

Loudness Penalty

User Manual



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Welcome to Loudness Penalty

Thanks for choosing Loudness Penalty! This manual will get you up and running quickly, and will serve as a reference once you learn the basics.

System Requirements

- Mac OS X 10.7 or greater
- Windows XP or greater
- AAX, Audio Unit, or VST 2.4 compatible DAW

Compatibility

- Mac: AAX (Pro Tools 10.3.7+), Audio Unit and VST 2.4 (all 32 & 64-bit)
- Win: AAX (Pro Tools 10.3.7+) and VST 2.4 (all 32 & 64-bit)

Installation and Authorization

To install Loudness Penalty on Mac OS X, run the installer and follow the on-screen instructions. Loudness Penalty will be installed into the following folders:

Mac

- AAX: /Library/Application Support/Avid/Audio/Plug-Ins/
- AU: /Library/Audio/Plug-Ins/Components/
- VST: /Library/Audio/Plug-Ins/VST/

Windows

- AAX: C:\Program Files\Common Files\Avid\Audio\Plug-Ins\
- VST: C:\Program Files\Steinberg\VSTPlugins\

Most DAWs will scan these folders for plugins. If yours doesn't, you may need to configure it to scan these folders. See your DAW's manual for more information.

Online Authorization (Requires Internet Connection)

When you first install and run Loudness Penalty, an authorization dialog will prompt you for your email address and serial number. Enter the email address that you used when you purchased Loudness Penalty. Note that both fields are case-sensitive.

The image shows a software dialog box for MeterPlugs. At the top center is the MeterPlugs logo, which consists of a stylized blue and red arc above the text "MeterPlugs". Below the logo are two text input fields. The first field is labeled "Email" and contains the text "email@domain.com". The second field is labeled "Serial Number" and contains the text "XXXXXX-XXXXXX-XXXXXX-XXXXXX-XXXXXX". At the bottom of the dialog box are two buttons: "Authorize" and "Cancel".

Figure 1: Loudness Penalty Authorization

Offline Authorization

If you prefer, it is possible to authorize Loudness Penalty without an Internet connection. This approach may also be required if your DAW blocks keyboard input from plugins, preventing you from entering your email address and serial number. Visit the following URL for details:

<http://www.meterplugs.com/offline-authorization>

Introduction

In recent years all the major online streaming services have started regulating playback loudness. This means that loud songs will have their playback volume (or loudness) turned down, to prevent users from being “blasted” by sudden changes, and quieter songs *may* be turned up, depending on the service. The goal is to create a more consistent, enjoyable listening experience for users, especially in “shuffle” mode. This process is known as **loudness normalization**.

However, all the services achieve this goal in slightly different ways, which makes it challenging to understand and predict how your music will sound on each one. For example, you may be wondering how much your music’s loudness will be affected, and how it will differ depending on the streaming service.

The Loudness Penalty plugin has been developed to answer these questions, simply and easily, by giving you a precise estimate of the change in loudness you can expect when uploading your music to five of the most popular online streaming services.

You can also preview the final loudness of your song on each service, allowing you to compare it to similar reference tracks, and make optimal decisions for your music, balancing the artistic and technical aspects for maximum impact.

Getting Started

Using Loudness Penalty is straightforward. Simply insert the plugin in the final slot on the stereo output channel of your DAW, after all other processing, and press “play.”

The plugin will immediately begin to assess the loudness of your music and provide feedback about how it will be treated when it is played back on five of the most popular streaming services: YouTube, Spotify, TIDAL, Pandora and iTunes (iTunes is not technically a streaming service - see the next paragraph). The results are displayed in decibels (dB) and indicate how much your music’s loudness will be reduced (or increased) by each service. We call these results the **Loudness Penalty scores**.

(Both Apple Music and iTunes use the same mechanism for determining the playback volume of songs: an algorithm named Sound Check. Throughout this manual, we will refer to “iTunes” even though Apple Music is the rightful name for the streaming service.)

Loudness Penalty Scores

Suppose that your song has a Loudness Penalty score of -2 on YouTube. This means that its loudness will be reduced by 2 dB when it is played there. *(The adjustment is made at playback-time, in the player, and is not “baked in” to the uploaded file.)*

The Loudness Penalty scores update in realtime as audio is played through the plugin. To get an accurate reading for a particular song, you need to play it from beginning to end (or use “offline” processing, such as Pro Tools’ Audio Suite). To see a quick “worst case” estimate you can jump straight to the loudest moment in the audio.

