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THE LOW END

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TIME TO SHELVE THE LOW END

Why so many concerts are being wrecked by too much low-end and what to do about it.

Text: Howard Page

I've enjoyed a long career where I've been lucky enough to mix concert sound for the likes of Sting (both with and without a 60-piece orchestra!), Van Halen, Sade, Phil Collins, The Bee Gees, James Taylor, Paul Simon, Mariah Carey, Paul McCartney and in earlier times Billy Thorpe and the Aztecs plus many, many others. Now, in my role as Senior Director of Engineering at Clair Global I don't get to actually tour as much as I used to but I find myself parachuting into a lot of situations to rescue a tour that's going wrong. Normally it starts with management calling our office and saying, 'Help!… the sound is going off the rails!'.

Most of what I hear in this regard relates fairly and squarely to badly tuned PAs, where the system is simply not reproducing what the mix engineer is sending out of the console. I come across far too many guys – who are otherwise competent, knowledgeable mix engineers – who have fallen into a seemingly obvious trap: excessive low-end.

By tuning your PA with too much low-end you're setting yourself up for a bunch of problems you could easily do without – problems for you, the band and the audience.

"But I need the impact of the subs to get the audience going. Everyone expects that in a big rock or pop concert." I don't buy that argument for a minute – and believe me, I hear it a lot… mostly when I've been called in to rescue a show that's spiralling out of control!

Okay, I can accept that there's a hardcore minority of concert-goers that are happy to go deaf and want to be brutalised by the subs, but the vast majority want the excitement and impact of a big PA without the low-end woolliness of too much sub. Too much low-end will cause audience fatigue – their hearing wears out over the course of the show, as does that of the engineer. And when the kick drum is louder than the vocal, towering over it like a 10-storey building, it creates a false audience focus – it's all wrong.

And the band? Well, if the band heard some of these bass-heavy mixes that are becoming so prevalent, they'd be horrified. After spending years honing their craft and creating amazing recordings in the studio, their sound is being slaughtered!

STUDIO QUALITY

I've recently returned home from Sting's *Symphonicity* tour [see last issue for more]. It was a long world tour that took in just about every major city on the planet and along the way I got to use just about every name-brand PA on the planet. But regardless of what PA I was confronted with, I tuned it to be flat and true, without excessive low, or mid, or high. My goal is to make the sound system exactly reproduce what is coming out of the mixing console. I want to have that control; I want to be able to fine-tune my mix and for those fine tonal and dynamic adjustments to be reproduced as faithfully as possible through the PA.

As I'm writing this, the point I'm making seems obvious – self-evident even: and yet, far too many rock sound systems are overdone in the low-end… often with disastrous consequences.

SUB SYSTEMS: BALANCED RELATIONSHIP

Tuning the main hang of your PA to be as flat as possible is one thing, but the reality of concert touring today is having the PA augmented by a big inventory of subs. And here's where many engineers get into hot water, especially those taking the leap up from club rigs to stadium or arena systems.

If the subs are in balance with the rest of the PA they're a great asset – no question. The problem is, they're all too often *overused* and end up colouring the whole sound, making the task of mixing on that system very, *very* difficult, especially for an inexperienced mixer not used to large scale systems in bad rooms.

A MATTER OF LFE & DEATH

The uncomfortable reality is, many large venues around the world have an RT60 in the low frequencies that's so long it will tend to 'hold on' to low notes, and in the case of a kick drum this hold will extend beyond the typical 4/4 timing of most rock music. The result is a complete mess – boomy, unintelligible low-frequency energy that ruins the show experience for the audience.

When setting up the balance between the low frequency elements of the main sound system and the sub-bass systems it's vital the balance be very carefully matched. The sub-bass systems should only ever be set as an *extension* of the main system low-end, not as a separate (often *louder*) entity.

Tune and balance the main system *without* any of the sub systems turned on. This way the main

system can be configured to sound as good as possible with perfect balance between the lows, mids and highs *before* you introduce the subs. After the subs have been time-aligned to the low end of the main PA, play a favourite track and slowly bring up the subs until they become a true low-end extension (only!) of the existing mains low-end.

Turn the subs off and on a few times to check what they're actually adding to the low-end and ensure the room is handling all that extra low-end extension. If the room can't cope with the extra sub energy then adjust it accordingly – downwards! There have been times – in really bad rooms – where I've turned the subs off entirely, as they're doing more harm than good. Once that low-end/sub balance is set correctly, make a note of the levels. This is especially crucial when you're feeding the subs from a separate mix output. Once you've made a note of the levels, stick to that balance for the duration of the show. Later in the night it'll be nigh-on impossible to get the balance reset correctly if this critical levels relationship gets out of whack.

TUNING: A STEP UP

We've determined what excessive low-end can do to a show, but I realise that many reading this article will still be shaking their heads thinking they can't do without the high-energy impact of some extra power in the subs. And I get that. So try this technique that I call 'stepped low-end' tuning.

