/revision, I try to incorporate more clarity based upon readers comments, which usually means more text. It took me some 30 years to figure out how to explain it where others could learn it in a few hours time.

If you have just fumbled through tuning over the years or are a beginner, it really makes sense to read it page to page top to bottom. It has been arranged to explain what to expect and why many things react the way they do. Because many have written and asked for it in book form, it is now available in limited text via a PDF document. In otherwords, at this time, the PDF file DOES NOT contain all that this site does because I simply cannot update all that as fast.

What's New?

Within this version you will find a more detailed definition of what to listen for in tuning. I've expanded upon the head selections, the role of microphones and the electronics. You'll also find the definition of some of the terms used to define sound characteristics so we can communicate better and is less difficult to get an idea across.

We will tackle the construction aspects of the drum in greater detail by exploring the issue of woods, metals, drum sizing, and how it all translates into sound and cost. And then I touch on what I consider to be a proper way to pick cymbals and drum sets.

In this age of E-commerce and a constant desire to pay the cheapest price rather than receive service, I admit it may be difficult for many on a budget to employ these concepts. But I ask you to view them with an open mind because even if you decide to buy over the Internet, the concept will help sort things out.

It seems the selections in local stores are getting less abundant and more geared towards the beginner and intermediate player rather than the medium to advanced player. This too is unfortunate, because it means you may actually have to put more time into your thoughts and selections in the form of travel if you really want to pick good products that reflect your personality.

What to Expect/Who Can Tune?

Ask any well respected producer what makes a great song and most will tell you a good drummer is an essential ingredient. Beginners should know that it is far more important to tune well and play steady than it is play as many notes as possible, and still sound bad. Well respected engineers will say that if the drummer can tune and play proficiently, recording a drum sound takes care of itself. So don't ever sell yourself short as an important ingredient in the scheme of things. Drummers need to know a lot about how sound works.

Drummers need to be able to hear the tonal differences in pitch and timbre to tune. Some people just cannot hear these changes. For those people, I recommend you spend a few dollars and buy what's called "Ear Training" software. This is available for your computer and will teach almost everyone how to hear

pitch changes. This guide will not.

The musical ability of someone playing drums is not synonymous with an ability to technically understand it, nor does it mean you can tune a drum, or explain how to tune a drum. Having actually shopped for new kits, snare drums, heads, etc., at many local shops in the Midwest, and having frequented chain stores and various forums on the internet, there is a major stream of misinformation being transmitted at all age and skill levels. This Drum Tuning Bible is my attempt to give you factual information. And, at least for now, with the continued support of sites like Drumweb.com, hopefully it will remain free to those who seek out the knowledge.

I cannot emphasize enough that it takes work to tune. This guide does not say, "Put 2 turns on one side and then a few more on the other side". This goes into great detail about the drum, its construction as well as tuning in an attempt to teach those who really want to understand what their entire drum set can do, how to go about figuring that out and put it into practice. It requires time, patience, thinking and work.

> **You must plan on at least 3 hours, if not more, on each drum in your kit to truly understand how it responds to tuning and how you respond to tuning.**

It will get substantially shorter if you understand what to expect. And therein is the shortcut to tuning and great sound, knowing what to expect. So if you spend the time to read the entire "bible", it should also aid you in choosing and tuning a drum set to fulfill your dreams.

These are the Essential Concepts:

1. The interval between drums is more important than many realize and the size of both the diameter and the depth are key to getting even resonance and the desired incremental notes between drums. **Diameter determines the note** of the drum, **depth influences articulation and resonance**. *See* "Shell Depth versus Diameter"

2. The tiniest of movements on the tuning lug "will" make huge differences in pitch and resonance of the drum, more so with a rigid hoop, such as cast. Tweaks of the lugs on the resonant side are more prone to raising pitch than are ones on the batter side. One simple rule to remember (assuming the drum is well tuned to begin with) is "**Batter for feel, resonant for pitch**". *See* "Zones"

3. Tuning that works for a small venue will not likely work as well for a large venue. You have to consider what component of your sound will carry through to the audience. **What does the audience hear?** Is it the batter side via a microphone, or is it the resonant side via an acoustic set? Which leads too…

4. All drums sound different at 0, 15, 50, 150 foot or differing distances. It's a sound wave/reflection thing. So what sounds good to the drummer while playing may be terrible to the audience, in whatever forms the audience takes. It's important to **go out and listen to what your kit sounds like** while the other instruments are playing. Move around and make head selections and tunings accordingly. A higher pitch enables the drum to carry more, lower pitches less so.

5. **Head selection for microphones will likely be different than without**. In large venues under close micing techniques, its typical for drummers to use 2-ply heads because the sound is more muffled or controlled. You get a shorter burst of energy, which by virtue of the hall or venue, reverberates or becomes delayed to the audience. Much the same as large venues require a more selective or simplistic placement of notes and fills because the audience does not hear the detail.

6. **A highly resonant kit may be your sound tech's worst nightmare**. While the drummer can be inspired by this tone, a large venue or recording may result in a very muddy sound due to the overtones and lingering decay of the drum mixed with other instruments or acoustics that occupy the same frequency bandwidth in the mix.

7. **Get to know microphones well if you're going to use them**, even slight alterations in placement make a huge difference. For example, placing a mic near the outside edge of a drum can bring out the high-pitched overtones. But move it in just a ½" and those diminish dramatically.

8. The sound heard from a CD at home is not what a drum really sounds like but on few occasions. What you hear is usually an altered version recorded according to what the producer and the artist want it to sound like through electronic alterations and is designed to fit the recording. An electronic device called a "compressor" used on a drum can accentuate the attack of the stick or kick drum beater giving it that un-natural edge. It can also bring out the very deep bottom end of a kick drum or floor tom to very un-natural levels. Triggers are devices which turn the acoustic energy of the stick hitting the drum into electronic voltage that will cause an electronic drum module, loaded with sampled sounds to emit the tone of your choice. This can be any sound at all from a hand clap, to a door slam, a guitar sting being plucked every time the stick/beater hits the head. Developing unique sounds by mixing electronically processed sounds with acoustic tones is a very common practice. For this reason, **sometimes you just cannot duplicate your "drum god's" sound** without the knowledge and use of electronics.

9. **Less expensive does not mean inferior**, in some cases, it may be far superior to achieve the desired end-result. *See* "Construction" *for the real issues here*.

10. The **air hole or vent in the shell is to allow the shell to breathe** when two heads are used and atmospheric changes occur, thereby helping to eliminate moisture build-up. This is a typical problem moving from cold to hot environments much the same as glass windows can sweat in your house. The

single 1 or 2 vents in the shell have little effect on tone. However, multiple large vents or holes in the shell can make a drum extremely loud and bright sounding.

11. Stretch the heads – This is a concept that is controversial, and in my opinion, is often taken out of context. I'm of the belief you should stretch heads (within reason) on all drums; **"seating" is the most important and often most overlooked step in getting quality sound** and consistency out of a drum. The heads may not last as long, but they will stay in tune longer. On the flip side is the argument, that if you do stretch them, they do not last as long, and do not tune as low. It seems logical, that both concepts are true with some exceptions. So you will have to weigh out what is important in your case. Because I come from a school that states it is wise to create as few problems for yourself and others as possible, this bible will hold true to the concept that you need to seat the heads via stretching them up front.

The Drum Sound

The batter head controls attack and ring associated with the stick attack. The resonant head produces "resonance" associated with the stick attack and aids in sustain, it has a major effect in the overtones and enhances the timbre of the drum.

Timbre and note/pitch are not the same. The term "Timbre" refers to the overall character of the drum, the distinct quality of the sound given by its overtones. The fact that one drum is "brighter" vs. "warm" is the timbre. The "fundamental" note, which is the point at which the drum is likely to be most "open" or "resonant" in tone quality, it's the sweet spot for that particular drum shell. The shell design is the governing factor in what the fundamental note of the drum can be. "Pitch" is the highness or lowness of the sound, it can be raised or lowered in reference to say a note on the piano, and it is the act of tuning. But the shell sweet spot or fundamental note at which it resonates doesn't change. So a 12" drum of a given material, diameter and depth may produce a note of G up to say a D-sharp ("pitch"), but it may really stand out around an A-flat ("fundamental"), or the note of shell. The fact that it becomes bass heavy ("warm") or very treble heavy ("bright") is the timbre.

While the many drummers focus on the sound coming from the batter side, an audience hears something completely different. Often, either the drummer or the audience can hear a sound that is inferior or superior, it depends upon your perspective? Some drummers like a very dead sound and wonder why the drum doesn't cut through to the audience? Sound Techs that place mics close in on the drum love dead sounding drums because of how mics pick them up. Other drummers like a very live sound because it inspires them and when they close mic the drum kit, the audience hears a very muddy tone and the sound tech goes nuts and gets out gaffers or duct tape and wants to slap it on everything. You need to tune for the audience. You just need to understand what the term "audience" means. The reality is, mic technique can play a huge role on how the kit sounds in the venue and to the audience and there are as many different ways to correct the problem with simple mic choice and placement as there are tuning and head choices.

The mindset you have to have is that the term "audience" can take the form of a pair of headphones, speakers, someone sitting 10 feet away, 50 feet away or in a church or stadium. It also encompasses the method by which you will be heard (i.e. Microphone or ears). In other words, the "audience" is the end result of your efforts to be heard. So tune accordingly and understand the effect each variable has on the sound. One tuning does not work for everything.

If using microphones, you need to understand microphones and how their choice and placement will effect the tone of the drum because every mic has a sound of its own and the use of them can result in a dramatic tonal difference. *See* "Microphones". If you do not have multiple mics to choose from, then understand how to pick a head (i.e. Coated, muffled, coated, clear, single ply, 2-ply, thin, etc.) based upon the mic available and the other variables you will encounter.

Every drum has a sweet spot in the center of the head. As drums get smaller, the sweet spot gets smaller. If you routinely hit outside of the sweet spot, the drum develops more complex overtones and tuning along with head choice becomes more critical. It is the phase relationship between the two heads that cause a drum to work. This is the essential reason for going through the exercise of tuning as I have outlined it below. It is to teach you these relationships. But to effectively employ it, you must understand what you are hearing, and why?

When the drum is hit, the ear hears mostly the attack and the fundamental pitch of the drum, the sound of the stick tip hitting the head can be accentuated by the resonant head and we refer to these as overtones. Overtones are washed out at a distance, but up close, they can be very strong. Overtones are also an essential component to making the drum sound carry through other instruments and to the audience. The power put into the stroke is essential to gaining the best tone/overtones from the resonant head. Consider that if you play soft on deep shelled drums, they will be more difficult to get tuned well because exciting the lower resonant head becomes more difficult with the limited power you put into the stroke. If the stroke is light, a uniform tone is easier to achieve on a shallow shelled drum. How a drummer hits may be the most essential component of the sound.

"Power" comes in the form of the column of air that causes the resonant head to vibrate. So just apply some logic. The longer the column of air, the more power required to cause the other head to vibrate. It also means that the duration of time from the time the stick hits the head, to the time the resonant head vibrates, is longer. This results in a "fatter" tone, a tone that takes up more space in time whereas shallow drums become more "articulate" and take up a shorter space in time.

You can isolate the ability to hear whether a drum head is in tune with itself or not by placing it upon a soft surface, such as carpet. When tapped very lightly with even pressure and at the exact same distance towards center away from the hoop (about 1" inside of each lug), it allows you to hear whether the drum head is in tune with itself or not. When repeated at each lug, again and in keeping with a uniform pressure and distance, each tone should be identical. Note I said the **tone** should be identical, this does not always correspond to even tension as felt by the tuning key. When they are all even in tone and the phase relationship between heads is correct, the overall tone you get becomes clear. This is all explained more fully step by step under "How To Tune". When you do this with the drum held up in the air, or mounted, hearing these subtle tones become more difficult.

Head Construction and Concepts

Coated heads are considered "warm" or "mellow" sounding meaning generally void of the real bright overtone associated with the "clear" version of equal brand and specification. Clear heads are considered "bright" or "clear" sounding meaning they bring out as much of the high-pitched tones of the stick attack and resonance of the drum. In between the coated and clear heads in tonal quality is the "ebony" series of heads and is often described as being a "thicker" or "darker" sound than that of a clear head of equal specification. Ebony colored heads, while usually chosen due to aesthetics, have the virtue of being both warm in the overtone area, yet bright in the stick attack. Kevlar heads and Aramid fiber heads (popular among heavy hitters for snare drum) are designed to be extremely durable under a wide range of considerations. They are marching drum heads and take extreme abuse. They are known for their inherent dry staccato sound and can be cranked up extremely tight. So much so that often, a normal snare drum will not take the amount of tension possible without stripping lugs or deforming shells/hoops.

The most resonance is heard by placing a head of identical specifications on both the batter and resonant side because polymers of equal thickness vibrate reasonably equal to each other when the tension is equal. It is a common misconception that if you have a heavily muffled head on the batter side and place a thinner head on the resonant side, that the resulting sound will be more warm, or bass heavy and more resonant. Actually, the thinner resonant head makes the high frequency tone, that most seek to eliminate come back out of the drum and the bass frequency produced lasts for less of a duration (a good combination for those who like the single ply sound but hit really hard). On the contrary, thicker heads, such as coated heads or thin two ply heads have more mass, and mass once set in motion is harder to stop than a thin head with less mass. For this reason, the thicker resonant head is actually more resonant in the lower frequencies whereas the thinner heads produce the more hollow or upper midrange resonance for less of a duration. High carbon content is required to make the ebony heads. This too adds mass while making the head just a hair more brittle. The resulting sound is a little more focused and slightly void of higher pitched overtones. Pure white, rather than coated white, goes the same direction as ebony heads.

As you add a glass component to the polymer, it becomes both heavier in specific gravity and more brittle. So when considering the snare drum sound, it's actual "snare" sound is more a reflection of the resonant side than it is the batter side. With the snare, you care about issues like sensitivity (how easy it is to excite the snare) and how bright versus how warm the tones are? For this reason all snare side heads are thinner than batter side counterparts. A thin head is easy to excite. It produces the bright tones, overtones, or in the case of glass content, a dryer but more bright and focused tone. Small air holes have become popular with some manufacturers and can be seen on the snare drum heads as well as some bass drum heads. These would appear as very small holes ranging from a little less than 1/16th (1.5mm) to ½" (12.5mm) in diameter. These are not to be confused with the larger holes in kick drums which are discussed below under "Hole In Your Head". These smaller holes relieve pressure very quickly and the resulting sound is a very dry tone because the resonant side is not easily excited. When you combine these elements and properties, you can begin to understand what the resulting sound of a given head will be even before you mount it to the drum.

As you tune the drum with one side either higher or lower, you go through "zones" producing one of clear pitch, phase cancellation, no sound or a Doppler effect. "Doppler" is where the drum when hit, descends in pitch from the point of initial attack to a lower pitch. This also becomes more pronounced when the head is of a different specification (weight/thickness) and the batter head is higher/lower in pitch than the bottom head. If the drum is tuned wrong or "seated" incorrectly the first time a head is mounted, you will likely ruin the head beyond its use or it will never sound its best. This is described in great detail under "How To Tune". Seating wrong does not always mean uneven tuning, such as one side tighter than the other. A poor seating can also be the result of using bent, twisted or distorted hoops and/or poor bearing edges. Even though the drum has been equally tensioned (such as that of using tension devises which measure lug torque or head tension), inferior hardware and shell problems cause unequal stretch of the head polymer and/or force the head out of round.

Well, if you made it this far, you really haven't been instructed on how to do anything. But you now have a foundation to understand the concepts and information that follows. You are also much better equipped to sound better than that lazy person who skipped all this stuff. The rest is designed to give you the knowledge required to exploit, purchase and make a drum sound at its best, which is how "you" want it to sound.

Prof.Sound's Drum Tuning Bible v3

Pocket Drum Tuning Bible

What follows is intentionally brief for those who do not want to wade through the longer text. However, the longer version does include many more insights that may aid you in your decisions.

Fundamentals:

- **Batter Head:** The batter head controls the feel of the hit, initial pitch, the sound of the stick slap and the initial element of the drum sound or overtones. When the drum is hit, the ear hears mostly the attack and the fundamental pitch of the drum. Overtones emitted by the batter head are washed out at a distance, but aid in the overall projection.
- **Resonant Head:** Often underestimated for its contribution to the tone, it is mostly responsible for the pitch, lingering tone and pitch of that created as a result of striking the batter head and resonance of the shell. The resonant head produces "resonance" and aids in sustain, it has a major effect in the overtones and enhances the timbre of the drum. Generally you do not use anything other than single ply on the bottom, but there are exceptions.
- **Tuning:** As you tune the drum with one of either the batter head or resonant head higher or lower in tension and pitch, you go through "zones" producing one of clear pitch, phase cancellation (no life) or a "Doppler" sort of effect where the drum descends in pitch, also referred to as "pitch bend". This becomes more pronounced when the resonant head is of a higher pitch than the batter.
- **Seating:** Things are changing in the manufacturing of heads. When the head is first mounted, the objective is to get the head to seat itself. **Seating the head** is where you create that all-important bond between the bearing edge of the drum and the film and cause the head collar to become tight to the hoop. Seating is often also referred to as putting more that normal tension on the head. This seating process, whereby you put the head under heavy tension to form it to the bearing edge is not required to get a good tuning. However, the pre-stretch that occurs during the high tension event can aid in minimizing the need to tune back up to pitch more often. Moreover, if your bearing edges are good and sharp, less tension may be required. If the head is pulled tight on side it may fail to be centered on the drum and its ability to produce an even harmonic tone may be inhibited. Uneven tensioning can limit the ability to tune a head to its lowest potential note.
- **Heads:**
  - **Coated heads** will be warmer and minimize high frequency tones. The stick slap has a very bright element to it, much like sandpaper rubbing together, but the main element is darker in tone. Coated is probably required if doing brushwork.
  - **Clear heads** are bright with overtones, the stick slap does not have bright sandpaper like characteristics as found on coated heads, but the overall presence of the slap is very bright in the upper register and carries through the mix very well.
  - **Ebony** is in between the coated and walks that balance of properties between coated and clear and the stick slap does not have bright sandpaper like characteristics as found on coated heads. It produces a less of a high frequency overtone resonance ("darker" tone).
  - **2-ply:** These aid in durability and can also limit high pitched overtones. Often referred to as "muted" in tone, when they do not have a control ring adhered to them do produce lingering resonance and bright overtones the higher they are tuned. These come in multiple film weights depending upon the manufacturer.
  - **Snare Side Heads** are specifically designed to be thinner and should be the only style head used on the snare side of the snare drum. Thin heads enhance sensitivity and are brighter whereas thick heads are exactly opposite. The most common weight is a 300 weight.
- **Drum Size:** Shell diameter is more responsible for pitch than any other element. Depth is responsible for the duration of the note and aids in resonance. Shell thickness when thin, adds tone, body and resonance. When thick aids in projection and detracts from resonance.
- **Timbre vs. Pitch:** Timbre and note/pitch are not the same. Timbre refers to the overall character of the drum vs. the fundamental note, which is the point at which the drum is likely to be most "open" or "resonant" in tone quality. Know that pitch can be raised or lowered in reference to say a note on the piano. The length of shell resonance doesn't really change, whereas the pitch of the shell resonance will change as a reflection of the overall pitch. So a 12" drum may produce a note of G up to say a D-sharp ("pitch"), but it may really stand out around an A-flat ("fundamental" note of shell). The fact that one drum is "brighter" vs. "warm" is the Timbre.
- **Bearing Edges:** Sharp 45° bearing edges will produce lingering sustain and bright overtones. Bearing edges of 30° are slightly more controlled in tone, have a bit less problem with high-pitched ring. Rounded edges produce a muted tone.
- **Shells:** The rougher the interior, the less resonant the drum. With thick shells, the heads are more responsible for tone. Each shell can have a fundamental frequency. Thinner shells exhibit this more than thick. Detailed tuning or thumping on the shell and matching the note to a known scale allows you to find that "fundamental" shell pitch and enhance or detract all the inherent sounds of that particular drum character. However, this concept is forgiving and the pitch of the head does not

have to match the shell pitch note. Thinner shells are more resonant so with thin shells, tuning to the shell pitch note does make a drum most resonant. A sharp bearing edge means more high overtone and resonance (i.e. 45° vs. 30° or rounded). If the drum is void of obstructions inside, like no reinforcing hoop, the drum will be more open and vibrate more freely. With a reinforcing hoop it will have a shorter decay/sustain and a more mid-ranged presence or attack than unobstructed shells.