It’s normal to see different scores for different streaming services. Additionally, the precise results of the normalization may vary depending on the settings a particular user has chosen in their player. See [Interpreting Loudness Penalty Scores](#) for details.

You’ll notice that as you increase the loudness of your music, the Loudness Penalty scores become larger (in magnitude), negative values, indicating that your music will be turned down

further.

[Preview Mode](#)

Loudness Penalty also lets you preview your music at the reference level of the streaming service that you have selected. This allows you to compare your music “live” against suitable reference material from each service, to make sure you’re happy with the way it sounds. See [Preview](#) for details.

[Ideal Loudness Penalty Score](#)

By using the Loudness Penalty plugin you can know accurately, in advance, how the loudness of your music will be adjusted when it is played back online, and hear how it sounds. Knowledge is power, and equipped with this information, you’ll be able to make the best possible technical and creative decisions to make your music sound exactly the way you would like it to, on all the online services.

As part of this guide, we’ll discuss whether it makes sense to ask what the ideal “score” is for your music, and how to find it (see [The Ideal Loudness Penalty Score](#)). For now though, if you want to get straight to work, knowing that your music will incur a minimal “penalty” on all the major streaming services, we suggest adjusting its loudness (before the final limiter) so that the whole song has a Loudness Penalty score between 0 and -2 on YouTube, with peak levels not exceeding -1 dBTP.

User Interface

This section briefly describes the features of the Loudness Penalty plugin. To get the maximum benefit from using it, we also recommend that you read the sections that follow it, especially about interpreting and optimizing the results you get. The display and results are deceptively simple, whereas fully understanding and managing the Loudness Penalty score for your music is crucial for getting the most out of the plugin.

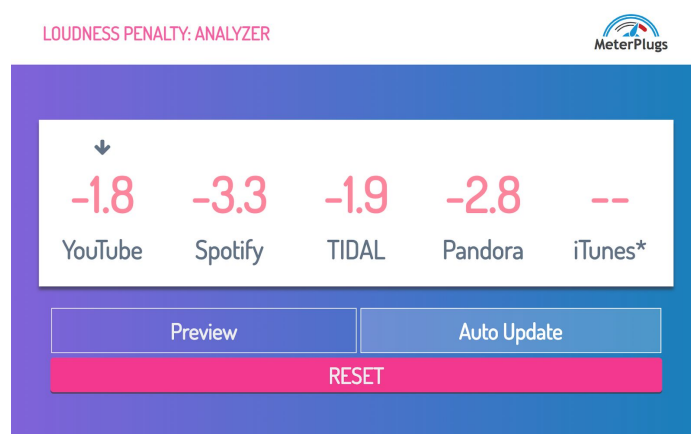


Figure 2: Loudness Penalty Plugin Interface

Loudness Penalty Scores

The main section of the plugin displays the Loudness Penalty scores (in dB) for YouTube, Spotify, TIDAL, Pandora and iTunes. The scores are updated in realtime as audio is played through the plugin (see [Interpreting Loudness Penalty Scores](#)).

Clicking a Loudness Penalty score for a given service makes that service the **active** service for Preview mode and updates the preview gain when Preview mode is enabled (see [Preview](#)).

Hovering the cursor over a Loudness Penalty score reveals a tooltip with additional information in certain situations. For example, if the loudness of your music can be increased without incurring a “penalty,” the tooltip will tell you by how much.

Reset

Clicking the Reset button clears the Loudness Penalty scores, forcing the calculation to restart from scratch. Use the Reset button before measuring a whole song to get accurate scores for the entire song.

Preview

Toggle this button to enable / disable Preview mode. When Preview mode is enabled, the plugin will adjust its output gain to match the active service's Loudness Penalty score. The active service is indicated by an arrow above the Loudness Penalty score and can be changed by clicking on a different Loudness Penalty score.

For example, if YouTube is the active service and its Loudness Penalty score is -2.4, the plugin's output gain will be reduced by 2.4 dB. This feature allows the loudness of your material to be compared "live" to the output of a streaming service in a browser or player app.