This technique tunes the PA such that the system is absolutely as flat as possible down to 100Hz (*no* higher!) and then has a 'step' up of approximately 3 – 4dB (no more than that!) from that point down. This eliminates the low-end-into-low-mid overtone that tends to colour the whole system (we'll delve more into that in a minute) but gives most mixers of rock/pop music the extra punch they need with a tight, solid low-end. Personally, I still tune flat all the way down, and get any extra low-end punch I need out of the channel strip on the console. As a knock-on benefit, I find this also delivers a much better result when I'm recording the gig or feeding it to media or an OB truck.

LOW MIDS: DO THE SUMS

The other area that gets out of control is between the frequencies of 100 and 300Hz. One of the things I teach in my system engineer tuning classes at Clair is that the range between 100 and 300Hz is the critical 'frequency summation' area that *must* be treated very, very carefully when tuning a large-scale system. If you look at a chart of the frequency ranges of most musical instruments – rock or orchestral – in your mix, where do they all overlap? Between 100 and 300Hz. Some don't go that low, some not that high, but for the overall summation of any set of good mics on most instruments – guitars, keys, drums etc – that's the area. If that wasn't tricky enough, guess where most of these arenas and bad rooms sum and interact with the system? That's right, between 100 and 300Hz!

These two factors really do conspire against us, so in this frequency range we need to be especially careful. Make sure the 100 – 300Hz range is as flat and as tight as possible. In fact, when in doubt I always 'underdo' this frequency range (trusting my ears, *not* Smaart!) because it will inevitably get filled in when I excite the room with my mix. In other words: even if I left the console completely flat, a mix would always have more summation in the 100 – 300Hz area.

TAKE CONTROL

I hope I've made a strong case for taking back control of your mix, rather than being a slave to low-end. Still not convinced? Think of it this way: if you tune a system with 4 or 6dB too much low-end energy *relative* to the mids and highs of a large-scale system, you've effectively gone along every single low-frequency EQ section on your mixing console and turned up a full low-frequency shelf 6dB to 8dB! This is before you've even started to mix on that console! Always remember: everything you do to the overall system tuning applies to every single channel on the mixing console. The sad reality is that when this happens all those lovely state-of-the-art microphones with their flat response curves have had that response totally ruined and will now have to be 'hacked up' with channel EQ to get them to sound vaguely decent.

So before you've even started mixing – before you've even done a line check – you're already chasing your tail; trying to compensate for the bass-heavy system tuning. The answer is: don't! Don't let the low-end master you. Take control and pull the best mix you're capable of: the band and the audience will love you for it. ■

GET SMAART (BUT DON'T TOTALLY RELY ON IT)

Smaart is a great reference tool for tuning PAs, and quickly puts you in the right ballpark, but it doesn't tell you everything about the interaction of the sound system installed in a particular venue. Unlike our ears, Smaart can't determine where the problem frequencies are coming from. The system alone? No. They're coming from the system summing and interacting with the room.

I believe Smaart is leaned on far too much as the final reference to tune systems. The reality is that a system completely tuned using just Smaart sounds far less 'musical' than one that has been voiced correctly. Some of the greatest, musical sounding systems don't look all that great when analysed with Smaart. Although they will definitely be in the ballpark they won't actually be 'ruler flat'.

So get yourself a personal reference microphone (make sure it's pretty flat, with minimal proximity effect) and actually 'voice' the system – that's right, *check one, two*. You need to train your ears to pick up on problem areas and then use Smaart to help you focus on them – it's a great tool but training your ears to know what those problem frequencies are and knowing how to correct them will make you a better engineer. Remember: Smaart alone won't tell you exactly what that 'something' is.

While we're on the subject of Smaart, one of the greatest benefits it can offer is the real-time FFT function used either to check your system tune before a show, or have running during a show. To set it up create, within the console, a true mono summed mix of the stereo master outs and feed that into the reference channel (Channel 2) of Smaart and put up a reference mic next to the console as normal into Channel 1. Put Smaart into FPPO Mode (with an average of 32 and smoothing of five points), turn on the phase function, make sure you've set up the delay offset correctly, balance the two channel levels and then let it run. What you're looking for is an *average* on the FFT measurement. With a really good system tune you should get a pretty flat line (i.e. what's coming out of the console is – on average! – being reproduced in the room). If the line is constantly high in the high-end, the system tune is too bright; too low, and it's too dull. The same applies to the mids, ditto for the lows, although the lows may be inaccurate (always too high!) due to room reverb etc (use your ears for the lows!). The key here is you're only looking for an average, over two or three songs – don't chop and change things based on one song, which may have many peaks and dips based on its particular texture. Remember: the goal is for the system to reproduce what is coming out of the console!