- **Wood:** The best way to relate to the sound of wood is through comparing it to another. Maple compared to African mahogany (not Philippine mahogany); Mahogany will have an approximate 20% increase in low frequency resonance over the Maple drum. The mid and high frequencies will be about the same. Maple compared to birch; Birch will have about a 10% loss in reproduction of low end and about a 20% increase in the high end, with the mid range remaining about the same. Birch will be a “harder/brighter” sounding kit. Beech is in between Maple and Birch. Several filer woods are also used, such as basswood, Philippine mahogany, poplar, etc. These are to lessen cost and typically drums made of these woods lean more towards the tone of Birch of Beech than Maple or US/African mahogany.

Tuning

This procedure works on all drums, toms, snare and kick. In the following, the normal top head is referred to as the “batter” whereas the normal bottom is referred to as “resonant”):

1. Remove both old heads, inspect the drum, thump it and eliminate rattles and buzzes.
2. Set the drum on an absorbent surface, such as carpet or blanket.
3. With batter side down, resonant side facing up put the resonant head on.
4. Tighten all lugs just to the point where contact is made with the washer or rim. Once contact is made with the washer/rim, back-off 1/4 turn.
5. Using two keys 180 degrees apart (or in the case of an odd number of lugs use 1 key in a star type pattern), tighten in half turn increments together until you've put 2 complete turns on all rods of the drum. The musical note is not important.
6. Lift the drum up a few inches, hit the head once and see if it is a distortion free sound. If not give each lug another 1/4 of one full turn. Repeat until the drum is distortion free. Do not be afraid to really tighten the head above a normal playing pitch, it is essential that the head produce a clear undistorted tone before proceeding.
7. Place the drum back down on the carpet with the side you are tuning facing up.
8. Tap with the drum key, lightly and with even force about 1.5” (40mm) from the edge. ALWAYS tap with equal force and in the same place at each lug. LISTEN to an element of resonance of the tap. There will be several tones. You need to focus on one element or frequency band heard. Remember, even force at an identical distance from the lug. Now adjust each lug so the pitch of the resonance is identical. The order is not very important here. DO NOT EVER TUNE DOWN TO A NOTE, TUNE UP. If a lug is too high detune below what you are trying to achieve and then bring it back up to pitch.
9. To make sure the head is seated or crack the glue joint in the case of heads with glued collars, push down with light force making about a 1/2” (14mm) depression directly in the center of the head.
10. With the drum off the floor or on its stand/mount we need to detention the head just to the point of no resonance and where the head buzzes. Loosen as you tightened with 1 or 2 keys in ¼ (90°) turn increments hitting the head between each turn of a lug. Now put 1/8th of a full turn on each and every lug and hit the head once between each hit until you get a distortion free and clear tone.
11. Now as in Step 8, even out each lug so they are all the same pitch.
12. Turn the drum over and place the batter side on and place the drum batter side up on a carpet or absorbent surface.

Repeat the above Steps 4-11 on the batter side using the head of your choice. Once complete, proceed to the section *Fine Tuning* below.

Fine Tuning

Here’s where you dial the drum in. *Note: If you have the time let the drum sit a few hours to overnight to stabilize the head. This is not a requirement by any means, but will help in some cases and make the tuning process easier.*

1. Working with the resonant side facing you, place the drum up on its stand or hold by the rim. Hit once and see if you still have a low, resonant and clear tone. If so go to Step 2 below. If not, begin tightening evenly and successively on each lug in extremely small increments of no more than 1/16th of a turn per lug. Slow is the key here. Go around once, even out the tone as in Step 8 above by tapping and then strike once in the center. You want to tune just until you get a low and clear tone. STOP AT THIS POINT.
2. Turn the drum over, batter side towards you. Hit once and see if you still have a low, resonant and clear tone. If so go to Step 3 below. If not, like above tighten evenly and successively on each lug in extremely small increments of no more than 1/16th of a turn per lug. Go around once, even out by tapping and then strike once in the center. You want to again tune just until you get a low and clear tone. STOP AT THIS POINT.
3. Like it or not, this is the lowest pitch this drum will ever go. Note: If you’ve gone around several times moving up in pitch but the tone is distorted, you may have one or more of a bad head, bearing edge problem, shell problem, lug casing issue or the head didn’t seat. Before replacement, I suggest leaving the head under tension for 24 hours and try again. I have found that the problem goes away many times overnight. I don’t know why. If you can’t wait, try another head or try taking the pitch way up.
4. Now it’s time to proceed up through the tuning zones to get the most out of the drum. Focusing on the batter or top

head, proceed and tune, never go in larger increments than 1/16th of a full turn on the way up. Again, slow small movements of the lug are important until you grasp the concepts. Always hit the drum between each twist of a lug. With every few full rounds of lug tightening, stop and make sure the head is in tune with itself.

What to Expect - You will go through phases where the drum sounds good then sounds bad for a couple of turns and then suddenly the sound opens up again. You can usually do this for 2 zones and then the top head will go dead and have a high overtone/ring. While pitch may continue to change, the drum continues to have no real life to it. At this point you've gone too far with the top head, back off 1/4 to 1/2 turn or go back to the point where the drum sounds even, focused and open (sounds good).

5. If you want a pitch higher than this pitch you achieved, go to the bottom head and tighten each lug 1/8 to 1/4 of a full turn on each lug. Again, always hit the drum between each twist of a lug and with every few full rounds of lug tightening, stop and make sure the head is in tune with itself. Once you reach that point where the drum again has no life, after this you can increase the pitch of the top head again for another 1-2 steps.

What to Expect - When tuning in this manner, you'll experience certain phases in the tuning where when struck will the drum will have a descending pitch. Some like this sound and stop here. As you move up out of that phase of the zone, you'll reach a point where the drum evens out, the Doppler is gone and the drum becomes open and even in sound. This is the point where both heads are or are close to being identical in pitch.

6. Beyond this point, the drum will go dead again and you have to repeat with the 1/16, 1/8 or 1/4 turns on the opposite head to effectively raise the pitch of the drum and move up again to another zone and repeat the procedure.

Quick Tips

1. You can use or eliminate muffling devices such as “moon gel”. Moon Gel is effective and cutting unwanted overtones and lessening the duration of the note. Simply apply as much as you require for the sound – its that simple. You can also use a “O” shaped ring, either purchased or made from old heads that can create a similar effect as using moon gel. If using these “devices” bothers you, you can intentionally detune or raise pitch slightly on both heads. For example you might lower the batter and raise the resonant (or visa versus) by equal amounts causing a phase shift and become more muted or more open depending upon where you are in the zone.

2. People often will loosen one lug to create a similar affect. Although I find it is better to move all the lugs by a certain amount. This way you don’t run the risk of destroying the head.

3. Keeping your resonant head to its lowest note and then detuning it ever so slightly may help in achieving a “fat, loose or dark” drum sound. The batter head is then used to alter the pitch. Note that the pitch for a “fat” tuning can be somewhat limited.

4. For more “punch or attack”, the resonant head is raised in pitch by a small degree over the pitch the batter head. To create an “open, resonant” sound, both heads should be of equal pitch. Use of a clear head will result in a more “open” tone.

Prof.Sound's Drum Tuning Bible v3

Drum Woods

Drum Woods In Detail

We've all heard terms like basswood, luaan, maple, birch, beech, falkata, Philippine mahogany, African mahogany, etc. Most of us can relate to common woods like maple, birch, beech, and we even have an idea of what "color" mahogany is. But do we really understand why these are used? We (drummers) really don't put the role of the wood in perspective.

Sound is subjective. The marketing concept used by manufacturers, coupled with finish and function leads all of us to believe that more expensive is better. In reality the manufacture puts together a *package* designed to being a drum to market at a price point.

The purchase price is a function of manufacturing cost relative to market value (demand). What this article should do is help understand why some drums are more expensive. Much like furniture, it often has little to do with function, but sometimes a big impact on sound and finish.

People assume lots of things about drum wood and its effect on sound. Some common assumptions are:

- The interior layer of the shell is all that matters to influence the sound of a drum. By this I mean within the shell construction you can have any wood you want on the other layers and if the interior layer is maple, it will sound like an all maple drum. This is really not true, but the interior layer does affect the tone you get.
- The exterior layer is all that matters. So if you use anything you want on the interior and core layers, the outer layer is the most important grade and species that will influence the drums sound. This is untrue as well but again, the exterior layer can affect tone and obviously the look of the drum.
- The shell has to be all one material to matter. So, make the drum up of all maple, birch, etc. in layers and you have the resulting woods sound inherent in the drum. This is mostly true, but the thickness of layers, how bonded, etc. all influence sound.
- The drum shell must be solid material of all one species. As a purist approach, this is the truest of statements one can make because depending upon construction, it allows the wood to emit tone unaltered from its natural state. Some have actually carved a donut shell out of very large logs, which depending upon thickness can create weak points in the shell

Albasia Falkata:

Woods like Albasia falkata are used as a substitute for American hardwood maple as well because it will finish extremely well and is cheap. To my ear it imparts a bright attack tone and is most appropriate as an inner layer.

Maple:

Maple is a general overall warm sounding product, it can reproduce frequencies of the drum fairly well across the spectrum. True slow growth old forest maple trees are most prized due to the narrow growth rings and straight grain. The wood resonates extremely well and the finishes are well accepted. Newer and reforested trees do not have as tight a growth ring habit and are not as prized as old growth timber. Solid shelled snare drums made of burled or Birdseye maple are very warm in overall tone but also impart a very bright attack. Maple is generally thought to have very even tone across the spectrum and is prized by many drummers.

Mahogany:

True mahogany from USA or Honduras will have about a 20% increase in low frequency resonance over the maple drum, mid and high frequencies will be the same from a reproduction point of view, but because the Mahogany has the 20% low end increase, the perceived tone is warmer. Certain deep red timbers from South East Asia are sold as a 'Mahogany', or 'Mahogany Finish' although they are not true Mahogany from USA or Honduras. It's most likely called mahogany due either its common appearance (dark red) or due to the nature of the forestation being depleted and the stigma attached to it. Asian 'Philippine Mahogany' is often sourced from the endangered Dipterocarp forests of Indonesia, Malaysia and the Philippines. Dependant on the source tree the timber types are often known as Meranti, Lauan and Keruing. Hence the name Philippine mahogany. The species known as Khaya Nyasica or African mahogany are more plentiful yet still endangered and therefore, not plentiful at this time.

and wastes material as drums get large. So bending materials to form a shell are the next best thing and obviously bending thicker walls takes more skill and time, hence very costly to create.

Any two or more manufacturers of drums will sound the same if all aspects of the kit are the same.

To create a different sound (or price point) you must change something about the drums construction. While there are different hoops, there aren't that many all that different from manufacturer to manufacturer. Most use the same form and often the same materials, with few exceptions. Mounting systems and hardware look different, but most have found ways to get the same function these days and they require substantial effort to alter design once put into production.

So if you are a manufacturer, and you want to alter your product for appearance, sound and cost, wood is a good place to begin experimenting. If it's easier to tool, cheaper to buy, easier to come buy and the result cannot be detrimental to sound and finish you are competing with, it gets incorporated in the line.

Construction and Its influence on Sound:

Drummers are becoming more educated about sound and with that more demanding. Things of different mass densities are known to vibrate differently. Wood and the construction used (shell thickness, plies, type, edge treatment) is the mass of a density that will influence the tone of the drum most.

To create a drum from true mahogany of the US or Honduras variety can be very expensive. Counterparts that have very similar sound characteristics are basswood, poplar and lauan, all of which are less expensive. So from a manufacturer's point of view, to reduce manufacturing costs, you might choose to use one of these wood substitutions. However, appearance may be an issue and the ability to finish it may be in question as well if you used it as an outer layer. So if a drum shell has 80% lauan, and 20% something else like an inner play of Albasia falkata and an outer ply of birch, you can hypothesize that the lauan will be effecting the tone more so than will the "something" else, and given it's the sound characteristics of mahogany, to some degree, you can reason out that the drum will have a nice low-end with reasonable midrange punch and bright overtones.

The interior treatment of the drum will highly influence the tone, such as the relectance (or lack thereof) of the stick slap on the drumhead, or snare sound on a snare drum. Lauan is a very stringy, porous wood that will lead to a rough appearance and not finish very well once bent. The result would be a drum with little reflection of the brighter tones, essentially a very lifeless tone that doesn't carry very well. To counteract this, a ply of a dense, non-porous hardwood that will finish very smooth may be added such as maple, or again to keep costs down, a birch or Albasia Falkata because they not only have the characteristics sought, but look attractive as well.

Birch:

Birch is a very dense tough wood, blond in color that tools well. It will have about a 10% loss in reproduction of low end compared to Maple and about a 20% increase in the high end, with the mid range remaining about the same, so the Birch kit will definitely be a "harder" and "brighter" sounding kit. Birch is derived from fast growth trees that are commonly large in diameter and finish reasonably well. Birch is often referred to as a naturally "EQ'd" drum set. This came from its popularity when used in recording studios where the attack portion of the sound was an important ingredient in recordings dating back to the late 60's. It made it easier to get the drums to cut through the mix with minimal effort.

Poplar:

Poplar is derived from fast growing straight medium hardwood trees and is a less expensive alternative to Birch and Maple. Its finish can be somewhat green in color and is therefore used in the inner ply layers as substitute for more expensive and less plentiful woods. To my ear it takes on more of the tone of birch or mahogany than maple.

Basswood:

Basswood is a great less expensive hardwood that mimics the sound of Maple to some, mahogany to others. Yet it is more plentiful and gives the manufacturer a price advantage. It in many ways is an upgrade to luaan, or ramin and is often used as a core wood with a bit more of the lower register tone to it than realized out of maple. For this reason I tend to think of it more like mahogany than maple.

Lauan, Luaan or Luan:

By any spelling is a less expensive alternative to woods like basswood and "true" mahogany. To my ear it does not sound like true mahogany, but more like that of birch. This is a inexpensive filler type wood. It is in fact a species of endangered wood called "ramin" and or "meranti". Actually, several other woods fall into this category too and are often referred to as "lauan" by various spellings. Lauan is "a coarse textured stringy wood with a wavy interlocked grain pattern, it has a pale creamy-red colour. Light but strong and durable it accepts stain and varnish well and can be polished to a high finish but remains somewhat porous. Red Lauan (Shorea negrosensis) is the mother tree of

The exterior is mostly appearance related, although anything that can add mass and dampen vibration will again influence sound (i.e. tom mounts). An easy thing to target here is the hardware and most drummers notice when toms are mounted to the shell. This is an easy target for illustrating the effect of something that can dampen shell vibration and influence sound. What we don't always focus on is the exterior layer of the shell itself.

Laminate materials being essentially heat set resins, do not have much in the way of attractive sound characteristics. They do offer extremely durable finishes that widen the choice of appearances possible. They are heavy materials from a bulk density viewpoint, and will inhibit the transmission of sound around the circumference of the drum, but aid in the transmission of sound at 90 degrees to the heads. This may exactly what you want if you are a high volume player.

In subtle ways, some designers believe that the application of paints and various other finishes influence the tone as well. This has merit when you consider that as you add resins to bond plies, you are also filling pores within the wood and also inhibit its ability to vibrate at different frequencies. How much this influences sound will depend upon how many plies and finish treatments. The same happens when finishes are applied. Some believe the application of wood oils are better, others believe its their so-called "vintage" finish. Others don't think it matters at all. What's better? I suspect that will be up to you in the end based upon what you want to hear.

What frequencies get effected? That all depends upon these combinations of variables, but is sort of boils down to this:

- Thinner drum shells resonate easier and generally lead to a very open sounding drum. A good examples of this is the Premier Genista.
- Thicker shelled drums are dryer sounding drums. A popular example of this is the YAMAHA Recording Custom series of drum.
- Drums which have counter hoops adhered inside are warm, yet have a controlled resonance. A good example is the DW series of drums.
- Drum which have no counter hoops tend to have brighter attack and more overall high-frequency resonance.

Price and Value:

In the end, the core woods are most responsible for the sound of the kit, but not entirely. Price is a reflection of the ability to get and tool wood into a shell and the end users perception of the value they received. If it cost a great deal but does not sound good to you, then there is little value.

All softwood trees are fast growing whereas maple, true exotic US mahogany trees or Honduras mahogany are very slow growing. These trees growing in the wild are about 200 years old when harvested from the rain forest. The reason old growth tree lumber is so valuable is because the trees grew slowly in a dense forest and limited light. The result

true Meranti. Natural inhabitants of the Philippines, Malaysia and Indonesia, they are large trees; 61.5m (200 ft) in height with a trunk of up to 2m (6ft 6in) in diameter. Asian 'Mahogany' is often sourced from the endangered Dipterocarp forests of Indonesia, Malaysia and the Philippines. Dependant on the source tree the timber types are often known as Meranti, Lauan and Keruing. Hence the name Philippine mahogany.

was fine grain wood. Commercially grown trees are not as dense in grain and therefore, not as prized.