When using the plugin in this way it's important to ensure that both your DAW and the streaming service player / app (e.g., the YouTube player) are operating at unity gain. For example, the Loudness Penalty preview assumes that the apps / players for YouTube, Spotify, TIDAL, etc., are set to full volume. The Pandora web player in particular defaults to a lower volume, so you'll need to set it to maximum for comparison purposes. You also need to ensure unity gain from the output of your DAW. If you are using an external sound card, it's probably easiest to set your streaming players to use this audio output.

By default, the preview loudness does not update along with the Loudness Penalty score (see [Auto Gain](#)). This means that over time, the preview loudness might diverge from the Loudness Penalty score of the active service. When the two numbers diverge by more than 0.3 dB, the Loudness Penalty score turns orange, indicating that you might want to "refresh" the preview loudness. Simply click the Loudness Penalty score again to update the preview loudness.

Disabling Preview mode returns the output gain to unity (i.e., the plugin makes no changes to the audio's loudness).

Auto Gain

With this option enabled, the plugin automatically adjusts the preview loudness as the active Loudness Penalty score changes. This means the final loudness you hear always matches the streaming service's reference level, without you needing to click the Loudness Penalty score to update it.

This is very handy, because you don't need to click on the Loudness Penalty score to update the preview loudness, but the feature must be used with caution. If the Loudness Penalty scores haven't yet "settled" and are changing rapidly, the preview loudness will also fluctuate rapidly, which doesn't mimic how loudness normalization works in practice (i.e., with a constant gain offset). For this reason, you should usually disable Auto Gain *until* the Loudness Penalty scores for your music have stabilized.

Note that the Loudness Penalty plugin doesn't apply any limiting, and can't predict in advance whether a positive gain change might cause clipping if the audio gets louder. For that reason, you should take care enabling Preview mode when the current service is reporting a positive Loudness Penalty score.

Output Gain Warning

If any operation (e.g., enabling / disabling Preview mode, selecting a new active service or resetting the plugin) will result in an increase to the output gain of more than 6 dB, a warning will be displayed. You can choose to accept the gain change or cancel.

Interpreting Loudness Penalty Scores

A Loudness Penalty score is a deceptively simple measurement. In this section we'll start with a high level overview of what a Loudness Penalty score is, and then dive into some of the nuances. By the end, you should have a clear and detailed understanding of how to interpret Loudness Penalty scores, and how they can help you achieve great results when streaming your music online.

At a high level, a Loudness Penalty score tells you how much your music's loudness will be adjusted when played back on a given streaming service. The score is given in dBs, relative to the music's original loudness. In other words, it represents the change in loudness that a streaming service applies. For example, a Loudness Penalty score of -2 for YouTube indicates that the music will be turned down by 2 dB when played back there.

Negative Loudness Penalty Scores

If your music has a negative Loudness Penalty score, it will be turned down, but that does not mean that it will be played back quieter than other songs! Rather, it should be played back at the *same* loudness level as other music, with the exception of very quiet music (more on this later). Indeed, this is the goal of loudness normalization: to eliminate sudden jumps in loudness between songs.

For example, a song with a Loudness Penalty score of -2 will play back at the same loudness level as a song with a Loudness Penalty score of -4. The latter just needs to be turned down more because it is louder. But the obvious question is then: if it's going to be turned down anyway, why bother turning it *up* in the first place?

This is a great question! Achieving very high loudness can be difficult, and sometimes has a negative impact on sound quality since it's often necessary to use heavy limiting or clipping. By targeting lower loudness levels, you can reduce the amount of processing needed, which causes less distortion and often allows you to achieve more space, depth and clarity in the sound while maintaining the same final playback loudness.

Finally, note that when your music is turned down by a streaming service, a simple, constant gain adjustment is used. No compression or limiting is applied to achieve the effect.

Positive Loudness Penalty Scores

Most modern, mainstream music genres are mastered very loud, resulting in negative Loudness Penalty scores, and they get turned down as a result. But some material will result in a positive Loudness Penalty score. In this case (you guessed it!) the music *won't* be turned down, and may be turned *up* by some services (see [How Streaming Services Increase Playback Loudness](#)).

If your music has a positive Loudness Penalty score, you might decide to master it louder, without having to worry that it will be turned down after uploading. For example, if your music has a Loudness Penalty of +2 on a particular service, you could safely increase the loudness by up to 2 dB without triggering any level reduction.

