Understanding the Loudness Penalty

How to make your mix sound good on Spotify —
IAN SHEPHERD explains the loudness disarmament process

I never wanted to be 'the loudness guy'. I remember saying exactly that to my colleague Simon Murphy in 2008. My blog post about Metallica's *Death Magnetic* had just gone viral after being picked up on by MusicRadar, *Wired* and *The Guardian*. I was glad the issue was finally getting some mainstream press coverage, but I didn't want it to be the only thing I ever talked about.

Now, over 10 years later, after writing numerous articles and blog posts, developing plug-ins to help people get to grips with loudness and even organising an online event to raise awareness of the issue... I have to admit, I am 'the loudness guy'. I get to talk about all kinds of other stuff too, but the topic I keep coming back to is loudness — over and over again.

And there's a reason for that. Loudness is FUNDAMENTAL, at every stage of the production process — in the dynamics of the performance itself; the choice of mic; the pre-amp and converter gain; the fader level; EQ choices (EQ is just frequency-dependent gain) plus of course dynamic management — compression and limiting choices during mixing and mastering; and finally the actual playback gain. Loudness is crucial — it alters our perception of the audio. Even when nothing else changes, a difference of as little as half a dB can influence the way a piece of music

sounds to us. As a result it changes the way we react to it, the way we feel — it can change everything.

Loudness in mastering has always been an issue. On my first day as a trainee over 25 years ago, I was taught about the importance of optimising and balancing loudness, using peak and VU meters — and the difference between them. The 'Loudness War' was just beginning to

kick into overdrive back then, and by the end of the decade was soon a regular topic of discussion in online mastering forums. There was so much interest in the topic that in 2010 I decided to set up Dynamic Range Day — an online event to further raise awareness of the issue. People loved it, and it got a lot of support from engineers like Bob Ludwig, Steve Lillywhite and Guy Massey plus manufacturers such as SSL, TC Electronic, Bowers & Wilkins and NAD. But it didn't work. Like the TurnMeUp initiative before it, the event was mostly preaching to the choir, while other engineers felt either unfairly criticised for honing their skills to achieve "loud but good" results, or trapped by their clients' constant demands to be louder than the next act.

The Loudness Unit

At the same time though, the world of loudness was changing in three important ways. Firstly, the tireless efforts of Florian Camerer, Thomas Lund, Eelco Grimm and many others helped achieve the official adoption of the Loudness Unit (LU, or LUFS). Loudness standards for TV and radio broadcast were quick to follow, since sudden changes in loudness are the main source of complaints from listeners and users. Secondly, online streaming began to gain significant traction. I wrote back in 2009 about Spotify's decision to include loudness normalisation from the beginning, and sometime in 2014 YouTube followed suit, with TIDAL and Deezer soon afterwards. And crucially, people noticed. This is the third important change I mentioned — people were paying attention. My blog post about YouTube normalisation got over a quarter of a million views in just a few days — a figure that completely dwarfs the site's usual traffic! When I posted about TIDAL's unusual normalisation method and Spotify's decision to reduce its reference playback level by 3dB there was huge interest again.
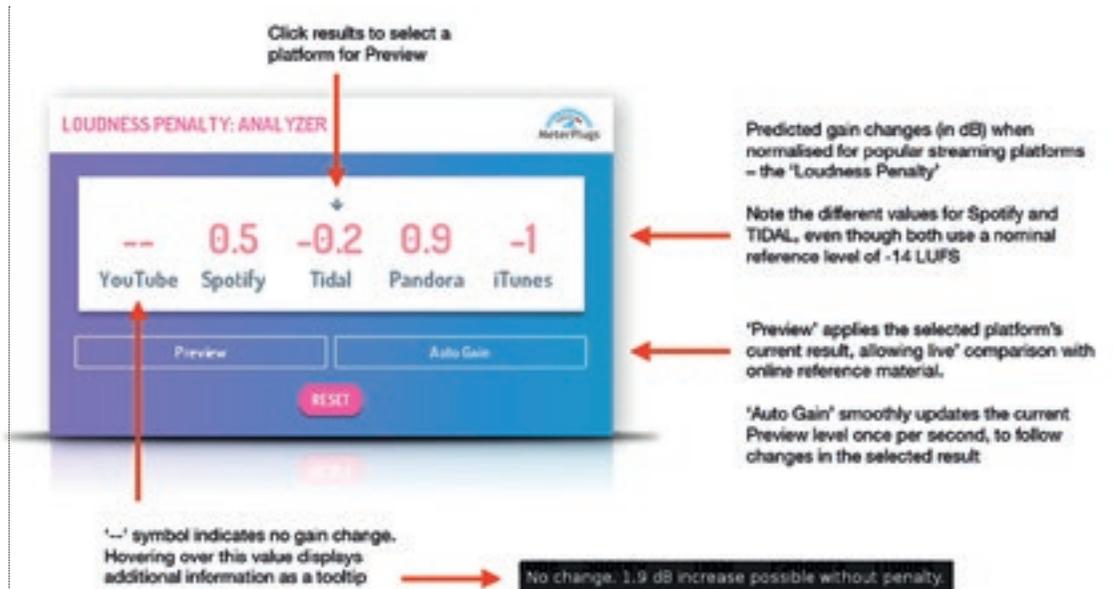
I wrote in detail about streaming loudness back in *Resolution* V16.1, but the main theme was that online normalisation was a mess. A