In most cases, the costs of the respective sets are warranted. An all maple set is more expensive because it is all maple and maple is expensive. Mahogany sets have dropped off in availability simply because there isn't that much good true mahogany left at a price most drummers will pay and the brighter attack imparted by today's popular music tends to favor Maple or Birch sounding kits. Birch and beech grow faster and are easier to get, so they get a little cheaper.

In the end it doesn't have to be complicated. When you hear what you like within a budget that has the look and finish, you will then know what you are after and can begin the process of finding a kit that comes close to your budget. Try to avoid marketing hype and just sit back, relax and let your ears guide you.

Prof.Sound's Drum Tuning Bible v3

Construction

Construction Guidelines, All Drums

To pick the right head to achieve desired sound, you should consider the inherent character of your drum, which is often very much determined by its construction.

All of what I consider as important aspects of construction are covered in greater detail as you read through the bible. Here we start by giving some simple rules to better understand the construction aspects:

1. The rougher the interior, the less resonant the drum. Just like putting carpet on a wall, rough interiors break-up and absorb reflections.

2. Thinner shells are more resonant. Because there is less mass, they are easier to excite, they resonate more than thick and heavy shells.

3. The sharper the bearing edge, the more overtone and high pitched overtone resonance.

4. If the drum is void of obstructions inside, that is, no reinforcing hoop adhered to the inside; the drum will be more open and vibrate more freely. Conversely, if the drum has reinforcing hoops inside, it will have a shorter decay/sustain and a more mid-ranged presence or attack than unobstructed shells. The reinforcing or counter-hoop stifles the ability for the drum to resonate, thus decreasing the low-end along with the very high-end response to a small degree. Therefore, the unobstructed shell is usually brighter or with more high frequencies, while the thin unobstructed shell increases low-end resonance as well.

5. A “better” sound is what you want the drum to sound like and despite the marketing propaganda; less expensive does not mean an inferior sound. Low cost drums are usually a “punchy” type sound due to wood grades used. If recording, this may be exactly what you want in a drum.

6. Wood Sound Explained: First, these are general guidelines, which are greatly enhanced by the thickness of the wood used. So if you apply the rules given above, and some common sense, the following will hold true or aid in choosing a drum.

- Maple compared to African Mahogany: Mahogany will have an approximate 20% increase in low frequency resonance over the Maple drum, mid and high frequencies will be the same from a reproduction point of view.
- Maple compared to Birch: Birch will have about a 10% loss in reproduction of low end compared to Maple and about a 20% increase in the high end, with the mid range remaining about the same. So the Birch kit will definitely be a “harder” and “brighter” sounding kit.
- Beech is in between Maple and Birch. All other Maple colored woods used in laminated shells are basically there for either structural integrity or looks and do not have the desired qualities (meaning density and grain structure) of the above.
- Mahogany has earned an undeserved bad reputation due to the use of inferior grades such as Luann on low cost drums for appearance reasons. But Mahogany is a very rich sounding and warm tone.
- Oak is a very bright cutting sound and stick attack and presence are very pronounced.

Bearing Edges

For many reasons, this is a very misunderstood area of the drum. The bearing edge is the part of the drum that the head should be in contact with at all times and is the essential element to gaining resonance, or the lack thereof. The problem is, they are hidden from view most of the time.

If you are using a “vintage” set of drums, or any set of drums for that matter, first take into account the era or how they were

manufactured and realize that the set was designed to produce a sound that reflects the designer or that, which may have been popular with the times.

Anyone can very quickly determine whether his or her set will be able to be tuned to a point where it can be very resonant, excluding the abilities of the tuner and head used. If upon further investigation you determine that your set has been constructed so that a built-in problem or construction technique exists, rethink your desire to put new heads on your drums in hopes it will sound like something in your head because it simply may not be able to be achieved by changing heads, in other cases certainly changing heads may work.

By simply removing the drumhead on any given drum, the answer will be visually right there, staring you in the face. Many older sets were manufactured with a bearing edge that has anywhere between a 35 to 60 degree chamfer cut on the interior side of the shell. On the outer side of the shell, in many cases the bearing edge is rounded over on the outside and crown area as opposed to that of the newer manufacturing techniques. Now add a bent or deformed hoop to this and I don't care what head you pick, it will always have a "thud" element to the sound. The closer you move to flatter bearing edge or a bearing edge of 35 degrees on the outside or inside, or rounded as the case may be, the drum will exhibit more of the "thud/cardboard" sound. With newer drums, which usually are a 45 with a very small radius of less than 1/16 of an inch (some kicks very as do snares), resonance is easy to achieve and the head selections I have given will hold true. It is the designers tool to get the drum to produce it's signature sound.

The key is not the shape of the cut as much as it is what interacts with the head under tension. It's that fine line of an area right after the head breaks towards the inside of the shell and what remains in contact or can contact the head underneath and interfere with the tone around the circumference.

If you take your finger and lay it lightly on the surface it has an impact on muffling the sound. If the bearing edge has a contact patch of say .03125" or 1/32nd of an inch, the contact area on a 12" drum head is 1.17 square inches, or the same thing as taking the tip of your first index finger to the first joint and laying it on the drumhead. Now if you double that to what seems to be an insignificant 1/16" (twice my 1/32nd example) can imagine how little a change in the contact of the bearing edge surface has on the impact of the sound. In our example, it would be like laying two fingers on the drum. These kinds of differences can make big changes in the tone of the head. So again, its not so much the angle or being double cut (although this can determine where the bearing edge falls on the head), its what contacts the surface at tension and the treatment of the crown of the edge. A 35-degree cut allows greater contact thus a drier sound vs. a 45, which can be a more resonant sound. Many snares purposefully use a 35-degree cut. Sharper or steep is not always better; it depends upon what you want.

Then you have the limitations of what the wood and how it will tool to consider, which ply it falls on, etc. I leave any tooling of a bearing edge up to a professional because it's easy to get flat spots or inconsistent angles without proper tools or fixtures.

So my advice is that before you spend, spend, spend on new heads, take 10 minutes and really observe what you have in the bearing edge department. It will not be enough to see 2-45's degree angles on the drum. They must be even, very even. The drum must be round, very round. They must be consistent in that the profile is the same all around. For example, a round over of 1/16 in one area and a round over of 1/8th in another is a sure sign of trouble. If one of the chamfer cuts looks wavy, the round over will not be consistent nor will it be truly round. The drum must also sit flat on a hard surface. Lay black paper on a flat hard surface and shine a light from the inside to check. If everything is consistent, this is the mark of a good candidate to get tone from the shell. If not, before you spend money on heads, consider spending the $30 to $60 per drum to have the edges re-cut. It's money well worth it..

Shell Depth versus Diameter

The shell depth while having a small impact on the warmth or resonance of the drum has a greater impact on volume and articulation. The diameter has a far greater impact on creating lower pitch. Greater depth increases volume or power by having an impact on resonance of the fundamental note of the shell. A shallower shell creates a shorter burst of tone and makes a drum more articulate by virtue of the fact that the quantity of surface area of the parent material (i.e. the shell) is lessened and therefore cannot resonate as much as large surface area. Less distance between heads means the opposite head (i.e. Resonant head) reacts quicker, or gets excited faster when striking the batter head, it responds better to softer playing. For instance, a 22" diameter kick drum of 16" in depth has a shell area of approximately 6,080 square inches. A 22" diameter kick drum of 18" in depth has a shell area of approximately 6,840 square inches, or a 12.5% increase in area to resonate. Take that same thought to a 10" tom with a 9" depth. This results in a shell area of approximately 706 square inches versus one with an 11" depth, which results in a shell area of 863 sq. in. That 2" increase in depth is now a 22% gain. The deeper the shell, the more likely they are to produce a deeper or warmer sound because of resonance ability, but this should not be confused with a low tuning.

As for diameter, you have to think about your approach to tuning and overall sound desired. This further explained in the section Interval, Sequences and Concepts

Hoops/Rims

1. Die Cast Hoops: Thicker and stronger then triple flanged stamped hoops with an ability to allow more even tuning of the head and as a result, the head is usually more responsive throughout the tuning range with less varied overtones. As such, may create a slightly drier sound on thin shell, small sized drums due the weight of the rim causing the drum to

vibrate less freely. They can also be made out of differing materials such as nickel or aluminum and all aid in changing the sound of the drum.

2. Triple Flanged or “stamped” hoops come in a variety of metals, which affect the tone of the drum. The thinner they are the more difficult they’ll be to tune with. Many drummers prefer these on toms because of the ability to tune “fatter” or “warmer” than with cast. Aluminum makes for a higher pitched tone than does steel and as a result is used on snares quite a bit for a great “crack”. Brass makes the drum more musical and aids in the presence or high-pitched overtones.

3. Wood Hoops have the virtue of being either rigid or flexible, depending upon the manufacturer’s thickness of the hoop. As a result, they can take on the tuning characteristics of a cast hoop if rigid or flanged hoops if thin in construction. However, the rimshot sound is considerably different and acts like an extension of the shell so the drum is usually both more resonant and brighter.

4. Less lugs means fatter tuning and more complex overtones. The longer the interval between lugs the less likely you are to get the head tuned evenly between lugs.

5. A hoop of “rigid” nature results in a head, which can be tuned more evenly between lugs and will accentuate the imperfection in your drum if out of round or bad bearing edges. Sometimes, this causes a drier or more muffled sound as a result of inferior bearing edges.

Prof.Sound's Drum Tuning Bible v3

Tuning and Seating

Home
Pocket DTB
Woods
Construction
Tuning & Seating
Kick
Snare Drum
Snare Tuning
Snare Unit
Buzzing
Concepts
Equipment
Buying Drums
Buying Cymbals
BIO
Acoustics
Contact

Click for PDF of Prof.Sounds Drum Tuning Bible V2

When to Replace Drumheads – One of the most frequently asked questions:

There are several indicators that determine when a drumhead should be replaced. Outside of the obvious, when there's a hole in the head, most heads will always produce a sound. You will ultimately have to be the judge of when, enough-is-enough. But here are some simple guidelines:

- Coated Heads – If the coating is beginning to wear off you have defeated one of the major reasons to use a coated head. The coating is a main ingredient in the tone of the stick hit and overall sound. Also, once coating has been removed, its almost a given that when detuned the head will be dished out in the center and a low clear pitch becomes more difficult to achieve.
- Heads are Dented or Dished Out - When the head is removed from the drum, it exhibits a dished-out or dented appearance. This is the indicator that the head has been stretched beyond its limits and tuned to the point not mush elasticity is left, or it's just been abused. Without a doubt, it's time to replace that head.
- Cannot Achieve Pitch - When attempting a low-pitched tuning (assuming you have properly seated the heads as described in the section *Tuning* the drum will not give the desired pitch due to a distorted sound or buzz. This is an indicator that the head has begun to stretch and as such, is no longer capable of remaining in constant contact with the shell. On 2-ply heads, this can occur sooner due to the upper ply stretching at a different rate than he bottom ply. The head may not be completely bad, but you may have to use a higher tuning from this point forward.
- Changed Venues - When you have changed venues such as now playing either a smaller, larger, less or more reverberant venue. A sound or tuning, which works for a small venue will not work as well for a large venue. You have to consider what component of your sound will carry through to the audience. For example head selection for microphones will likely be different than without. A highly resonant kit may be your sound tech's worst nightmare. While the drummer can be inspired by this tone, recording or a sound produced by a resonant and open sounding kit may result in a very muddy sound due to the overtones and lingering decay of the drum mixed with all the other instruments or acoustics. In large venues under close micing techniques it's typical for drummers to use otherwise muted or 2-ply heads because the sound is more controlled and focused ("Dry" sounding). As a result, the drum produces a shorter burst of energy, which by virtue of the hall or venue if reverberant, then reverberates or becomes delayed to the audience. Otherwise outside of a more simplistic placement of notes the fast fills will have more definition.

Fundamentals:

- **The Environment:** You cannot under estimate the role the room or acoustic properties of the space have on the sound you hear. It has a major effect on the overtones and can dramatically enhance or detract from timbre of the drum. While the drummer focuses on the sound coming from the batter side, an audience hears something completely different and many times is direct result of the acoustic properties of the space. If using microphones, this problem can lessened to some extent if you employ so-called close micing techniques. This is where a microphone is placed in very close proximity to the drumhead and as a result, the reflections of the space are not as readily picked up. In these instances, the microphone is usually placed on the top. Even in these cases, nearby drum heads can resonate in sympathy to the head being hit and affect the sound being captured by microphones on other drums. Without mic's, or in the case of micing the drums via overhead or outward room techniques, the reflection of what the resonant head produces or that of the space is now a major component of the sound. If the space is highly absorbent, then the drum may also lose life. If highly reflective, you may not hear much in the way of warmth or due to affects of the acoustic space, it may actually be a very round tone and lose definition in other ways. Overtones are an essential component to making the drum sound carry through other instruments and to the audience. The drummer should focus on the sound they create, as the audience (or microphones) would hear it rather than how they hear it in an otherwise quiet and stale environment. High-pitched overtones are essential to making a dull drum come to life in the audience.

- **Batter Head:** The batter head controls the feel of the hit, initial pitch, the sound of the stick slap and the initial element of the drum sound or overtones. When the drum is hit, the ear hears mostly the attack and the fundamental pitch of the drum. Overtones emitted by the batter head are washed out at a distance, but aid in the overall projection.
- **Resonant Head:** Often underestimated for its contribution to the tone, it is mostly responsible for the pitch, lingering tone and pitch of that created as a result of striking the batter head and resonance of the shell. The resonant head produces "resonance" and aids in sustain, it has a major effect in the overtones and enhances the timbre of the drum. Generally you do not use anything other than single ply on the bottom, but there are exceptions.
- **Tuning:** As you tune the drum with one of either the batter head or resonant head higher or lower in tension and pitch, you go through "zones" producing one of clear pitch, phase cancellation (no life) or a "Doppler" sort of effect where the drum descends in pitch, also referred to as "pitch bend". This becomes more pronounced when the resonant head is of a higher pitch than the batter.

What to Expect - A drum placed upon a soft surface, such as carpet, and tapped very lightly allows you to hear the overtones in an easier fashion that simply hitting the drum in free space. The most inherent sound created from any given head will be heard by placing a head of identical specifications on the resonance side. This is due to the ability for polymers of equal thickness (specification) to vibrate reasonably equal to each other, thus eliminating phase cancellations, which can cause a tight head to sound dead or lifeless.

- **Seating:** Things are changing in the manufacturing of heads. When the head is first mounted, the objective is to get the head to seat itself. **Seating the head** is where you create that all-important bond between the bearing edge of the drum and the film and cause the head collar to become tight to the hoop. Seating is often also referred to as putting more that normal tension on the head. This seating process, whereby you put the head under heavy tension to form it to the bearing edge is not required to get a good tuning. However, the pre-stretch that occurs during the high tension event can aid in minimizing the need to tune back up to pitch more often. Moreover, if your bearing edges are good and sharp, less tension may be required. If the head is pulled tight on side it may fail to be centered on the drum and its ability to produce an even harmonic tone may be inhibited. Uneven tensioning can limit the ability to tune a head to its lowest potential note and also create premature buzzing, or a “distorted” tone.
- **Drum Size:** Shell diameter is more responsible for pitch than any other element. Depth is responsible for the duration of the note and aids in resonance. Shell thickness when thin, adds tone, body and resonance. When thick aids in projection and detracts from resonance.
- **Timbre vs. Pitch:** Timbre and note/pitch are not the same. Timbre refers to the overall character of the drum vs. the fundamental note, which is the point at which the drum is likely to be most "open" or "resonant" in tone quality. Know that pitch can be raised or lowered in reference to say a note on the piano. The length of shell resonance doesn’t really change, whereas the pitch of the shell resonance will change as a reflection of the overall pitch. So a 12” drum may produce a note of G up to say a D-sharp (“pitch”), but it may really stand out around an A-flat (“fundamental” note of shell). The fact that one drum is “brighter” vs. “warm” is the Timbre.
- **Bearing Edges:** Bearing edges are hidden from view, little understood by most drummers and are without a doubt the single most important aspect of the ability (or lack thereof) for the drum to produce a clear, resonant tone. Sharp 45° bearing edges will produce lingering sustain and bright overtones. Bearing edges of 30° are slightly more controlled in tone, have a bit less problem with high-pitched ring. Rounded edges produce a muted tone. Even cheaper drums can produce acceptable tone, provided the bearing edge is true, flat and properly formed. The most expensive, high-tech set available will produce poor tone if the bearing edge has been damaged or poorly tooled.
- **Shells:** The rougher the interior, the less resonant the drum. With thick shells, the heads are more responsible for tone. Each shell can have a fundamental frequency. Thinner shells exhibit this more than thick. Detailed tuning or thumping on the shell and matching the note to a known scale allows you to find that “fundamental” shell pitch and enhance or detract all the inherent sounds of that particular drum character. However, this concept is forgiving and the pitch of the head does not have to match the shell pitch note. Thinner shells are more resonant so with thin shells, tuning to the shell pitch note does make a drum most resonant. A sharp bearing edge means more high overtone and resonance (i.e. 45° vs. 30° or rounded). If the drum is void of obstructions inside, like no reinforcing hoop, the drum will be more open and vibrate more freely. With a reinforcing hoop it will have a shorter decay/sustain and a more mid-ranged presence or attack than unobstructed shells.
- **Wood:** The best way to relate to the sound of wood is through comparing it to another. Maple compared to African mahogany (not Philippine mahogany); Mahogany will have an approximate 20% increase in low frequency resonance over the Maple drum. The mid and high frequencies will be about the same. Maple compared to birch; Birch will have about a 10% loss in reproduction of low end and about a 20% increase in the high end, with the mid range remaining about the same. Birch will be a “harder/brighter” sounding kit. Beech is in between Maple and Birch. Several filer woods are also used, such as basswood, Philippine mahogany, poplar, etc. These are to lessen cost and typically drums made of these woods lean more towards the tone of Birch of Beech than Maple or US/African mahogany. You can read more about this subject on the page Drum Woods.

Drumheads

What is a Drum Head? Although there are few variants, typically they are made of polyester or Mylar®. Mylar® is a registered trade name of DuPont Teijin Films, which can be read about here if you want the detail. These films are tough, general purpose films that are transparent in 48 through 92 gauges and translucent in heavier gauges. They have balanced tensile properties and excellent resistance to moisture and most chemicals. They can withstand temperature extremes from -100°F to 300ºF. Mylar® does not become brittle with age under normal conditions because it contains no plasticizers.