Remember to consider the context, though. Research shows that 80% of listeners think that an acoustic ballad shouldn't sound as loud as a full-tilt rock song, even when listening in "shuffle" mode. Just because the Loudness Penalty score tells you it's *safe* to increase the loudness of your music, that doesn't mean you necessarily *should*.

How Streaming Services Increase Playback Loudness

It turns out that raising playback loudness is not quite as straightforward as lowering it, due to the risk of exceeding 0 dBFS and introducing clipping. Because of this, there is more variation in how each service handles loudness increases.

YouTube and **TIDAL** don't turn quieter songs with a positive Loudness Penalty score up. This means that your music may not sound as loud as other material, so you might want to consider increasing the loudness prior to uploading.

iTunes tries to prevent level increases that might cause clipping. This means in some cases it won't be possible to increase the level enough to achieve equal perceived loudness with other material. There is also a maximum possible playback gain increase of 12 dB.

Spotify is the only service that uses a limiter to control peak levels on songs with a positive

Loudness Penalty score. Depending on your music and taste, you may think this is OK, or not.

It should also be noted that while the Loudness Penalty scores are based on Spotify's default "Normal" reference level, there are two other possible reference levels which users can adjust in the preferences. One of these, the "Loud" setting, is 3 dB higher than the default "Normal" setting, and makes it more likely that the limiter will be active, as larger increases in loudness are needed to meet the reference level. For example, a song with a Loudness Penalty score of +2 that peaks near 0 dBFS could be limited by as much as 5 dB at the loudest moments when the "Loud" reference level is selected.

It's not clear whether **Pandora** takes steps to prevent clipping or not. The Pandora web player's volume slider starts off 6 dB below the maximum possible level, so clipping is less likely unless the user also increases this, but we have seen occasional examples of clipping during our tests when running the player with the volume slider at the maximum.

For all services, the "safest" and most predictable method is to increase the loudness of your music until it no longer has a positive Loudness Penalty score. You can do this using custom dynamics processing and Loudness Penalty's Preview mode to ensure that you're entirely happy with the way your audio sounds.

Neutral Loudness Penalty Scores (--)

The neutral Loudness Penalty score is denoted by the "--" symbol and indicates that the audio's loudness will not be adjusted. There are several possible reasons for this:

1. The audio already matches the reference level of the service closely
2. The audio is lower than the reference level, and the service in question doesn't increase playback gain (e.g., YouTube and TIDAL)
3. The audio is lower than the reference level, but increasing its playback gain would result in clipping or exceed the +12 dB maximum (iTunes)

You can find out which of these options is the case by hovering the cursor over the "--" symbol - a tooltip will give you more information.

In each case, the first step is to use Preview mode to compare your audio with a suitable reference track on the streaming service of your choice. If you're happy with the result, no further action is necessary; otherwise, you may want to adjust your processing.

[Album vs. Track Normalization](#)

There are two ways of applying loudness normalization: **track** normalization and **album** normalization. The names of the modes reflect the way normalization levels are applied.

In **track** mode, each audio file is normalized individually. The intention is to achieve more consistent results for "shuffle" playback and noisy listening environments, but in practice we've found it can sometimes sound strange. Songs intended to sound quiet are played at a similar level to songs that are meant to sound loud, which sounds unnatural in some cases. Track normalization also changes the song-to-song balance in albums, which can interfere with the intended artistic result. YouTube and Pandora only ever use track normalization.

In **album** mode, all the songs in an album are adjusted by the same amount, based on either an overall measurement, or the loudest song. This retains the artistic song-to-song loudness relationships in an album, which in our experience sounds more natural, even in shuffle playback. Both Spotify and iTunes use album normalization when appropriate.

Because Loudness Penalty only measures individual songs, it doesn't predict the results of album mode. This is important to know, especially when assessing material for TIDAL. TIDAL *always* uses Album mode, even when playing single songs or in shuffle mode. This means that if you're uploading files as part of an album, you should measure all the loudest songs. The biggest (most negative) Loudness Penalty score will then be applied equally to all the songs on the album.

The Ideal Loudness Penalty Score

Some people say that the variation in Loudness Penalty scores between different services means we should create multiple masters, each optimized for a specific service. This is impractical though, since most aggregators only accept a single file and submit it to all services.

In fact, in our experience the idea of using a particular service's reference level as a "target" is misguided. It doesn't make sense for an acoustic ballad and a heavy rock song to both be mastered at the same loudness, for example. Differences between songs are desirable to get the right musical and emotional impact, which is why album normalization works well.