Photo credit: Mike Banks

combination of different loudness measurement methods and rules, plus different reference levels on all the platforms, makes it hugely challenging for even a really tech-savvy engineer to figure out what's going on. I was already developing loudness-related products with MeterPlugs: an auto-loudness-matching A/B comparison plugin called Perception (*Resolution* V13.6), and Dynameter, which offers an intuitive way to visualise the micro-dynamics of music over time (*Resolution* V16.2). Other manufacturers have similar tools, notably Nugen's MasterCheck and Expose by MasteringTheMix.

But using LUFS estimates or the "-14 LUFS" rule of thumb in this way can sometimes be wrong by as much as 3dB, in our testing. TIDAL is still the only platform to actually use LUFS for making loudness decisions at this point — and that's where Loudness Penalty comes in. In 2018 we announced the free LoudnessPenalty.com website, which quickly calculates exactly what playback loudness changes will be made by five of the most popular online streaming services — securely within a web browser, without uploading any files. The results are far more accurate than simple LUFS estimates — typically within half a dB of the real-world values in our testing. The site proved hugely popular, with thousands of users every week, but there was one recurring feature request — a plug-in version.

Click results to select a platform for Preview

LOUDNESS PENALTY: ANALYZER

MeterPlugs

--   0.5   -0.2   0.9   -1
YouTube   Spotify   Tidal   Pandora   iTunes

Preview   Auto Gain

RESET

Predicted gain changes (in dB) when normalised for popular streaming platforms – the 'Loudness Penalty'

Note the different values for Spotify and TIDAL, even though both use a nominal reference level of -14 LUFS

'Preview' applies the selected platform's current result, allowing live comparison with online reference material.

'Auto Gain' smoothly updates the current Preview level once per second, to follow changes in the selected result.

'--' symbol indicates no gain change. Hovering over this value displays additional information as a tooltip

No change. 1.9 dB increase possible without penalty.

In April this year we released exactly that, and have already had a fantastic response. You can now assess the Loudness Penalty without leaving your DAW, and watch the results evolve in real-time to spot "loudness pain points" that trigger a higher penalty. The plug-in also offers useful extra information, for example when it's possible to increase the loudness of a song without triggering a penalty.

Red card for loudness penalty
We deliberately used the word "Penalty" in the name to be a little provocative and thought-provoking, but a common response is that we shouldn't be encouraging people to mix or master to arbitrary "target" numbers at all — and we agree! Aiming for target levels is unlikely to work from a musical perspective — engineers should always make their decisions based on ➤

what sounds best for the material. But The Loudness Penalty results offer an invaluable perspective, nonetheless. Both the plug-in and site include a Preview function that allows users to hear the way the music they're working on sounds after normalisation, and compare it with reference material streamed directly from the online services. If it sounds great in this situation, then there's no 'penalty' and no need to change anything.

But it also allows you to quickly compare alternative versions using lower levels and less limiting. These will incur a smaller penalty and be played back just as loud as a result, but also potentially benefit from less aggressive processing (implemented by streaming services). Personally I'm comfortable with a result of -2 on YouTube for loud songs, for example, but if I see values of -4 or lower it's an experiment that I always want to try, at least. Loudness Penalty puts the control back in the hands of mixing and mastering engineers, allowing them to make informed decisions either way — and can also be a valuable way to reassure clients that it's "safe" to release more dynamic material, if they like the sound of it.

Make your mix sound good on Spotify

So, where does all this leave us? Well, whether I like it or not I'm one of 'the loudness guys' now, and a member of the Music Loudness Alliance to boot. And personally I'm optimistic — because of the attention these issues are getting. Bob Ludwig asked me to speak at the AES Convention in New York about streaming loudness in 2017, and every day now I see people asking questions about online loudness. With good reason — 87% of US music industry revenue in 2017 came from streaming and downloads alone, where normalisation is already standard. Understanding loudness and dynamics is a key element to sounding great on these platforms. This year's (10th!) Dynamic Range Day was a huge success, including the announcement that the petition I helped set up with Bob Katz and Matt Mayfield (the original Loudness War YouTuber) now has over 10,000 signatures. The petition is a request for streaming services to follow AES guidelines and move to even lower reference levels — a crucial step in the loudness disarmament process.

The conversation has changed, and the technology continues to evolve. In recent months Netflix has issued its own updated guidelines, and Spotify has published a FAQ page recommending peak levels no higher than -2dBTP for the loudest material, to avoid encoding issues. It's confusing right now, but that's only because we're in an important transitional period. The more people who hear for themselves and understand the effects of loudness, dynamics and normalisation, the more empowered they'll be to make the best possible decisions for the music, without feeling the need to compete in the 'war'. My hope is that knowing and understanding the Loudness Penalty numbers and the effect they have, will one day set us free from needing to pay any attention to them at all. ⓡ

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