Heads:

- **Coated heads** will be warmer and minimize high frequency tones. The stick slap has a very bright element to it, much like sandpaper rubbing together, but the main element is darker in tone. Coated is probably required if doing brushwork. What follows are general observations and you should try them all to see if you hear or experience and differences? Coatings vary depending upon manufacturer. Some manufacturers have created heads which give then a very unique sound and wear characteristic. By way of example, REMO offers the Renaissance™ or Suede™ series which gives the head sort of a less resonant but midrange presence to the sound, whereas the FiberSkyn™ heads have a much more mellow tone to them. Coatings from brand to brand not only offer a sound that separates one brand from another, but wear characteristics are affected as well. In most cases, REMO will be a warmer coating at the expense of faster wear on normal WEATHERKING™ drum heads like that found of the Diplomat™, Ambassador™, Emperor™, etc. However heads like the FiberSkyn™ may potentially last less or longer because a lot of this has to do with your style of play. Heads like the REMO Suede™ series and Evans J1™ have an embossed textured surface, thus longer life and do not chip like normal coating would. To my ear, Aquarian is on the brighter end of the scale for presence but their coating will outlast most everyone else’s and is also thinner and a bit smoother. Evan’s sort of strikes a medium balance between REMO and Aquarian. Keep an open mind because manufacturers are improving their lines all the time.
- **Clear heads** are bright with overtones, the stick slap does not have bright sandpaper like characteristics as found

on coated heads, but the overall presence of the slap is very bright in the upper register and carries through the mix very well.

- **Ebony** is in between the coated and walks that balance of properties between coated and clear and the stick slap does not have bright sandpaper like characteristics as found on coated heads. It produces a less of a high frequency overtone resonance (“darker” tone).
- **2-ply:** These aid in durability and can also limit high pitched overtones. Often referred to as “muted” in tone, when they do not have a control ring adhered to them do produce lingering resonance and bright overtones the higher they are tuned. These come in multiple film weights depending upon the manufacturer.
- **Snare Side Heads** are specifically designed to be thinner and should be the only style head used on the snare side of the snare drum. Thin heads enhance sensitivity and are brighter whereas thick heads are exactly opposite. The most common weight is a 300 weight.
- **Hazy heads** are generally both "bright" and have a stronger "midrange presence" to the sound.
- **Glass heads** are both brighter and drier than Hazy or other pigmented heads.
- **Thickness** - In all cases thicker heads will be mellower and less sensitive than that of the exact same thinner counterpart. For example, a REMO Diplomat Clear will be brighter and more sensitive than a REMO Ambassador Clear, the Ambassador being thicker than the Diplomat and both being single ply.
- **Etched** – The finish of the film has rough sort of embossed surface and does not chip away as does true coated surfaces. Good examples of this are the Evans J1™ and REMO Suede™ series of heads. These are favored for Jazz like applications.

Tom Batter Drum Heads

Categorized in 5 different categories, within each are subtle to very subtle tonal differences and can be used interchangeably with a similar end result for sound. For example, in Category 1 a REMO Ambassador™ coated will sound very similar to an Evan's G1™ or Aquarian Satin Finish™. However, between categories there are major sound differences.

- **Category 1 - Sensitive, good stick feel, open sound with good sustain and resonance.** Single ply, not muffled medium weight such as
  - REMO Ambassador™ - Classic open stock drumhead sound
  - REMO Renaissance™ - A bit more presence than Ambassador™
  - REMO FiberSkyn™ FA – Warmer than the above.
  - Aquarian Satin Finish™ - Classic open stock drumhead sound
  - Aquarian Classic Clear Series™ - Brighter than above
  - Evans G1™ series - Classic open stock drumhead sound
- **Category 2 – A more mellow tone compared to single ply with overtones becoming less prevalent on the initial attack, stick feel and sustain are reduced slightly; A sound similar to placing an “O” ring around the head.** Comprised of either single and 2-ply muffled or heavy weight heads, these can help warm up or round out the tone, yet retain an element of sustain with minimal high-pitched overtones. This would include heads such as the
  - REMO Emperor™ (2-7mil plies)
  - REMO PowerStroke3™ - Single ply feel – minimized overtones
  - REMO FiberSkyn™ F1 – Warm and open – minimal overtones
  - Evans G2™ - Slightly muted over Evans G1™, open sound tuned high.
  - Aquarian Studio-X Series™ - Warm overtones, single head feel
  - Aquarian Double Thin™ - slightly more responsive and open than Response 2™
  - Aquarian Response 2™ - Focused sustain strong attack
- **Category 3 – Muffled and suitable for heavy wear concerns.** This category is sort of limited. These all take the Category 2 style heads and add a bit darker tone to them by have a section of the head adhered together like the REMO PinStripe™, or add thickness to the film like the Aquarian Performance II™. They also encompass almost anything with a "Power dot" on it. These produce a very short initial attack coupled with a very short sustain add bring out the low frequencies by minimizing upper register response.
  - REMO PinStripe™ - Excellent for that classic fat deep tone
  - Aquarian Response 2™ – (yes bridges both Categories) Focused sustain strong attack
  - REMO Control Sound™ - thick attack and wear resistant w/high-pitched overtones
  - Aquarian Signature Carmine Appice – Strong attack, warm fundamental tone.
- **Category 4 – Very dry heavy muffled.** There isn’t much competition in this category. These heads are as void of overtones as they come, yet still produce a dark sound that enhances the depth of sound and a very focused attack. Classic 70’s sound.
  - Evan’s Hydraulic Glass™ - Classic oil filled 2-ply.
  - REMO PowerStroke4™ - Like a REMO Emperor™ w/Underlay at outer edge.
- **Category 5 - Thin Single ply, not muffled and thin in weight.** These are usually only suitable for an orchestral setting,

light touch or Jazz type situation where feel and sensitivity are of the utmost importance.

- REMO Diplomat™ weighted heads - Very resonant/sensitive used in various REMO lines
- Evan's Strata 1000™ - Warm and simulates the feel and tone of calkskin
- Aquarian Hi-Frequency™ – Much like the above, a Jazz favorite
- Aquarian American Vintage Series™ - Available in thin weight to simulate calfskin heads

Toms Resonant Drum Heads

Note, you can obviously use any head, but it is generally accepted to use a single ply head. However, the following will explain and present guidelines on what to expect for popular style heads:

- **Thin resonant heads:** These accentuate the higher registered overtones of the drum and shell that thicker or 2-ply head take away from the sound. It adds back an edge to the sound to compensate for the tone a thicker 2-ply or muted head from Category 2, 3 or 4 may have lessened or eliminated. These are easier to excite, and do not make the tone linger on or add low end warmth. This is because they are thin and have less mass. Things of less mass stop quicker once set into motion. So if you want a bright attack and less low end resonance, these are good choices.

  - REMO Diplomat™ weight heads
  - FiberSkyn 3 FT/FD™
  - Aquarian Hi-Frequency™
  - Evan's Genera Resonant™
  - Evans Glass Resonant™

- **Medium or Standard Weigh Heads**: These will have less high frequency sustain than the *thin* counterparts such as the REMO Diplomat™ or Evans Glass™. They are thicker and as such stay in motion a bit longer and add warmth or depth to the tone. As a reminder, coating adds even more thickness (depending upon manufacturer and style of coating) and can further enhance low end resonance while keeping high-frequencies in check. Moreover, ebony colored heads because of their inherent properties take the low end response and make it right in between clear and texture coated heads. They are ideal where you want a great attack yet decent low end depth.

  - REMO Ambassador™
  - REMO Ambassador™ Ebony
  - REMO FiberSkyn™ FA
  - Aquarian Classic Clear™
  - Aquarian Satin Finish™
  - Evans G1™

- **Heavy Muffled or 2-ply:** Comprised of either single and 2-ply muffled or heavy weight heads, these can help warm up or round out the tone, yet retain an element of sustain with minimal high-pitched overtones. When used in conjunction with Category 1 or 2 batter heads, in can add an element of warmth by minimizing high pitched overtones. They create a very warm tone and round low end attack much the same as adding muting devices to the batter head might. This would include heads such as the

  - REMO Emperor™ (2-7mil plies) – general warm sound, less high overtones
  - REMO PowerStroke3™ - Further minimized high overtones
  - REMO FiberSkyn™ F1 – Warm and open – minimal overtones
  - Evans G2™ - Same as REMO Emperor™.
  - Aquarian Studio-X Series™ - Warm overtones, longer resonance than above
  - Aquarian Double Thin™ - Same as REMO Emperor™
  - Aquarian Response 2™ - Focused warm sustain w/strong attack

Toms, Selections and Characteristic Sounds

- **Category 1 Batter paired with Medium Weight Single Ply Resonant of same type:** Very resonant, high ring can be very prominent when clear resonant is used, more so when clear batter is used. Sound goes warm when coated versions are used, very good sustain, excellent stick response. Coated on top w/clear on bottom produces warm attack w/bright overtones. This is what a large portion of jazz, country and light rock guy's use. Tuning can control ring easily. Popular recording choice. Coated provides a nice sibilance to the stick attack while clear provides predominate midrange attack. Examples are

  - REMO Ambassador™
  - Aquarian Satin Finish™
  - EVANS G1™

- **Category 2 Batter paired with Thin Weight Single Ply Resonant:** Resonant but focused, Initial stick attack is not as sharp as with a clear batter head. An element of hi-frequency ring is present in the resonance but overall sustain is less than if a medium weight resonant head were used. Good stick response. A popular recording choice where you want a more focused and less open sound, not completely dry. Works very well for close microphone situations. For a little warmer sound and more resonance, use a medium weight coated head on the bottom or Ebony series. Examples are

- REMO PowerStroke3 with REMO Diplomat™ - more low-end resonance use Ambassador™
- REMO FiberSkyn™ FA with REMO Diplomat™
- REMO Emperor™ with REMO Diplomat™
- Aquarian Studio X™ with Aquarian Hi-Frequency – Very warm w/High-Pitched Overtones
- Evans G2™ with EVANS Genera Resonant Clear™

- **Category 3 Batter paired with Medium Weight Single Ply Resonant** Focused Initial stick attack, deep fat sound, sharp edge to tone with clear head top and bottom. Sustain in the lower registers is prominent and deep when tuned low. Tradition deep fat sound. Stick response is moving towards less of a bounce. A popular recording choice where you want a very focused muted sound bordering on the dry side. Works very well for close microphone situations and where the term punchy or articulate seems to be what you are after. Like the others, for a little warmer sound and lower end resonance, use a medium weight coated head on the bottom or Ebony series. Examples are

  - REMO PinStripe™ with REMO Ambassador™ or Suede™
  - REMO Control Sound™ with REMO Ambassador™ or Suede™
  - Aquarian Performance II™ with Aquarian Classic Clear™

Tuning

This procedure works on all drums, toms, snare and kick. In the following, the normal top head is referred to as the “batter” whereas the normal bottom is referred to as “resonant”). Once you know the relative tuning capability of the drum, you will not always have to remove both reads. Remember, the objective is to find the true capability and tuning range of each drum.

1. Remove both old heads, inspect the drum, thump it and eliminate rattles and buzzes.
2. Set the drum on an absorbent surface, such as carpet or blanket.
3. With batter side down, resonant side facing up put the resonant head on.
4. Tighten all lugs just to the point where contact is made with the washer or rim. Once contact is made with the washer/rim, back-off 1/4 turn.
5. Using two keys 180 degrees apart (or in the case of an odd number of lugs use 1 key in a star type pattern), tighten in half turn increments together until you've put 2 complete turns on all rods of the drum. The musical note is not important.
6. Lift the drum up a few inches, hit the head once and see if it is a distortion free sound. If not give each lug another 1/4 of one full turn. Repeat until the drum is distortion free. Do not be afraid to really tighten the head above a normal playing pitch, it is essential that the head produce a clear undistorted tone before proceeding.
7. Place the drum back down on the carpet with the side you are tuning facing up.
8. Tap with the drum key, lightly and with even force about 1.5” (40mm) from the edge. ALWAYS tap with equal force and in the same place at each lug. LISTEN to an element of resonance of the tap. There will be several tones. You need to focus on one element or frequency band heard. Remember, even force at an identical distance from the lug. Now adjust each lug so the pitch of the resonance is identical. The order is not very important here. DO NOT EVER TUNE DOWN TO A NOTE, TUNE UP. If a lug is too high detune below what you are trying to achieve and then bring it back up to pitch.
9. To make sure the head is seated or crack the glue joint in the case of heads with glued collars, push down with light force making about a 1/2” (14mm) depression directly in the center of the head.
10. With the drum off the floor or on its stand/mount we need to detention the head just to the point of no resonance and where the head buzzes. Loosen as you tightened with 1 or 2 keys in ¼ (90°) turn increments hitting the head between each turn of a lug. Now put 1/8th of a full turn on each and every lug and hit the head once between each hit until you get a distortion free and clear tone.
11. Now as in Step 8, even out each lug so they are all the same pitch.
12. Turn the drum over and place the batter side on and place the drum batter side up on a carpet or absorbent surface.

Repeat the above Steps 4-11 on the batter side using the head of your choice. Once complete, proceed to the section *Fine Tuning* below.

Fine Tuning

Here’s where you dial the drum in. One of the first concepts you must grasp is the whole idea that all of what you hear is dramatically affected by Acoustics/Placement. It is highly possible that your drum sound will be enhanced or made worse (to varied degrees) if the acoustic space you are tuning is full of inherent problems. Sp please read the link Acoustics/Placement at some point if you have not already. Nonetheless, the principles that follow do tend to be accurate all thing acoustically being equal, which is rarely the case.

Note: If you have the time let the drum sit a few hours to overnight to stabilize the head. This is not a requirement by any means, but will help in some cases and make the tuning process easier.

1. Working with the resonant side facing you, place the drum up on its stand or hold by the rim. Hit once and see if you still have a low, resonant and clear tone. If so go to Step 2 below. If not, begin tightening evenly and successively on each lug in extremely small increments of no more than 1/16th of a turn per lug. Slow is the key here. Go around once, even out the tone as in Step 8 above by tapping and then strike once in the center. You want to tune just until you get a low and clear tone. STOP AT THIS POINT.
2. Turn the drum over, batter side towards you. Hit once and see if you still have a low, resonant and clear tone. If so go to Step 3 below. If not, like above tighten evenly and successively on each lug in extremely small increments of no

more than 1/16th of a turn per lug. Go around once, even out by tapping and then strike once in the center. You want to again tune just until you get a low and clear tone. STOP AT THIS POINT.

3. Like it or not, this is the lowest pitch this drum will ever go. Note: If you've gone around several times moving up in pitch but the tone is distorted, you may have one or more of a bad head, bearing edge problem, shell problem, lug casing issue or the head didn't seat. Before replacement, I suggest leaving the head under tension for 24 hours and try again. I have found that the problem goes away many times overnight. I don't know why. If you can't wait, try another head or try taking the pitch way up.

4. Now it's time to proceed up through the tuning zones to get the most out of the drum. Focusing on the batter or top head, proceed and tune, never go in larger increments than 1/16th of a full turn on the way up. Again, slow small movements of the lug are important until you grasp the concepts. Always hit the drum between each twist of a lug. With every few full rounds of lug tightening, stop and make sure the head is in tune with itself.

What to Expect - You will go through phases where the drum sounds good then sounds bad for a couple of turns and then suddenly the sound opens up again. You can usually do this for 2 zones and then the top head will go dead and have a high overtone/ring. While pitch may continue to change, the drum continues to have no real life to it. At this point you've gone too far with the top head, back off 1/4 to 1/2 turn or go back to the point where the drum sounds even, focused and open (sounds good).

5. If you want a pitch higher than this pitch you achieved, go to the bottom head and tighten each lug 1/8 to 1/4 of a full turn on each lug. Again, always hit the drum between each twist of a lug and with every few full rounds of lug tightening, stop and make sure the head is in tune with itself. Once you reach that point where the drum again has no life, after this you can increase the pitch of the top head again for another 1-2 steps.

What to Expect - When tuning in this manner, you'll experience certain phases in the tuning where when struck will the drum will have a descending pitch. Some like this sound and stop here. As you move up out of that phase of the zone, you'll reach a point where the drum evens out, the Doppler is gone and the drum becomes open and even in sound. This is the point where both heads are or are close to being identical in pitch.

6. Beyond this point, the drum will go dead again and you have to repeat with the 1/16, 1/8 or 1/4 turns on the opposite head to effectively raise the pitch of the drum and move up again to another zone and repeat the procedure.

Quick Tips

1. You can use or eliminate muffling devices such as "moon gel". Moon Gel is effective and cutting unwanted overtones and lessening the duration of the note. Simply apply as much as you require for the sound – its that simple. You can also use a "O" shaped ring, either purchased or made from old heads that can create a similar effect as using moon gel. If using these "devices" bothers you, you can intentionally detune or raise pitch slightly on both heads. For example you might lower the batter and raise the resonant (or visa versus) by equal amounts causing a phase shift and become more muted or more open depending upon where you are in the zone.

2. People often will loosen one lug to create a similar affect. Although I find it is better to move all the lugs by a certain amount. This way you don't run the risk of destroying the head.

3. Keeping your resonant head to its lowest note and then detuning it ever so slightly may help in achieving a "fat, loose or dark" drum sound. The batter head is then used to alter the pitch. Note that the pitch for a "fat" tuning can be somewhat limited.

4. For more "punch or attack", the resonant head is raised in pitch by a small degree over the pitch the batter head. To create an "open, resonant" sound, both heads should be of equal pitch. Use of a clear head will result in a more "open" tone.

5. Hair Dryer – In the last iteration of the Drum Tuning Bible® v2 the use of a hair dryer was promoted to aid in helping the head form easier to the bearing edge. The process was described as heating the perimeter of the skin above the bearing edge. The instructions were to make about 3 revolutions remaining about 2" (50mm) off the surface, taking about 10 seconds for each revolution on a 12" drum. My latest effort to prove whether this is or is not warranted gave me mixed feelings on the subject. Keep in mind Mylar® is a very heat forgiving material and is generally picked for its heat stability virtues. In measuring the output of a average 1600 watt hair dryer, I noted that the heat output was on average between 170° and 180°F. The objective was to simply warm up the film a bit to get it to relax easily and form to your bearing edge. On the 3 heads I tested, the REMO Emperor™ (2-7mil plies, REMO Diplomat™ Snare Side Head and the Aquarian Classic Clear™, you could not feel any change in ductility. In other words, there was no noticeable change in the flexibility of the film. Given Mylar's physical properties, one would have to use an industrial style heat gun to affect the nature of the film. These can easily exceed the 280°F required to change the film and make it melt. I DO NOT RECOMMEND THE USE OF SUCH A HEAT SOURCE. THIS CAN ALSO DAMAGE YOUR SHELL, THE FINISH AND HEADS. Not to mention other potential damage.