This means the real challenge is to find a loudness for your audio that achieves a sound you're comfortable with across all the services. While it's not possible to find a "perfect" score for every service, in our experience it is possible to find a satisfying compromise that works well everywhere. The exact strategy you decide to use depends on your goals. In this section, we'll look at some examples.

Strategy 1: Maximum Loudness On All Services

To achieve maximum loudness on all services, you need to ensure your music matches the highest reference level of all services that don't turn quiet material up. Currently, this means YouTube.

(There's no benefit in terms of loudness in going higher than this, since the level will simply be reduced. At the same time, if your music is substantially lower in level, it won't sound as loud as you might like.)

Other services will turn the music down further, because their reference levels are lower, but that's OK as they treat all their content in the same way. You'll leave a certain amount of peak headroom unused, but in mainstream genres that's not necessarily a cause for concern.

Whereas if you optimize for a service with a lower reference level, your music may not sound as loud as you would like on the louder services.

As a rule of thumb when aiming for the loudest playback, a small negative Loudness Penalty score on YouTube is OK. Large negative Loudness Penalty scores should still be avoided though, as songs like this can sound “smaller” than those with smaller, negative Loudness Penalty scores, and will probably be turned down even further on other services.

Strategy 2: Streaming Quality and Musically Balanced Dynamics

If being as loud as anything else on the service isn't your main priority, we recommend you aim for the loudest song on the album to have a Loudness Penalty score of 0 on TIDAL.

TIDAL currently has the highest streaming quality of all the services supported by Loudness Penalty, and because it uses album normalization at all times (even in shuffle play), you can rely on it to maintain the intended musical balance between songs. By targeting a Loudness Penalty score of 0 for the loudest song on your album, you ensure that the loudest moments of your album balance with everything else on the service.

Because TIDAL's target level is lower than YouTube's, this recommendation means that your songs may sound quieter than the loudest material on YouTube. On Spotify, some additional limiting may be applied when boosting the loudness of your songs, and on iTunes, we have seen some occasional clipping result from songs being turned up.

If these final points are a concern for you, you should use YouTube as a reference point instead, as per suggestion (1), but only for the loudest song on your album. Maintain a musical balance for everything else.

Strategy 3: Maximum Dynamics and Complete Musical Freedom

Ignore the Loudness Penalty score completely! This may sound silly, but it's a genuine suggestion. You just have to accept that your music's loudness may not be treated exactly as you would prefer on all the services. You can still use Loudness Penalty to preview what the practical effects will be for your music, and make some adjustments if you'd like, but you may find it works out fine to master your music exactly as you choose, with no compromise.

Comparing the Streaming Services

This table summarizes the most important differences between each of the streaming services, plus some extra details we haven't discussed yet:

	Reference loudness in LUFS (approx.)	Normalization enabled by default?	Normalization type	Are quiet songs turned up?	Is limiting used?
YouTube	-13	Mandatory	Track	No	No
Spotify	-14	Yes	Both	Yes	Yes
TIDAL	-14	Yes	Album	No	No
Pandora	-14	Yes	Track	Yes	No
iTunes	-16	No	Both	Yes	No

YouTube

Normalization is mandatory - it can't be disabled.

Spotify

Spotify uses a limiter to prevent clipping when increasing the loudness of songs. It engages at -1 dBFS, with a 5 ms attack time and a 100 ms decay time.

Spotify has three user-selectable normalization levels: Loud, Normal and Dynamic. Normal is the default mode and the one that Loudness Penalty scores are based on. The Loud normalization level is 3 dB higher than Normal, while the Dynamic level is 9 dB lower.

TIDAL

TIDAL uses LUFS for normalization, so the results are predictable with any loudness meter. However, only the TIDAL mobile app supports normalization at this point, not the desktop app.

TIDAL always uses **album** normalization, which gives more satisfying musical results, even in shuffle. The loudness is decided using the loudest song on the album, so the largest, negative Loudness Penalty score will be applied to all the songs on the album.

Pandora

The default playback loudness level is 6 dB lower than YouTube, Spotify and TIDAL. Users can increase this using the volume slider, though. Loudness Penalty scores are based on the maximum volume level.

iTunes

The Loudness Penalty scores for iTunes are estimates only. Real-world results can be unpredictable.