It is the opinion of some drummer's that the use of a normal hair dryer maybe a total waste of time. This is because in practice (as demonstrated in the above experiment) the dryer does not get hot enough to affect the film at all, which I concede does appear to be true. However, others (such as the likes of Bab Gatzen as demonstrated in his 1993 video Drum Tuning: Sound and Design) feel it can help out to get a head seated quicker. I can only conclude that despite the outcome of the trial I performed, I too have thought there is a noticeable difference on the thicker heads when done while the head is under tension. I can only suggest that you try it with a normal hair dryer (NOT INDUSTRIAL HEAT GUN) and see what you think?

Drum Gauges/Dials

These are essentially tension or torque measuring devices that do have their place in the scheme of things. But the best gauge on the market comes packaged on each side of your head, which are your ears. This guide does not at this time give drum dial or gauge settings.

Some of the best drums on the market are being intentionally manufactured with lugs that cause resistance. The resistance induced by the lug itself can fool a gauge that measures torque of the lug. When you consider the film used is not always exact in thickness from edge to edge, devices that measure tension of the head can be fooled by thicker versus thinner heads. They do offer a better

means of repeating a tuning once you know the settings the gauge displays with a head of your choice.

If you've spent much time tuning by ear you know that it's not uncommon to have a few lugs that feel loose compared to others. So remember it's the pitch at each lug, not the evenness of lug or head tension/torque that counts.

So where do the gauges fit in? Gauges can cut several minutes to hours off of tuning time. If your drum heads, hoops or bearing edges are the type where the seating of the drum head requires high tension to accomplish, then seating of the head cannot be effectively accomplished by the use of any such gauge. The seating process must be done manually and then detuned prior to use of a gauge. After seating, you can then use the gauge to get reasonably close. Without seating by hand and pre-stretching the head (or cracking glue joints) you may find the use of the gauge alone will lead to constant retuning for an extended period of time.

To find settings, you need to go through the process of learning how to tune by ear and afterwards, place the gauge on the drum and record the settings created at tension and pitch. When replacing heads, you can then seat by hand, detune, place the gauge of your choice on the drum and very quickly get the drum reasonably in tune. Tweak by hand and even the head so that pitch is the same lug to lug.

What to Expect - Anytime you change brand of head, drum, thickness of head, or the manufacturer changes its manufacturing technique, you should start over by hand and record the settings. So you may end up with a book of several settings.

Prof.Sound's Drum Tuning Bible v3

Kick Drum Tuning

Kick Drum, Drumheads - Batter side

Most descriptions about coatings and material type are as described in the section "*Tom, Drumheads - Batter side"*. There are some similarities here to that used for a tom, but there are also some real differences in heads used, such as the Evan's EQ and Aquarian Regulator series.

- Single Ply – No muffling: Any head on par with the likes of REMO Ambassador, Ebony series, FiberSkyn 3 FA, Aquarian Classic, Aquarian Signature Series Jack DeJohnette, Evans EQ1, EQ4, etc.

- Muffled head, 1-ply: Any head on par with the likes of REMO Ambassador, Ebony series, FiberSkyn 3 FA, Aquarian Classic, Aquarian Signature Series Carmine or Vinny Appice, Studio X, Impact I, SuperKick I, Evans EQ1, EQ4, etc.

- Muffled head, 2-ply: Any head on par with the likes of REMO Pinstripe, Evan's EQ2, EQ3 or hydraulic, Aquarian SuperKick II

Kick Drum, Drumheads - Resonant side

- Single Ply – No muffling: Any head on par with the likes of REMO Ambassador, Ebony series, FiberSkyn 3 FA, Aquarian Classic, Ported Bass Drum Head, Evans EQ1, UNO 58 1000, etc.

- Single Ply – With muffling: Any head on par with the likes of REMO PowerStroke 3, Aquarian Regulator, Evans EQ2, EQ3, etc. Note that most of these come with a choice of a 4-1/2", 5", 7" or no hole.

Holes in Your Head or Not

Here are the basic concepts:

- Any hole larger than 7" is like having no head at all on the drum.

- A 7" hole creates the feel of a one-headed kick drum, feeds more beater attack direct to an audience and provides some of the tone of the resonant head. Further, it's easy to position a mic and change internal muffling devices, if used.

- A 4-1/2" or 5" hole, or even 2 such holes, offset, allows some relief for rebound control of the kick beater, contains more of the drums resonance so that the resonant head is more pronounced in the tuning of the drum. A 4-1/2" hole is difficult to get large mic's positioned within (but can be done) and/or internal muffling altered.

- No hole, very resonant, creates more bounce or rebound from the kick beater. It can become difficult to get the "slap" of the beater and resonance of the drum both when miced with one microphone. The muffling remains inside. The resonant head is very predominant in the overall sound.

There are usually four reasons why drummers want a hole (or multiple holes) in the bass drum:

- It looks cool.
- They do not like the feel of the beater on the batter head surface, it bounces as a result of not enough air relief.
- They need to mic the drum from or capture the sound from the inside.
- They want more projection without using a mic (less bass impact, more beater attack presence).

For those who want it because it looks cool, there is an acoustic impact on the sound by placing a hole or holes in the resonant side. By acoustic impact I mean that the removal of head material does affect the bass portion of the note coming from the drum.

Allot of the “bass” portion of what you hear is based upon the surface area in the center of the drum. That surface area is a diaphragm working much like a speaker radiator might work, in that it will aid in moving air. Remember that pitch is dictated by the tension and the surface area in movement. So if you remove a large center portion, you lose a large portion of the bass reinforcement that gets emitted by the heads movement and tension usually has to increase to compensate for the removal of the center area. Adding holes does not increase bass content as might be the case on a tuned vented speaker cabinet would.

Thicker heads tend to stay in motion longer. With loose tension they will vibrate at a lesser rate, which all translates into lower pitch and a longer resonance. *This assumes no internal muffling, or other devices to make the head stop its vibrating motion sooner.*

Some want the different feel created by having air relief but still want maximum bass affect. As you remove more head area you trade off deep bass for a different feel. A solution is using smaller holes placed around the perimeter of the head. If you want the mic to capture sound from inside, you either have to resort to say the May mic system or revert to a larger hole to get the mic into the drum as you require. What you ultimately do will be based upon the balcance of all the factors that are important to you.

It is the area of the hole that counts. Where it is located matters little for the affect on sound (as long as it isn't on the batter side). If you want maximum tone out of the head, then the size of each hole needs to be in the 1-2” size, and they need be placed closer to the perimeter, but not placed so the edge of the hole is closer than about 1” to the break for the bearing edge. In other words, for the best tone, you need to keep as much of the center of the resonant head intact as possible. And again, it’s not the number, it’s the area displaced that can make a big difference and where that area is removed. You can make any number you want, in the following example to illustrate the concept we'll make two holes to represent the maximum area displaced by a common 7 inch hole.

> The math is simple. We first need to calculate the area of a 7” hole. To do this we use the formula Pi (R^2). So first find half of the diameter of the 7" hole (the radius), which is 3.5”. Now multiply that times itself. So 3.5 x 3.5 = 12.25. Then take this result of 12.25 and multiply it times Pi, which is 3.142. So we now have 12.25 x 3.142 = 38.5. So the area of the 7 inch hole we started with is 38.5 square inches. This 38.5 sq. in. is important. We will simply round it up to 40 square inches, cause close is enough.
>
> Now we can use any number of holes as long as is does not cumulatively exceed 40 square inches of total area. Yet at the same time does equal 40 square inches. This will be the same air relief as having one 7” hole and the end result will be more center surface are and a stronger bass affect.
>
> Now take the 40 sq. in. and divide by 2, 3, or 4, what ever. Let’s say you want 3 holes. 40 ÷ 3 = 13.33. So 13.33 is the maximum area for each of the 3 holes. So we now take the 13.33 ÷ Pi (which is 3.142) = 4.24. Now extract the square root (from a math table or calculator) of 4.24 and you get 2.06. So 2 x 2.06 = 4.12. This means 3 holes of 4.12 diameter will give the same acoustic result as a single 7” hole.
>
> Let’s say you have1 hole of a diameter of 4.5”, a common bass drum hole. Let’s compute the area displaced by that single 4.5” hole. (Math: 4.5 ÷ 2 = 2.25, THEN 2.25 x 2.25 = 5.0625, THEN 5.0625 x 3.142 = 15.9). A 4.5” hole has an area of 15.9 sq. in.
>
> In the above example we show that if we were to use 2 holes of 4.5”, the cumulative affect will have less area (31.8 sq. in. total) than that of a single 7” hole, whichj we learned was about 40 sq. in. The 2 – 4.5” holes will therefore be a little more bass heavy than will a head with a 7” hole because they do not remove as much of the heads surface, although you probably will not hear it.

As the bass drum is equipped with a solid resonant head, it will always sound warmer or more bass heavy. The smaller holes are designed to allow relief yet still allow the resonant head to resonate. As you cut away more of the head there is less to resonate.

More large holes will make the drum a little louder and more present out front. Smaller holes around the perimeter gives better feel but the drum retains warmth.

So if you want more acoustic impact from the resonant head itself, create less “hole” area.

Pads and/or Pillows

1. One pad or pillow, or anything that covers a calculated 15-20% coverage against Batter head only: Beater attack is accentuated, tone and sustain linger.

2. One pad or pillow, 15-20% coverage against resonant head only: Beater attack will be lessened, tone and sustain develop as a short burst of energy followed by some bright overtones.

3. One pad or pillow, 15-20% coverage against Batter head and Resonant: Beater attack accentuated, overall volume diminished a bit, tone and sustain become focused, overtones diminished.

4. One pad or pillow, 25-30% coverage against Batter head and 15-20% coverage of Resonant: Beater attack becomes much sharper and accentuated, overall volume does not diminished much more than the above, tone and sustain become even more focused, overtones all but gone. When used with a single ply muffled batter head, easy to get very sharp sound. Good choice for mic use.

5. One pad or pillow, 25-30% coverage against Batter and Resonant: A very focused sound, which becomes ideal for close micing of a kick drum. Beater attack becomes as sharp as it gets, overall volume does not diminished much more than the above, tone and sustain become short bursts of energy that when listened to without a mic, seem lifeless. A distinct “punch” sound.

Kick Drum, Sound of Characteristic Pairing of Drumheads

Note all tone and muffling characteristics from the following heads can be altered by the use of pillows/ pads described in the section *“Pads and/or Pillows”* or the use of a hole in the drum head described under the section *“Holes in Your Head or Not”*. Coatings and material type are as described in the section “*Tom, Drumheads - Batter side”*. There are some similarities here to that which is used for a tom. But there are also some real differences such as the Evan’s EQ and Aquarian Regulator series.

1. Single ply unmuffled Batter and Resonant: Open tone, bouncy feeling, highly resonant, ringy,

2. Single ply muffled Batter, Single ply unmuffled Resonant: Attack of the beater pops out, open tone, highly resonant, overtones diminished a bit on the initial attack but linger on the sustain

3. Single ply muffled Batter and Resonant: Attack of the beater is heard more, a dense but not quite a focused sound, overtones controlled but still there. Typical combination is the REMO PowerStroke3 batter and resonant, or for a bit more low end try Evans EQ4 Batter paired with REMO PowerStroke3, Evans EQ2 or Aquarian Regulator Resonant.

4. Single ply muffled Batter and 2-ply muffled Resonant: Attack of the beater pops out, wide focused sound, overtones controlled. Typical combination is the REMO PowerStroke3 batter with Pinstripe, Evans EQ3 or Aquarian SuperKickII Resonant.

5. 2- ply muffled Batter and 2-ply muffled Resonant: Very focused and punchy attack, narrow focused sound, overtones very controlled (may need no pillows/pads). Typical combination on both the batter and resonant would be REMO Pinstripe, or Evans EQ3 or Aquarian SuperKickII/Regulator.

Kick Drum, Tuning Procedure and Tricks

1. The same tuning procedure works on the kick drum as well. Simply follow the procedure listed above under *"Tuning and Seating the Heads, All Drums"* and take into account the following points as well.

2. A Typical tuning method is to have the batter head control the attack portion of the sound and the resonant head to control the "sustain" portion of the sound.

3. For more punch, tune the resonant side up in pitch 1-2 notes from the batter. Tune entire drum up in pitch.

4. For a "plastic" sound, use single ply batter heads tuned just to a point of the lowest note and detune ½ turn on each lug. A hard felt beater without a patch works well. If you go to wood or plastic beaters, use the patch.

5. A fat kick drum is achieved the same way a "fat" tom sound is achieved. Taking the resonant head and tuning to the lowest note, and then detuning a slight amount (1/16 to 1/8 of a turn) creates a "fat, loose or dark" drum sound. The batter head is then used to alter the pitch. Note that the pitch for a "fat" tuning can be somewhat limited.

6. For a short "open" burst of resonant tone, followed by a muted overtone, try using one of the EQ pads placed loosely against either head so that when the beater strikes the head, the upper portion of the pad (the "hinged" section) floats away from the head yet returns quickly. You can effect the duration of the sound by the positioning of the pad. This also works when using 2 pads where one remains firm against the head while the other on top or against the other head provided the "hinged" sound.

7. Don't have a pillow or pad? Try using strips of felt or cotton sheet material of varying inches in width placed near the center of the drumhead, these get held on by the head, stretch them tight. As a guide try 4.5" on a 20"; 5" on a 22"; 5.5" on a 24". Used on 1 head, this is the equivalent of 25-30% coverage or like two EQ pads per head. Also, a towel rolled up and taped to the inside bottom of one or both heads works. An old feather pillow or folded blanket works equally well. Be creative! Anything that "lightly" touches the head will work, if done in the same percentage of cover given above in *"Pads and/or Pillows"*. For that "hinged" sound, try a towel or cloth taped to the head on just the upper edge so that it floats on and off the head with the beater strike.

8. Get the drum up off the floor as much as your pedal and spurs will allow for more resonance.

Prof.Sound's Drum Tuning Bible v3

Snare Drum

Snare Drum

Tuning the snare is not different than with any drum, it's just complicated or enhanced by the shell choice and snare wires. Review the shell tone guidelines first because from this you better understand the enhancements and limitations inherent in the drum shell tone prior to head choice.

Snare, Drumheads - Batter side

Coatings and material type are as described in the section "*Tom, Drumheads - Batter side".* There are some similarities here to that which is used for a tom. But there are also some real differences such as the Evan's Genera Snare and Genera Dry vented series.

1. Single ply Thin Weight such as REMO Diplomat, Renaissance, FiberSkyn FD (FD extra thin), Evan's Genera Concert Snare, all are coated and are great for very articulate, extremely sensitive, bright, open overtones (FiberSkyn warmer), not very durable. Special mention - Evan's Genera Concert Staccato Snare, a drier very articulate version of the "thin" group.

2. Single ply unmuffled/unvented medium weight such as REMO Ambassador, Renaissance and FiberSkyn FA, Aquarian Satin Texture Coated and the Evans G1 series, UNO 58 1000. Uno 58 is brightest, FiberSkyn warmest. All-purpose head, accentuated overtones, articulate, takes punishment from all but very heavy hitters. Aquarian coating most durable. Special mention – Evan's PowerCenter, all the virtues of a single ply head but has a perforated 5" coated thin dot that will withstand high tunings and severe abuse without the dot coming off (only 14").

3. Single ply muffled or Heavy Weight such as the REMO Emperor, Renaissance, PowerStroke, FiberSkyn F1 and the Aquarian Studio X series, Evan's Genera Batter. The sound here goes more mellow compared to single ply with overtones becoming less prevalent on the initial attack and less or minimal sustain. There is still an element of ring to the drum.

4. Single ply muffled and very "Dry" or "Vented". Evan's has the most in the market for this category with the Genera Dry, Uno 58 1000 Dry, The sound has a sharper, quicker attack and is almost void of overtones. This head requires careful attention to tuning and generally will make the midrange tone of the shell material standout while limiting the low frequencies of the drum.

5. 2 ply muffled or wear resistant heads like REMO Pinstripe, Aquarian Performance II or Double Thins and the classic Evans G2, or anything with a "Power dot" on it, these produce a very short initial attack coupled with a very short sustain.

6. Heavily muffled with an oil barrier such as the Evans hydraulic. These heads are the most inherently "boxy" or "dull" of any. Almost void of any inherent sustain on their own.

Snare, Drumheads - Resonant side

Note: Obviously you can use any head, but it is correct to use a "Snare Side" head. If you use any head other than a "Snare Side" Head, it will be the equivalent of using a "Heavy" weight or thicker head and the result will be the

Snare, Construction Brief

Brass: A very sharp edge to the sound and very rich with mellow overtones.

Steel: A step more towards bright with a very pronounced ring, allot of body and longer decay than brass.

Aluminum: Clear, open sounds with bright, crisp overtones and is capable of incredibly loud rimshots.

Bronze: A close cousin to brass with the overall character of woods, can be loud, a good all around drum.

Copper: A close cousin to the Aluminum drum only slightly warmer.

Hammered: Same overall characteristics as the parent material, only slightly less resonance to varying degrees.

Metal Thickness: The 1mm shells are not as low to mid range resonant as thicker shells such as 3mm plus.

Metal Cast Drums: Very Loud and Resonant due to special cymbal alloys used in the casting process.

Wood Drums: see "Construction Guidelines" above in the "Tom" section, they apply here too.

Small Diameter: Means higher pitch.

Longer Length: Means more power and shell resonance, longer decay.

Shallow Depth: Means more articulate, less power due to decreased shell area.

Snare Bed: A slight depression in the resonant side bearing edge to allow the snare to ride closer to the head.

Bearing Edges: Less than 45° are not inferior, they simply make for a different sound, usually less resonant and darker in character the less the angle, 35° is popular on Birch Drums. Drums get brighter if the crown of the bearing edge is a tighter radius (sharper) than if the radius is flatter (may be desired on the toms and kick).

lack of or absence of snare sound, buzzing, no sensitivity or all of the above.

1. Thin resonant heads: Heads like REMO Diplomat Snare Side and Evan's Genera Hazy 200. These heads are great to increase snare response, sensitivity and crack while allowing ghost notes and rolls to become more articulate.

2. Medium weight heads: Heads such as REMO Ambassador, Renaissance, Aquarian Classic Clear Snare Side or Evan's Hazy 300. These will have less sustain than the thinner counterparts such as the REMO Diplomat or Evans 200, the sound becomes more focused and not as bright and articulate. The Evan's Genera 300 and Genera Glass 300 go drier in tone yet retain very good snare response while the Renaissance goes warmer.

3. Heavy Weight resonant heads: REMO Emperor, Evan's 500 Hazy are both very dry heads and not real articulate. Clear/glass versions of these heads are a bit drier yet. Aquarian Hi-Performance Snare Side is built to counteract wear yet give response characteristics of the medium weight heads.

Snare Drum, Tips and Tricks

1. The stand affects the sound. With the drum sitting in your stand, don't have the stand basket tight against the hoop of the drum, this restrains the inherent sound of the drum, it keeps the hoop and shell from vibrating freely.

2. As a drummer hits harder, the crack of the drum or volume of the snare does not rise but the pitch can change or the perception exists because more of the inherent tone of the batter head is now coming out. Therefore you might want to resort to micing the bottom if you cannot get that high-end crack you otherwise hear in the room.

3. If using a mic on both top and bottom you should be conscious of phase problems associated with the bottom mic, you might have to wire the resonant mic "out of phase". Remember the heads ideally are moving in phase with each other, therefore when the batter is moving away from the upper mic, its moving towards the lower mic causing a phase change making a electrical phase reversal needed.

Prof.Sound's Drum Tuning Bible v3

Snare Tuning

Home
Pocket DTB
Woods
Construction
Tuning & Seating
Kick
Snare Drum
Snare Tuning
Snare Unit
Buzzing
Concepts
Equipment
Buying Drums
Buying Cymbals
BIO
Acoustics
Contact

Enter subhead content here

Snare Drum, Tuning - Method 1 (Fat and Wet)

The following suggests any choice of head from the single ply medium weight muffled category such as the Evan's Genera Batter, REMO PowerStroke or Aquarian Studio X, all Texture Coated coupled with the Genera Hazy 200 Snare or REMO Diplomat Clear resonant side. Objective, a controlled ring, focused sound, very good resonance with excellent articulation and stick response. For more "open", resonant big band type sound, go with either a REMO Ambassador coated, EVANS G1 coated or Aquarian Satin Texture Coated.

Note: We are working for the drum sound without the snare wires installed.

1. Start by placing the bottom or resonant head on the drum, we want to tune the bottom without the top to the lowest clear tone exactly the same as described above under "Learning How, Resonant Side Tuning - The beginning" in the section "Tuning and Seating the Heads, All Drums".

2. Once you have achieved the lowest pitch for this drum on the resonant head, now the procedure changes just a bit. On the resonant head, bring each lug up one half of one turn to one full turn on each lug and even out again. This is a good starting point.

3. On the batter head, continue to follow the tuning directions under "Batter Side Tuning" under the tom section, including installing and tuning the batter side as described under "Batter Side Tuning".

4. Once you have achieved the lowest pitch for this drum on the batter head, now listen for the pitch and feel of the drum. I suggest you tune this head fairly high or 3 to 5 notes higher than your highest tom.

5. This gives excellent stick and brush response and even though the batter is now much higher in pitch than the resonant, it will still have that complex resonance produced by the resonant head being low. This overall feel or resonance of the pitch can be controlled by snare tension (discussed below).

6. If it's too low in resonance after tuning the batter and applying the snares, you then crank the snare side up 1/4 to ½ turn per lug. Again, I suggest you do this after applying the snares. Once you get the desired resonance, stick response, etc. without the snare wires installed, its time to replace the snare bed.

7. Jump to *"General Snare Tuning Guidelines"* and then to *"Installing The Snares"* section.

Snare Drum, Tuning - Method 2 (Suitable for Pop top 40 drumming, Not Choked, Preferred by many studio Drummers):

Note: Proceed without snares installed

1. Replace the heads exactly as described in Method 1.

2. Rather than tuning the batter/top head higher in pitch, tune it identically in pitch to the resonant/snare side head.

3. Now move just the bottom snare side head up in pitch about 3 notes higher than the batter head.

4. Jump to *"General Snare Tuning Guidelines"* and then to *"Installing The Snares"* section.

Snare Drum, Tuning - Method 3 (Highly Resonant, brings the most out of the shell)

Note: Proceed without snares installed

1. Replace the heads exactly as described in Method 1 and use single ply medium weight unmuffled texture coated heads on the batter and either Diplomat Clear or Evans Hazy 200 snare side. For warmer but more focused and a bit softer

while resonant, use the Ambassador, Aquarian Classic, or Evan's Hazy 300.

2. Rather than tuning the batter/top head higher in pitch, tune it identically in pitch to the resonant/snare side head.

3. Now move just the bottom snare side head up in pitch just ever so slightly and listen carefully to the tone of the zone you are in. Move tiny amounts and listen for that point of most resonance.

4. Jump to *"General Snare Tuning Guidelines"* and then to *"Installing The Snares"* section.

Snare Drum, Extra Tuning Guidelines

1. Work your way up through the tuning zones as you would a tom but rather than tuning the top head up in pitch, your tuning the bottom head up in pitch.

2. Work in a typical "X" fashion as best you can or better yet, use 2 keys 180 degrees apart. The thin snare side heads are easy to knock out of whack if you pull one side tighter than the other, so move up in small ¼ turn increments for best results.

3. Once you get the differential relationship be it for a "fat" or "pop" tuning, then you can move the entire drum up in pitch for a higher overall pitch. By this I mean that both heads must maintain the 2-3-note differential in tuning at all times. Minute changes in this relationship cause phase cancellations (or should) and as a result, usually by moving one head or the other minuscule amounts, you can cause the drum to kill allot of the overtones or accentuate them making the need for muffled heads less desirable.

4. If you want a fat wet sound, keep the resonant head low pitched regardless of the pitch of the batter.

5. If you want a more articulated, cutting sound, tune the bottom head up in pitch and keep the batter head lower in pitch than the resonant head.

6. The tension of the snare bed also controls that punch you can feel in your stomach. If the head is too tight, the snare can't seat itself as well into the snare beds.

Prof.Sound's Drum Tuning Bible v3

Snare Unit

Learn how the snare unit effects your sound!

Snare Unit, Installation of

1. Place the snares a little off center towards the opposite side of the release side.

2. Tighten down the strings or strap paying close attention to the snare making sure its square to the hoop, not askew.

3. With the retainer in the on position but with the tension control screwed down (as if loosening the snares), pull the strings or straps again square to the hoop to moderate tension.

4. With the strainer now on, start to tighten while hitting the head, you'll get to a sweet spot where the buzz of the snare and feel of the drum come together. If you tighten more, the drum becomes more articulate. The slightest adjustment here can make huge differences. I'm talking 1/16 of a turn or less on the tension adjustment for the strainer. If you are blessed with an adjustment on both side of the drum, move up equally, very important!

5. Experiment; at some point in the process you'll hear the bottom or that feeling in your stomach suddenly jump out at you if that's what you want. Don't over tighten; it really doesn't add much other than choking off the tone of the drum and killing stick response.

6. Even the slightest adjustments will make the tone/overtones come alive or die. *See "The 5 Stages of Snare Sound" section.*

Snare Drum, Inspection and How to Issues

1. Drum has an intermittent buzz during play: Remove heads and thump on the shell with your hand or butt end of a stick. If the lugs buzz, isolate the offending lug and first try to remove it or them and see if stuffing cotton into the lug retainer helps stop the buzz. You can also look at taking some thin sheet rubber and placing it between the lug casing and the shell, be careful you do not move the lug too far away from the shell, the lugs must align freely with the hoop. If you put the rubber in do it on all the lugs, not just the trouble lugs. If nothing buzzes without the heads, it is possible that the head itself is spent or seated wrong and this too can cause a buzz or distortion during play. The solution is to either replace the head or apply higher tension and try reseating the head. Look for loose bolts, etc. as well.

2. How to check snares wire units: Lay the snares, unrestrained on a flat surface. See if all the wires look very uniform, make sure 1 or 2 of the strands are not over stretched or curving out (this can happen on new units as well). If they are in doubt, go buy or choose another snare wire unit, otherwise control over the "buzz" and "crack" of the drum may be very difficult. Check that portion of the unit where the wire of the snare couples with the clip and look for less than uniform joints. No sharp protrusions, lumps, etc. should be present. If you observe protrusions or unevenness, sometimes filing them off works, but don't remove too much or your likely to cause the wires to pull off the clip.

3. How to determine if a head is too old to use? Outside of an obvious split, make sure they're not overly worn where the snare bed rides on the

Snare Unit, Sound and The 5 Stages of

Working from loose to tighter you need to work very slow to best understand how the tension on the snare unit can effect the overall tone of the snare drum. I break this down into 5 stages and if you hit the batter side as you tweak the strainer tension adjustment knob, you'll hear the stages:

1. Contact with buzz and sounding a little sloppy,

2. Fewer buzzes and a little dry sounding. Almost like over tightening.

3. Warmth starts to come out with a nice sort of "slap" of the snares,

4. Becomes more articulate and the warmth goes away, and

5. The garbage stage, extremely tight, choked, void of character, little to no response on the outside 3 inches of the batter head at low volumes, you've gone too far.

Snare Unit, General Guidelines

It's important to have the actual snare bed itself ride flat against the resonant head. If a drummer has used an inferior brand or replacement snare in the past, the place where the wires are held or soldered to the clip can be uneven or have sharp protrusions. This may have left the drummer feeling the thinner heads are not satisfactory because the poor condition of the snare itself actually caused the premature failure of the head. This is where the so called "Heavy Weight heads are usually employed. However, you might want to try the Aquarian Hi-Performance series here due to it's unique construction, it gives protection where you "need" it yet retains some response of a medium weight Snare Side head.

Snare count, length and material have to be considered. While you can retrofit another snare to change the drum, be sure

head (sometimes there's a tiny hole or a milky color). Make sure the head is not warped or dished out from age or being over tensioned. If either of these conditions exists, replace the heads.

4. How to check hoops? Place them on a kitchen counter or other very flat surface (not glass or plastic, these are inherently unleveled) and see if they sit flat. If the hoop is stamped or a triple flanged hoop, push down on them to straighten, fix or replace. If the hoop is cast or wood, you run the risk of breaking the hoop if you push hard enough to actually cause a movement. Your only solution other than live with it will be to replace it. Check for round by measuring in a "+" pattern with a simple ruler at 90 degrees apart across the hoop. If the measurement is not the same, they are out of round.

it really is the correct length and attaches to the strainer throw-off correctly.

Carbon steel is going to be brighter than stainless steel with cable, gut or a synthetic being much less bright.

Less curl to the wire equals less volume and more articulate (i.e. Cable snare units).

Wider snare units will be louder and potentially so sensitive that you won't be able to control the sympathetic vibration buzz. So if you bought the wide one and tighten the heck out of it to eliminate the buzz, you just as well stay with the original one.

- Snare units with a wider surface coupled with a second smaller set inside will provide a "fatter/wetter" sound.
- If you hit a drum hard, there is a point at which you do not increase the overall snare drum volume and in fact the drum will sound as though it has less "crack" than at moderate volumes. This is because you now hear more of the "tom" or "timbales" sound of the drum by virtue of the fact that you're hitting only the batter side.
- The snare side is the excited side and it will only move so much when hit. So changing snares may or may not get you more volume or crack from the snare wire its self, depending upon how you hit.
- To keep the tone of the drum yet get a warmer less powering snare sound, reduce the snare count to 10 strands, carbon steel. For less metallic, stainless, etc.

Prof.Sound's Drum Tuning Bible v3

Sympathetic Vibration

More information than most anybody wants on this subject follows:

Snare Unit, Buzz Issues or Sympathetic Vibrations

I have found on the less expensive snares, the depth of cut on the snare bed can be a real issue that contributes to the buzz. Oddly, the same can be true on expensive or custom build snares. So look close to see if the snare bed is cut deep enough to accommodate the snares themselves. Sometimes the way the actual wire is attached to the end clips make the snares ride off the head just a fraction, this will cause a buzz. After market types such as Puresound are made with a better attention to this detail and can be less prone to that issue.

I have also come to believe that a 200 weight head should be the stock snare side head on all snares as opposed to the very common 300 or "Ambassador" weight snare side head. In my opinion, the 200 or Diplomat weights tune better, help greatly with sensitivity and allow snares to ride up into the head easier at high tension tunings and thus, help to reduce sympathetic buzzing of the snares. I strongly suggest you try it on your drum (even if you play death metal!).

There are many instances where the sympathetic resonances of the snare drum snares are problematic. I will break this down into first, a simple set of suggestions to rid yourself of the buzz, and then a fairly detailed method.

Usually the tuning of nearby drums or the bass guitar, etc causes the "buzz". The cause of the problem is that the tuning of the snare is at or close to the frequency of the sympathetic vibration, that is, they're too close in pitch. Retuning the snare may be the last thing you want to do now that you've found this incredible sound. But as is everything in sound, there may have to be compromises. It can be quite complex to solve this problem because of the inherent overtones found in the snare.

I will attempt to summarize what others have offered for solutions. I have found the first two tips work very well, but many have become overly concerned by this and really shouldn't be. The buzz in many cases is the essential ingredient to getting the drum sound, such as a "fat" tuning and does not appear in the recording or the audience, as a buzz.

Simple Methods

1. On the snare side of a ten-lug snare, detune both lugs on either side of the snare where it attaches to the shell until the head ripples. Then tune it back up until the ripple just disappears. This means you will have detuned 4 lugs. Now, compensate by over- tightening the remaining 6 lugs (3 on either side of the snares).

2. Find the offending instruments and retune it. Usually it's one of the toms and the tuning of the tom is usually not as critical in the mix. Others report that if the toms are tuned a 5th away from the snare and then from each other, this can eliminate the problem. But this is only partly a solution, as the snare drum itself is very rich in overtones (independent of tuning) and removing one overtone (by retuning) is likely to introduce a new one!

3. A completely different approach put some very thin piece of paper or duct tape between the snare and the bottom head near the place where the snares attach to the retaining clip. You have to experiment a bit with thickness and placement, but it is possible to reduce the problem a lot.

4. Different heads. Calfskin heads were rather insensitive to this phenomenon. It is thinkable that the use of calfskin-like heads (e.g. REMO Renaissance or FiberSkyn 3) may reduce the effect.

5. Drape a towel or other heavy cloth from the bottom of the snare drum between the drum and the offending source if it is a nearby drum.

6. Wire snares are the most problematic. Try using cable snares such as those made by Grover, Patterson or Hinger. Traditional gut snares are also less likely to buzz. However, the sound may likely change to the drier as a result.

7. Try tuning the bottom head down in pitch and the batter up to achieve the same note and if that doesn't work, do the opposite. The idea is to create a larger value in pitch difference between the heads so the drum does not want to vibrate as freely at the same frequency head to head.

Complex, but Educational

Here's a method I have developed to help flush out the problem of snare buzz. But to solve it, you have to get a little education. I'll start by posing this question; if nothing different is acceptable, what makes you think something will change?

The reality is, something in the tuning of the drums (most likely the smaller toms or snare drum itself) or acoustics of the room must change. Drumheads are diaphragms that are caused to vibrate by something. That "something" must set the heads into motion, be it a stick or other sound that will excite the head. Once the heads are excited, the snares riding against the surface of the head are going to vibrate. This is much the same as a piece of paper laying on a floor tom will vibrate when a nearby bass guitar hits a note or the glass in your bookshelves will rattle when the subwoofer is turned up during a movie. These sound sources causing the vibration must be of sufficient volume AND frequencies to make it all happen. Knowing this is key to making the buzz go away.

Almost every room that has not been acoustically treated has a frequency that is more pronounced than others. Further, this "node" in the response will occur at even multiples of that frequency again and again. Studio designers know this and go to great lengths to create things called bass traps to suck up these "spikes" in the waveform, treat the surface to further absorb and diffuse frequencies to help eliminate these problem node frequencies. Sounds in the bass and mid bass region are the most problematic with regard to snare buzz. Rooms that have walls, which are parallel to each other, are much worse than are those where every wall is a different length or angle. If this problem frequency happens to fall close to or at the tuning of a drum, or close to a note that a bass, keyboard or guitar player hit, the buzz will get worse because the volume of that note is accentuated and creates a sympathetic resonance within the drum due to its tuning.

Also, if a source of volume is situated close enough to your drum or drum set (such as an amplifier speaker cabinet), then regardless of the note, the shear movement of air caused by the playing of a note at a high volume, can again cause a vibration of the head. Again, it will vibrate and in the case of the snare, buzz more if the note is close to or at the point of tuning.

Younger and less experienced player get pretty annoyed with this and tend to choke the snare response in an effort to eliminate the buzz. The result at the audience or under mics is the drum has no life or sensitivity for the playing of ghost notes. Most experienced players ignore it because they know that the buzz is not really heard in the mix and at the distance most audiences sit. Also you must realize that because rooms as well as instruments sitting in close proximity can cause the buzz and ringing of drums to occur, you must also realize that as you move from room to room, or from a room to stage it's very likely that the buzz won't be there in the next venue.

Nonetheless, now that you've nee slightly educated on the basics, here are some thoughts on how to minimize or eliminate the buzz caused by snares.

First try to change the position of the kit in the room. For example, if you have the kit placed facing out of a corner, consider placing it in the center of a longer wall. Placing a kit facing out of a corner can cause bass loading and accentuate certain bass frequencies. Your kick drum and toms may sound fuller placed in a corner than elsewhere. Hence moving the kit may also help to eliminate the ringing of toms. This movement may very well be the key to eliminating the buzz if other instruments rather than the striking of a tom cause the buzz. You can also try simply carrying the snare drum around the room while others are playing and look for the place in the room where the node frequency has been canceled due to the acoustic nature of the room. Where there's a spike, there's usually also a null point where phasing has caused a dip in the frequency response of a room. Studio engineers routinely look for places in a room where acoustic instruments sound better, you can too, and now you know why.

If all else fails, and raising and/or lowering the pitch of toms and snare are no longer options, or haven't produced an acceptable result, and the snare still buzzes, here's my method to help reduce or eliminate the buzz once all the options available above have been exhausted.

Take the batter head off the snare. See if the snare still buzzes when you hit the toms or toms or the note is played that cause it to buzz? If it does then you need to raise or lower the pitch of the snare side head in very small increments while playing the offending drum and/or instrument. Look for a place in the tuning where the buzz has been minimized or eliminated. If it does not go away, then the problem is acoustic and changing the style of head may help? For example, glass based heads such as those made by Evans have a higher specific gravity and are not as easily excited. Try a thinner head because although its excited more easily, due to less mass it stays in motion for a shorter length of time and the buzz may become more acceptable because it does not linger as long. Thinner heads such as the Evans Glass20, 200 and REMO Diplomat series of Snare Side heads also allow the snare to ride up into the head easier and can sort of contain the snare movement. However, the opposite may be true? A thicker head may be the answer because of its mass, it may not be as easily excited by the offending frequency. Thicker heads make the snares ride on top of the head and this can lead to snare buzz.

If after making a change regarding the resonant head things got better, then its time to replace the batter side and begin to retune it. Make sure you continue to play the offending note as you do.

If after you removed the batter side head the buzz goes away, it's a simple tuning relationship between top and bottom heads that must change. In other words, find a different note to tune the drum to. Again, if nothing different is acceptable, what makes you think something will change? Try walking the batter head up and the resonant side down and see if an alteration in head tension helps? Try the reverse; Walk the batter side down and the resonant side up.

Beyond this it's the process of deductive reasoning and experimentation. Such as trying a different snare drum or using a muffle ring or head on the snare drum.

Interval, Sequences and Concepts

Tuning Sequences, Suggested

I feel you have to know the center of your universe for playing and/or which drum is most important in the way of sound. Once you know that, the rest falls into place. So lets go through the concepts for the "type" of tuning you desire. To obtain:

Lowest, fattest sound: Start with your biggest, meanest floor tom and do a fat tuning as described above under *“Results – What They Mean”*. No point in starting with the smallest drum because when you get to the low end of the range on the larger drums, the incremental tuning ability of the drums involved may make tuning the large drums impossible for the required interval. In other words, the floor tom won’t go that low and you’ll end up with a mismatched interval, so start low and work up in pitch to the small drum (s).

Punchy, top 40, where the focus is on rack tom fills: Your rack toms are what usually drives the sound. If you play 2 or 3 rack toms, pick the 2nd or 1st tom and get it where you want it, these are the center of your work. From here everything else will fall into place. Keep it melodic, play pairs of drums. If you move in 5 note intervals you’ll find all drums sound bigger, fuller, sympathetic tones are complementary. Move in 3 note increments, they’ll sound a little thinner and drier; you might want this especially for a close mic situation. Tip: Don’t make the kick drum too low in pitch, keep it in the same 5-note relationship to the lowest floor tom.

Interval and Drum Sizing

Here’s my thought’s on this subject, there are no rules other than the first two points I’ll make:

1. Diameter means more for pitch change than does shell depth. By this I mean that there is no substitute for a larger diameter if you want a real deep drum sound. Buying prepackaged sets with a 14” diameter floor tom and then complaining that you cannot tune it low is in a word, expected. You cannot make a 14” drum go as deep in pitch as a 16” drum. However, you can tune a 16” up to the pitch of a 14”. Regardless of the direction you choose, keep in mind that the feel of the stick rebound can mean everything to many drummers. So a very loose tuning may turn into trouble with your playing style.

2. Shell depth equates to articulation, resonance and the volume (power) of the resonant note given off by the drum shell. The shell depth coupled with wood and construction gives the drum its character.

- By way of example, a 12” x 10” (as in Dia. x Depth) gives you a shell surface area of 370 sq. in. as opposed to 333 sq. in. for a 12” x 9”. So the 10” depth is a 11% increase in the shell surface area and generally translates into an increase in resonance and or power. If the shell is reasonably thin, the tone of the 10” depth will be ever so slightly deeper and the note duration a few milliseconds longer. Engineers refer to it as “fatter”. The added depth also adds volume to the drum note. And if the shell is thick, adding depth translates into focusing more volume to those at 90° to the drumhead surface (audience). Regardless of diameter, a one-inch change in shell length, for a drum of identical diameter, generally translates into the same increase of 11% or decrease of 10%. So a 12” x 8” will be 20% less in surface area than a 12” x 10”. Simply put, the depth of the “punch” will be more evident on the 12” x 10” than that of a 12” x 8” drum.
- As an added note, often drummers always talk of wanting more resonance, but then turn around and put aftermarket devices on the head surface to mute out unwanted overtones. Overtones are of course a form of resonance. If you want your toms more articulated, I would suggest you are far better off to buy shallow depth drums than you are to buy so-called “power toms”. You may think

you are getting a drum that can tune deeper, but the trade off is less control over resonance than you will get on a shallow depth drum. Think of how tight and articulate a 3" deep snare is as opposed to one which is 6-7" deep. It works much the same way with toms, and bass drums.

So with these concepts in mind, I find a 12" drum is better paired with a 10" or 14" drum than it is a 11" or 13". That is unless you have a 10" or 14" and really desire something in-between for pitch. Then the in between sizes make sense.

The common belief is that even sized drums produce better tuning qualities. I don't know why this belief is out there, I find they can all be tuned if tuned as the shell/diameter allows. If you try to make a 13" sound like a 14" while pairing it with a 12", you're setting yourself up for trouble unless you want a small incremental note difference.

It just seems to be more melodic to skip 1 or 2 sizes in diameter in between drums (see the section *that follows below "Musical Notes for Tuning, Suggested"*).

So here are some further suggestions:

- Use a **Power Tom** as rack/mounted toms if you like big floor toms.
- Use **Fundamentally Accurate Sized Toms** ("FAST") if playing small venues, when size is a concern or when you just want less "power".
- Small drums tune "low" fairly well, large diameter drums don't always tune "high" well.
- I find any combination of drums in the following sizes tune well and allow room to add: (Expressed in Diameter x Depth) 8x8, 10x9, 12x10, 14x12, 16x14, 18x16, 20x16, 20x18, 22x16, 22x18, 24x18.
- If you like a tight sound, consider substituting a rack tom depth that is 2" shallower than those above.

Musical Notes for Tuning, Suggested

When I originally wrote this section, it got an awful lot of misguided attention and much debate was drawn from the concept of tuning to a specific note. An often received question was, what is a "standard" tuning for my drumset?

There is no standard tuning for Rock vs Jazz vs Country. By that I mean, every drummer playing Rock DOES NOT tune their kick to a "C", etc. There are however a few interval concepts that drummers "tend" to use between each drum, and that would be a 3rd or 5th apart. Typical thoughts are to tune in intervals that mimic the note spacing heard in the song "Here Comes the Bride", however, not to those exact notes. Smaller intervals are more predominant in Rock, larger intervals in Jazz.

True, most drummers don't worry about it. However, in my experience; the more seasoned the drummer, the more they are concerned with the relationship between their drums.

But remember the job of the drummer, other than laying down a beat is to make a song sound its best. If you are getting paid to work quick, you must be able to dial in the drum quick. The true studio drummer has 1 to 3 songs they need to lay down in a 2 to 4 hour session and the song is the specific focus. Typically the drummer will balance the tone of the kit so that it does not clash with

- bass or low octave keyboard textures, and
- the drums when hit together form a melodic structure so that if or as they resonant, there are no dissonant overtones being picked up by mics, or

- they know their kit and insist upon a very specific relationship between drum to drum and in most cases are only willing to alter the tone of cymbals or the snare (by choosing one of many they own and listening to the track back to hone in on the decision).

When playing live, especially if you are a cover band playing all types of music, you need to get real on what you can and cannot do. You will not have the luxury of altering your tuning to fit a particular song.

IMHO, the concept of tuning is essentially centered on knowing how to get the best tone (that suits you) out of each of your respective drums. Above all, it's about being realistic and being satisfied with what you have. Most frustrations come out of unrealistic expectations and not understanding that you may actually have the wrong sized drums to achieve your objective.

So bottom line is, any two drums struck together make noise and will get you by. However, it is not near as pleasing as how you will sound if they work together as a "chord" type sound. And that in a nut shell is the concept I have tried to get across. Hit all your drums together and make sure they sound melodic, whether tuned in 3rds, 4ths or 5ths, it doesn't really matter too much if they sound good as a "unit" rather than as individual drums.

> The best advice I think I can offer (other than learning your instrument) is not to have you and your bass/keyboard player sounding the same. This is a basic concept of engineering. Each instrument needs to have its space in the mix for clarity. So while each bass player will no doubt play a note that is the same as one of the drums at some point, the timbre or tonal characteristic between the 2 needs to be different.

You should get to know at what note your drum sounds best. Why? Because if you go to the trouble of finding that note, you'll also see that from a musical standpoint, playing 2 notes together directly next to each other on a keyboard sounds pretty bad (for the most part) and that's what we want to avoid. Play any combination of notes by counting 3 or 5 notes apart and it becomes very melodic. Hence your drums will sound better and can also sound bigger due to complementary vibration from drums, which are sympathetic to the one being struck. This is not an absolute rule. But in general, you should try playing your drums in combinations of 2 and try to make them melodic so they produce kind of a 2 or 3 finger cord when struck. Make notes of these types of things when tuning for different venues.

> **I need to stress that the idea here is not to try and match cords used for songs so much as keeping the whole of the drum set from clashing. And you may find that the result is far superior. Somewhere along the way, you'll find a sequence that fits your style and model of drum.**

For example, I know my drums will sound best tuned as follows:

10"x 9" tom: D sharp

12" x 10" tom: A sharp

14" x 12" floor: F

16" x 14" floor: C

22" x 16" kick: Batter F (octave lower than floor); Resonant E

Main snare 14" x 6" YAMAHA Anton Fig: G above the 10" x 9" D#, both heads the same

How I know this is by working through all the same steps I've outlined. It can also help me dial in my kit quick by simply hearing the note and then tuning to it.

<u>Microphone Use, In Brief – How they can affect the sound</u>

Playing without a microphone versus with one is very different. This is not a tutorial on Mic use, simply an elementary understanding of one key factor. When "close micing" a drum, the type of microphone can and usually creates proximity effect. If you look at typical mic's associated with use on toms, you'll see a drop-off on the frequency curve associated with most dynamic mic's. This drop-off can be compensated for

through proximity effect. This is less pronounced on an electret condenser microphone. “Proximity effect” is a condition, which, when the mic is in close proximity to the head, a bump in the low frequency range is created, and therefore, accentuates the lower fundamental note of the drum. The opposite is also true, pull the mic away and low end response drops-off. When close, the pronounced increase of the low end offsets for the otherwise dead sound of 2-ply/muffled heads or the lack of free field low-end frequency response. Hence, never buy a microphone based upon a stated frequency curve or specifications alone. The microphone hears and accentuates what the ear cannot. Experiment because the proximity effect diminishes the further from the head you get (out of proximity).

Much more to come on this in the future.

Kick Drum Microphone Tricks

1. Movement of the Mic as little as ½” can make big changes. Movement closer to the resonant head results in less definition and more “boom” from the drum.

2. Place a mic closer to the pad/pillow to cut resonance and increase presence.

3. Place a mic closer to the batter and mid range attack comes out, warmth disappears but deep low end remains. Careful not to get too close or clipping of electronics’ or destruction of mic can occur.

4. Two heads no hole – 1 Mic: Place the microphone on the outside of the batter side, but not in an upward facing direction. Try reversing the phase of the Mic, it will sometimes give more punch.

5. Too much snare bleed, try taping a cardboard funnel around the mic face to trim unwanted high frequencies or aim the mic down at the point of impact at 35 degrees.

6. Two Heads no Hole – 2 Mic’s: A phase reversal of one or the other head is almost a must if using a mic aimed at both heads. Your sound is at the hands of engineer now because it’s like retuning the drum to blend the Mic sounds.

7. When doing recording, take a large floor tom and place it out in front of the kick drum. Tune the floor tom very low in pitch and place a large diaphragm mic on it to capture sympathetic vibrations and low-end resonance.

Snare Mic Tricks

1. Controlling leakage from Hi-Hat: Use a Mic with a Hypercardioid pattern. As a result, you may have to Mic either from overhead of the kit or the hat itself, could be a plus depending upon philosophy.

2. To capture the “snap/crack” of the drum, especially for “hard hitters”, Mic from the bottom and use in reverse polarity under the snare.

3. Too many overtones: Don’t place a Mic aiming at the outer 2 inches of the head unless you really want to overtones to come through or use a head such as an Evan’s Genera Snare Batter, Aquarian Studio-X or REMO PowerStroke3, all coated.

4. Avoid having the mic too close in general, 2-3 inches up and out aimed at the center of the head allows the mic to capture a more natural sound.

5. Not enough snare sound when using a Mic. When Mic’s are placed too close to the head, the Mic doesn’t hear as much of the “crack”, it hear more of a timbale sound. Hitting harder equals less crack when placed too close. You can also place the Mic directly centered over the rim of the drum up about 1 inch and aimed at the center of the head. This keeps the Mic from hearing the warmth of the head and picks up more shell resonance.

6. If you do not have a brighter sounding snare, place just one mic in reverse polarity underneath in about 3” from the rim and centered on the snare unit itself.

Prof.Sound's Drum Tuning Bible v3

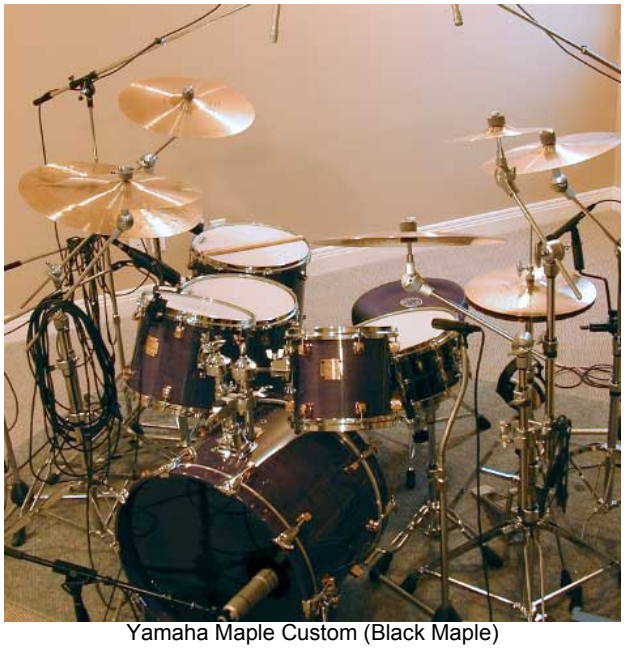
Equipment

Equipment Used by The Author

I play Yamaha Maple Custom drums (not Absolutes) by choice; I am not sponsored by anyone. I find that with Yamaha, the quality is superb. The drum is not the most resonant drum on the market, I prefer to think of it as "controlled". You'll find many pro's using the YAMAHA Maple Custom, as you will that which play other brands. The set and sound just reflects what I feel is right for me. I like the brightness and the warmth projected by maple. Bright is a good way of explaining the characteristic of this kit if you subscribe to the notion that the audio spectrum has 3 basic bands; Bass (warmth); midrange (presence or harshness); and treble (bright). Top quality sets, regardless of manufacturer are all great. There's only one really great drum set, and that's the one that inspires you to play your best given the budget you have and reflects your personality.

Mic Placement Shows a Typical Layout

- Yamaha Maple Custom, Sizes 10x9, 12x10, 14x12, 16x14, 22x16.
- Finish: Black Maple, Gold lug casings, YESS mounts on all toms.
- Hoops: Aluminum on toms, Solid Maple on kick, Snare by model.



Yamaha Maple Custom (Black Maple)

Hardware: YAMAHA 800 series

Cymbals: Paiste Signature Series

- Sound Edge Hi-Hat (14")
- Fast Crash (15")
- Fast Crash (16")
- Fast Crash (18")
- Dry Heavy Ride (20")
- Flat Ride (18")
- Splash (10")

Microphones typically used:

- Snare- Batter Side: Shure Brothers SM57-LC;
- Snare-Resonant Side:Audio Technica ATM3528, Shure SM98 or Beyer M101
- Kick: AKG D112 or RE20
- Toms, Rack: AKG C418
- Toms, Floor: Sennheiser 421 – 70's series
-

- Overheads: Shure SM81-LC's
- Hi-Hat: Audio Technica ATM3528

Headphones: Beyer 770

Head Choice:

Kick: Mostly Aquarian Superkick III Coated Batter paired with the Evans Ebony EQ3 Resonant w/4-1/2" offset hole. In all cases I use the DW pillow covering 15% of each head.

Toms: varies but mostly Evan's G2 Coated Batter w/G1 Coated Resonant.

Snare Drums:
14 x 5 1/2 Brass Snare Drum; Manu Katche Signature Model; Hoops cast; Heads: Ambassador Coated or Genera Snare, Diplomat Snare Side; Tuning Method 1 in the bible, batter tighter than resonant.

14 x 6 Maple Snare Drum; Anton Fig Signature Model; Hoops wood maple 19 ply; Heads: Ambassador or Evans Coated batter and Ambassador Clear Snare side; Tuning Method 2 which is Batter looser than Resonant, Resonant about 3 notes higher.

14 x 5 1/2 Steel Snare Drum; Phonic 400 60's era; Heads: Ambassador Coated batter and Diplomat Snare Side; Hoops are steel triple flanged; Heads equal in pitch, medium tuning Method 3.

14 x 5 1/2 Steel Snare Drum; Rodgers Dynasonic 60's era; Heads: Evan's Genera Snare Coated and 200 Hazy Snare Side; Hoops steel triple flanged things; Heads equal in pitch, medium tuning Method 3.

14 x 3 Brass Snare Drum; Pearl FreeFloat Model; Hoops Cast; Heads: REMO Ambassador Coated batter and Ambassador Clear Snare side; Tuning so the resonant side is typically 2 notes higher than the batter side

On all the Snare drums I'll use various width "O" rings with a ½ width being the most common.


Studio Shot


Typical Snare Mic Placement


Kick Mic - Max Resonant Head Affect

Lots of supporting content to be added - Stay tuned!

Prof.Sound's Drum Tuning Bible v3

Buying Drums

Buying Drums - The 10 Steps to Satisfaction

There are several manufacturers that make good quality drum sets. Work very hard not to get biased about any one manufacturer.

This may seem obvious at first, but, the best way to pick a drum set is to really go and play everything you can. If you are self-conscious about that, do not think you have to sit down at every store and do a solo that must stop everyone dead in his or her tracks. A very logical approach is all you need. The idea is to go look with an open mind and LISTEN and LOOK above all else. A simple 1 or 2 hits on a drum tells a lot. And I believe you should start with the hitting aspect, not the visual one where you migrate to finish and name badges.

Once a drum is hit, your brain takes over and responds by saying, “I like it or I don’t”. This may be or may not be valid information. Believe it or not, there is much more to be considered and a little knowledge can explain a lot.

Step 1 - The Surroundings: If the store has tile floors and multiple glass windows, the sound from all sets will be more harsh and open. If the store has a carpeted floor, the sound will go more dead or focused with less reverberant effect. If there are multiple drums stored nearby, they too will get excited by the sound of the hit and as such; accentuate the resonance or more often, the low end response. So you need to focus on the drum you are playing. The brain needs direction and you have to provide it.

Step 2 - The sound: As you move from drum to drum throughout the store, consider what you are really hearing through by applying visual identification. If the drum is in a corner, it will accentuate the sound from the resonant heads and the sound will be reinforced in the lower midrange and bass sections. If the drum is out in the open, it will likely be the reverse effect and go more accentuated in the upper midrange and sound thinner or lacking in bass. Look at the heads, are they the same as the previous drum, are they coated, are the muffled, are they 2-ply, been used, dented, etc. Heads and surrounding have a huge impact on the sound. Tuning is number one. Way too often shops let the sound of their sets go out of tune because the drum room is a prime target to create a weekend child care center. Heads stay on a long time but they are usually not destroyed. So tune them. I find the sound of a typical 12” tom and the kick drum define the timbre of the set, so I suggest you focus on those 2 drums until you find a few sets that you like and then finesse the rest. Snare drums are really a separate issue but one quick thing to do there is understand very high tunings sell drums. So often you’ll find everyone of them tuned way too high. Turn off the strainer on surrounding drums and pull any snare you want to try out and away from everything else, even the drum set you’re playing. Play it at YOUR normal height, while sitting at YOUR normal height with YOUR sticks you thoughtfully brought along.

Step 3 - Moving About: Now that these acoustic issues are implanted in your brain, do not spend much time at any one given drum set banging out a solo and try to refrain from hitting cymbals. Your ear gets tired and over a very few minutes, you’ll begin to stop hearing subtle differences. A few hits on one set, go to the next and trust your instincts. As a human (its an assumption) you’ve had several million years to hone these, they know more than you do! Trust them! As you move about, make mental notes on what you liked or didn’t about the sound of one drum vs. another.

Step 4 - Forget about price, manufacturer, wood, construction and finish. I cannot emphasize this enough. And yes, forget about your budget. We’ll get through that issue in the end and address the issue of how you can afford the drums and get something within your budget.

Step 5 – Serve Notice: Tell the shop you’re here to consider purchasing a new drum set. A good well trained sales guy, and even the ones that aren’t, will ask all sorts of questions. Be courteous and answer

the best you can but find a tactful way of telling them right up front you do not need any help right now. Tell them you really just want to approach this in as unbiased manner as possible and while you don't disagree with them, you just want to nose around a bit. Ask them for their card or name, and tell them you'll be sure to check back later as you narrow things down or have questions. Explain you want to just see what's out in the market these days, your in the market for a set, and would like to spend sometime methodically trying out a few things. Because of what I'm going to explain below, they will not see you as a self-indulgent egotistical drum junky looking for self-gratification hoping to impress everyone that walks by. Further, they really won't know your skill level at all, and to me, that's the fun part. Moreover, because you understood what you were doing up front, you thoughtfully brought your own sticks and a drum key. So you're displaying a professional attitude rather than an impulsive one. If for that odd reason there's one of those sets around that has a weird tuning lug, just ask the shop guys for that key when and if you need it.

Step 6 – Read the Drum Tuning Bible: It will explain how to tune a drum and details about drum construction for you to consider. This way, you won't destroy heads on sets on display, and you'll be armed with important information to stimulate the brain and point you towards the right choice. You might also read about the Drum Woods.

Step 7 - Bringing it all together: It's excruciatingly hard to get all factors even and do direct apples to apples comparisons. A larger drum, different heads, less than identical locations are all a few of the many factors that we've discussed and they all (collectively) influence the sound. If you read the Drum Tuning Bible, you know that several factors must be playing their individual part in shaping the sound. You should consider these and ask yourself first and foremost, if you changed the heads, would you get something more to your liking or not? You do have some things immediately at your disposal to help even the playing field. Did I mention tuning? You can also take the 12" mounted tom from the 2 or 3 or 4 drum sets in question and bring them together in the same spot so they are close to the one drum you are beginning to hone in on. Try to tune them all the same focusing on both heads. Hold them at the same level. Ask you sales guy to get involved, he or she is curious now anyway. Ask them to play the drum while you go across the room and stand in various places. This levels the field and brings all factors together. Seem silly? It shouldn't! You are going to play for an audience and not too many can sit there with you on your almighty throne. So it's very important to know what they will hear.

Repeat all this with the kick drum and snare drum and you'll be amazed at how quickly your brain kicks in and says, I like it or I don't.

Step 8 – Hardware - Now tie it together by putting the toms back on their respective mounts and see if the sound changes. See if moving the drum in closer or out further on the arm impacts the sound of these few drums you've narrowed things down to. Pay close attention to how you might setup the kit. Ergonomics are huge in how they influence your play. Refrain from setting the set like another drummer might, set it so your reach works to allow a consistent hit in the center of each drum, without the stick angle to the being too severe. Too steep of an angle and you get a thin sound and destroy heads. Too shallow of an angle and you may always hit the rim, not such a good thing on toms, but it can be great on snare.

The bass pedal should be comfortable. Adjustment could be a whole separate article but for now, make sure the beater is the same profile, material, and set to impact the drum in the center. Did I mention tuning? Does it have a hole in the head? Are they muffled? Do not trust the sound of a kick drum hit by hand, it just isn't the same. Even if you hold the beater in your hand and hit it, it's not the same.

The stands. Well I'm not going to focus on these too much other than to say, if they position to where you like, and you perceive them to be good, make a mental note of them for now, because you can always mix any stand with any set. Sacrilegious you say! Nope! It's a reality; it's legal to do that. There are no "stand police". But there is "quality" police. Even some of the most touted sets have inferior quality to the snare throw-off mechanics, lug and shell finish. You have to decide what you can live with.

Step 9 – Budget. Now that you've sorted it all out, because you did not focus on budget, and you did not let a brand influence you, and you did not allow color to influence you, and forgot about the woods, and I know you followed all the rest of my advice (?), you now have close to what is an ideal drum set implanted in your brain. So now the real work begins. Your job is to go back and try to match as many factors as you can possibly match to a set within your budget to your ideal kit. Because you now know the value of the factors involved that influence your sound, you can begin the process of collecting, tuning and adjusting and you will find out, very quickly whether, to your ear, the woods, heads, construction, etc. make a difference to you or not. And therein is the most important factor. You see all these discussions about

wood and manufacturers. But can you hear it?

Step 10 – The Purchase. As I see it, affordable means making use of something within your budget that in the end doesn't cost too much to own. Consider buying fewer drums for now if cost is a factor. This isn't so bad, you can develop great fills with fewer drums. It forces you to become more creative. Less cases, smaller vehicle, there are lots of advantages to buying fewer and build upon that. If you agree, consider a better quality drum shell pack in lieu of buying top of the line hardware. Consider financing but I would pay very close attention to the interest rate. Saving is a better option here! This is not a course in financial planning but as I see it, your better off waiting to buy something you like than you are to buy something to make do. Trade-ins are for convenience, not for a good return on your investment. Capitalize on this unfortunate beating another guy took. Ask about used sets like the ones you like, search the papers and the internet. Post the question on a bulletin board.

In the end, I have found this procedure to be very educational and I routinely go out in the market every few years and follow it. It will enlighten you as to just how good the sets that are not "top-of-the-line" are and how inferior even some of the most expensive drums are for sound, even if the construction and marketing are great. This is not to say expensive sets are inferior. To the contrary, many are worth the money when you combine all these factors together. But the reality is, some just are not worth the money when compared equally. In the end, you'll know that.

Buying Cymbals

The Perfect Cymbals Setup

I am going to offer some advice on how I think one should go about picking out a cymbal. This method was taught to me personally by Jazz great Louis Bellson and I don't think the method has changed in the last 35+ years since he gave me the following advice. However, it has become more difficult because stores carry fewer products and then there's that internet thing.

The reason mail-order is bad has nothing to do with price. Rather, it's the whole concept of achieving a quality sound that's at issue. If you do go out and do this enough, you will realize that very few of the better cymbals ever sound the same.

Because your friend or hero uses a MegaBronze 20" dry Heavy, it doesn't mean your going to get the same sound with the exact same cymbal. This is true even if you order the exact same cymbal, from the same place, etc.

Keep in mind the mic, room, placement, how hard one hits, stick tip shape, size, etc. all influence sound. So chances are even if you buy the same thing, or for that matter, play the same setup as someone else, it has a very high probability of sounding different. On cymbals, this is important because where one strikes the cymbal greatly influences the sound.

All that said here are ideas on how to go about the process:

General Guidelines: Some general rules are to pick fast or dry cymbals for music that has many instrumental parts, intricate patterns and fast changes. This leaves space in the mix to appreciate what the music is doing. Pick long or full cymbals for music with few parts, instruments and changes to help fill the space.

Step 1 - Take Your Cymbals (if you have any): Take your current ride and/or hat's if you have them to your local drum retailer. Most have large displays with many makes and models to choose from. If yours doesn't, take a road trip, it's worth it! (Note, if you don't have a current ride, just keep reading.) These are important cymbals, they are the foundation of your kit, so they need be the basis from which you augment your current set.

Step 2 – The Right Time: I suggest you ask the retailer for times when the shop is usually dead of traffic and try to get there at those times.

Step 3 – Serve Notice: Once you arrive, tell them (nicely) you will be there awhile and may try everything they have and will ask advice as you get closer to deciding upon what you want.

Step 4 - Take "Your" Sticks: Sticks dramatically affect sound of both drums and cymbals. The weight, material, tip design, angle and force of the hit, all contribute. Use your sticks!

Step 5 – Forget Budget: Forget about budget, this is very important, more on this later.

Step 6 – Picking Order: You should pick cymbals in this order. Hi-Hat, Ride, Primary crash, Secondary Crash, special effects (china, splash, etc.) This too is important. If you intend to ultimately replace all your cymbals, first pick a new set of hats because you need to blend from there. Otherwise, move through the above list in the order given. If you blend from a current setup, then you'll never achieve your long-term goals.

Step 7 – Compare: Play your ride cymbal (or the Rides in the shop if you do not have any) and new desired hats in the room and listen to all other cymbals. Be careful you do not pick cymbals from different

rooms or areas without having heard your current cymbals in the same or similar acoustic environment. For example, if the room has lots of glass, make sure you also listen outside of the room once you've narrowed it down. Glass makes cymbals sound brighter whereas cymbals in an open space, or carpeted space sound warmer, less shimmer. They will not be as sibilant. Now with reference to the “budget” issue; If you find one you cannot afford but really like, use that cymbal for reference and look for one in your price range that sounds closest to that cymbal, or preferably, save and buy quality rather than quantity (easy to say, right?).

Step 8 – Distance Matters: Once you have narrowed your choices, listen from across the room with someone else hitting the cymbals, they will sound different. And seeing as you are playing for the audience, or should be, this is a very important and often overlooked step in the purchase of a cymbal.

Step 9 – You are the Judge and Jury: Most important, please let your ears be the judge, forget about people saying, go buy cymbal "X" or don't buy or recommend cymbal "X". You've got to be happy with it so keep an open mind and don't buy something you have not heard. Listen to opinions about quality and customer service.

Step 10 – Age Matters: All cymbals do mellow with age - keep this in mind. No matter how much you clean them or how, they will still mellow. So you may want to buy them a little brighter than you would otherwise like. Many seasoned pro's will seek out used cymbals for just this reason, they want the mellowed tone as it takes all the guess work out of what you'll end up with.

Step 11 – Beware of Fatigue: Ears tire of sound this loud and with frequencies that a cymbal emits. DO NOT buy the night after a gig, or right after practice. Give your ears a rest and do not play for extended periods. Try to move quickly through out the selections and let your instinct be the judge. The faster you move, the more you can tell about what you'll like in the end.

Prof.Sound's Drum Tuning Bible v3

About the Author

Scott Johnson is "Prof.Sound".

The screen name Prof.Sound was given by people on the message boards due to the knowledge and time spent trying to describe the art of tuning.

Residing in Indianapolis, IN USA, played since 13. Raised in the Chicago, IL USA area, owned/operated first studio at 17. Focus was on Rock, Progressive Rock and Country music. Had brief personal involvement with Jazz great Louis Bellson.

Moved to Nashville TN in 1975. Designed and managed the manufacturing of recording studio electronics for Harrison systems, premier company for music, film and production studios electronics.

Designed and built wiring systems for touring sound companies as well as speakers and monitors. Worked with and in a variety of recording studios along with a number of top country writers that have multiple platinum and gold hits to their credit. Engineered and did live/studio drumming.

Left music industry in early 80's to form company that today is recognized as one of the most technologically advanced recycler's of electronics and plastic in the world highly pecialized in doing separations of mixed polymers.

In '98 start playing again for personal enjoyment and currently has project studio specifically for drum tracks with a focus on Light Jazz and Country. Still does occasional demo work and has taken up an obsession with DAW building.

Motivation behind the Drum Tuning Bible

Note from Author.

The musical ability of someone playing drums is not synonymous with an ability to technically understand it. You don't have to play at all to know how to tune a drum. Because you are musically proficient, does not mean you can or know how to explain how to make a drum sound the way you want it.

The DTB is my way of tryong to make the art of tuning understandable and focus on the detail missing from other articles and the typical responses on the subject.

I don't know everything, but having been in the market for a new set and experiencing misinformation at all levels, I felt I could help transmit accurate knowledge on the art and science of the technical side of the drum, head selection and tuning issues. The DT Bible is my attempt to make it readily available, all in one place to everyone for the price it should be, FREE!

Prof.Sound's Drum Tuning Bible v3

Acoustics/Placement

Placement

People ask about the best mics, dynamic processing and in general, how to get great ("best") drum sounds all the time. It's a very hard question to give a distinct answer to, and could get very lengthy because so much is at work when acoustics enters the picture. But I'll give you some short thoughts on what's at work so you can work on things that may very well enhance your sound.

Seasoned engineers know, an absolutely huge part of getting a good drum sound is the room acoustics. Drums (and cymbals) have their way of really bringing these characteristics out of a room. Moreover, the room can absolutely make you hate the most (otherwise) magnificent drum set.

So you need to understand the basics. Almost every room that has not been acoustically treated has a frequency that is more pronounced than others. This is referred to as a node, or standing wave.

Further, this “node” in the response will occur at even multiples of that frequency again and again. Studio designers know this and go to great lengths to create things called bass traps to suck up these “spikes” in the waveform, treat the surface to further absorb and diffuse frequencies to help eliminate these problem node frequencies or "fluttering" echoes you may hear as you clap your hands together (i.e stick hitting drumhead surface).

Rooms that have walls parallel to each other are much worse than are those where every wall is a different length or angle. All materials have a point where the material itself gets excited based upon the power of the source and its physical shape. Acoustic designers know how to manipulate these materials to accommodate frequency problems or cancel them out as the case may be.

Drummers (as well as many other forms of musicians and engineer hopefuls) often don't realize how much this can wreak havoc with the sound, and in this case, specifically, drum sounds.

Bass traps actually enhance the bottom end of a frequency response by allow the dips to reappear in the spectrum.

Here’s how drums shake out:

- Bass drum: 50Hz to 5.5 kHz, thump in chest boost a few dB between 60-85Hz, punch or slap 2.5 kHz to 5 kHz, hollow sound cut out around 250-500Hz by a few dB, based upon tuning. Note: Its suggested that you have more control over sound with a drum that’s a little “hollow”

Audio Terms Explained

As generally used at the professional audio/ studio level:

"wet" a term used to describe a reverberant sound, something with decay.

"dry" a term used to describe a sound which has no decay or reverberant quality.

"fat" a term used to explain something which takes up space in the mix. As an example, a loose snare drum, which has a longer sound burst in the mix. Hence the waveform curve is "fatter"

"tight" a term used to describe a sound which has a short duration within the mix.

"open" a term used to describe something which has a natural hollow tone with lingering overtones such as that of and very resonant drum that also exhibits high pitched overtones.

"muffled" a term used to describe a sound which has the higher frequencies attenuated or lessened by another device or structure.

“focused” a term which combines the elements of muffled and tight, has a very defined tone to it with less overtones.

"warm" a term to define the quality of the sound as being "round" with “sibilant” qualities to it or specifically with less of a sharp edge or "presence" to the sound.

“cold” a total opposite of “warm” meaning it has an edge to it and is very midrange present, without body.

“dark” a term which is used often to describe a tone that is somewhat distant and has a tonal qualities in between that of “warm” and “cold”, not quit as much resonance or body to the tone as one that is warm, but also more than a colder tone, still having an edge to the sound without being sibilant.

"presence" a term which is typically used to describe a sound which can have a more nasal quality to it. More specifically, a boost in the upper midrange frequencies.

“punch” a term used to describe that of a drum, which has both a “presence” and a

sounding rather than very dry and heavily muffled, or not muffled at all.

- Cymbals: 300Hz to 17 kHz; Presence 10 kHz to 14 kHz. Typically boosted a few dB at 10 kHz and cut some between 50-450 Hz.
- Key Jingles: 1.5 kHz to 17 kHz (for perspective).
- Snare Drum: 100 Hz to 12 kHz, center frequency at 1 kHz, tight at 5-6 kHz (typical boost frequency), crack at 8 to 10 kHz, bottom at 100 to 300 Hz and resonance between 800 Hz and 2 kHz.
- Toms: Typically boosted a few dB around 4-5.5 kHz and again at 9-10 kHz, cut around 500-750 on high to mid toms with low toms treated the same, but in the lower portion of the values given, based upon drum tuning.

Now, if you study the above, you would realize that these very frequencies that give a drum the round bottom end and depth of tone are many times right in the same problem nodes rooms can create.

So the very first thing to do when you do not like your drum sound is to try repositioning the kit in the room. Sometimes just a movement of a foot or two in one direction is all that's required to be out of the node area enough to allow the warmth to develop.

In large open studios, good engineers will walk around the room with a tom and strike it repeatedly until they find the sweet spot and that's where the kit will get set up.

You will also find that many times, loading a drum kit into a corner can make a dramatic improvement in the bass content of the kit (or make it worse if it's too muddy sounding).

As for the "heads" question, the absolute warmest sounding heads are any of the REMO coated heads. The coating does not last as long as Aquarian or Evans (in that order) but the sound of the stick hitting the surface will be much less pronounced with REMO coated heads.

Room Size

The size of the room plays a huge part in how frequency waves develop and to what extent a frequency will develop. Small rooms do not allow the deep bass waves to develop because they simply cannot fit in the room without a huge amount of power to reinforce it.

Surfaces that surround you, coupled with their respective distance will either stop transmission past the barrier, get excited based upon their physical dimension and density, bounce the wave(s) back in the opposite direction (based upon angle) or absorb certain waves.

So do not underestimate the importance of the room and placement of the kit.

"dry" quality to it.

"round" a term used to describe a quality of tone that has a longer bump to the lower frequencies and is usually upper bass heavy.

"Sibilants" These are high frequency sounds such as that of a hissing effect. The letters S, Z, C and H in combination are typical examples (such as SH, ZH and CH) and often describe the bright end of the cymbal and Hi-hat sound. In a distorted form they are unwanted, but in a clear form on drums they are required for accurate reproduction of the snare and cymbal sounds and enable an airy structure or quality to the music.