NUGEN Audio

LM-Correct

Automatic Quick-Fix Compliance

Contents

Introduction

NUGEN Audio LM-Correct is an Audio Suite plug-in and stand alone application designed to offer automatic, faster than real-time loudness analysis and correction within Avid edit systems (Media Composer, Pro-tools, News Cutter etc.) or as a file based stand alone product.

LM-Correct is ideal for use in situations where time is of the essence, providing an automatic method of rapidly conforming audio to current loudness standards. LMCorrect can be used as a one-stop solution for loudness correction, fixing audio that has not been mixed with loudness standards in mind or in conjunction with a real-time loudness meter (e.g. VisLM) to 'fine tune' audio mixed to loudness requirements from the outset. LM-Correct can also be used as a final 'back-stop' processor, ensuring that finished files are within specification and performing an in-place fix where errors are found.

LM-Correct can be used within a project to measure and correct audio without needing to leave the editing environment, enabling rapid in-place loudness normalisation of mono, stereo or multi-channel audio.

Simplicity of operation is achieved using the included presets, which can be automatically dialled in (including EBU R128, ATSC A/85, ITU-R B.S. 1770-02 etc.) enabling rapid time-saving loudness compliance. In addition to integrated (infinite program) loudness targeting, LM-Correct can also assess and target for Short-term or Momentary loudness and LRA*. These additional criteria can be useful for meeting delivery specifications for short-form material or when re-purposing audio (e.g. Feature Film for TV or TV/Radio for streaming services).

True peak metering is an integral part of the EBU and ITU loudness standards, and has therefore been included within the LM-Correct module. During the audio analysis, true-peak levels are automatically detected. When the loudness correction is applied, an optional true-peak look-ahead limiter can be engaged as a back-stop measure to ensure that the TP max components of the loudness standards are strictly adhered to.

*LRA targeting requires the optional DynApt extension

Interface

General Layout

The interface is designed to facilitate intuitive operation by following a logical flow from the source file analysis on the left to the target parameters on the right.

Exactly which parameters are shown on the interface is determined by the user settings. The interface will automatically resize to the minimum required footprint for the parameters chosen.

In addition to the LM-Correct parameters, the 'Analyze' and 'Process' or 'Render' buttons are also required. The location of these depends upon whether the plug-in or the stand alone application is in use, and in the case of the plug-in, the Avid editor in question: eg. Bottom left for Pro Tools and top right, second row in Media Composer.

Whether the plug-in or the stand alone application is in use, the process for using LM-Correct is conceptually the same.

1   **Source column.** This column shows the Loudness and True-Peak values of the original file before processing. Values failing target criteria (Target column) are highlighted orange.

2   **Target column.** The target column contains the target values for the audio selection. Click the value in the box to enter your target parameters directly. When the 'Process' or 'Render' (the name depends upon the edit software in question) button is clicked, LM-Correct will conform the source audio to the target values.

3   **Processing selection.** This column determines the processing active during the correction process. Checking a box (or radio button) activates processing for this value. If the process is inactive, Source and Target parameters will be greyed out. Source and Target values will still be calculated, but processing will not be applied in order to bring Source values into compliance with Target.

4   **Process controls.** The name and position of these controls depends upon the plug-in host or application. Functionality is analogous in all cases, with an initial analysis control (Analyze) which is used to populate the Source values and a correction control (Correct/Render) which is used to conform the audio to the target parameters. In some set-ups these two controls may be combined into a single 'analyse and render' control which performs both analysis and correction passes from a single click.

5   **Copy Source to Target. (Not available in one-click render mode).** This arrow button can be used to copy the source parameters over to the target parameters. This is useful for conforming files to the loudness of a reference file, rather than a specific standard eg. Matching dialog loudness of different takes/ADR to an original reference or matching background bed tracks to the same loudness.

        To use this function, first analyse the loudness of a clip. The arrow button will then be available. Click the button to transfer the analysis of this source clip over to the target values. It is then possible to select another clip and proceed as usual with analysis and correction to conform this and subsequent clips to the loudness of the original reference audio.

Parameter Description

1   **Source Values.** When the plug-in is initially opened, the values in this column are blank. Select an audio part in your editor or load a file into the stand alone application. This is the source audio. Click the 'Analyze' button. LM-Correct then rapidly analyses the file and populates the values for the Source column. Exactly which parameters are shown depends upon the user options or preset chosen, however in all cases, TP Max, Integrated Program, Momentary Max, Short-term Max and LRA are calculated. Which are actually displayed can be updated at any point. Source values that fail target criteria are highlighted in orange.

2   **Target Values.** The target column contains the target values for the audio selection. Click the value in the box to enter your target parameters. When the 'Process' or 'Render' button is clicked (the name depends upon the edit software in question), LM-Correct will conform the source audio to the target values.

      Target values are activated by using the check boxes and/or radio buttons in the centre of the interface. Checking a box/button activates the processing for this parameter. Inactive values are still calculated but processing is not applied.

      TP Max. This value determines the maximum allowable True Peak value for the audio. To activate TP Max targeting, click the blue square. The TP Max correction passes the audio through a transparent look-ahead limiter which ensures that the peaks are kept within specification. In practice, this limiter is largely inactive and can be seen as a back-stop measure, as loudness normalisation usually reduces levels below typical TP Max requirements. When TP Max targeting is inactive, the target box will be greyed out.

Integrated. You may target Integrated program loudness using the radio button in the centre of the interface. Selecting Integrated loudness will activate the target Integrated loudness value*. This value determines the integrated loudness value after the processfunction and is the main requirement of current loudness standards. The process function analyses the file and ensures that the resulting audio conforms to the target integrated loudness value.

A note on Leqm measurement and TASA submission:

VisLM measures Leqm to one decimal place. However, when making a submission to TASA specifications the rounded up whole number value is required.

eg. If VisLM shows a value of Leqm 84.3, the TASA specification value noted at submission would be Leqm 85.

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*Note: It is possible to target M Max or S Max simultaneously with Integrated program loudness using the Dynamics button. If this is active, LM-Correct can apply intelligent loudness limiting to ensure that both targets are met. If this is inactive (targeting options switch to mutually exclusive radio buttons), LMCorrect uses a linear offset algorithm to target M or S Max, generally bringing in the Integrated Program value in under target (which may be acceptable in some situations).

LRA. LRA or Loudness Range is a complex measurement designed to give an indication of how much the louder sections of audio differ from the quieter sections ie. How dynamic the material is, and is specified in some long form delivery specifications. This option is only available if the separate DynApt extension to LM-Correct is active. Checking the central blue box activates conformance processing for this parameter.

M/S Max. Selecting M/S Max (Momentary/Short-term integrated loudness) will activate the target M/S Max value*. This value determines the maximum Short-term or Momentary loudness value after the process function. The M and S buttons determine which value is to be targeted. Some delivery documents specify M or S Max as an alternative or additional requirement to integrated loudness for short sections of audio eg. EBU R128 S1. The process function analyses the file and ensures that the   resulting audio conforms to the target M or S Max value.

3   **Presets.** Click the preset button to open up the preset menu to automatically configure LM-Correct to a number of common loudness standards.

4   **Options.** Clicking the options button opens up the options panel, containing several additional parameters governing the operation of LM-Correct.
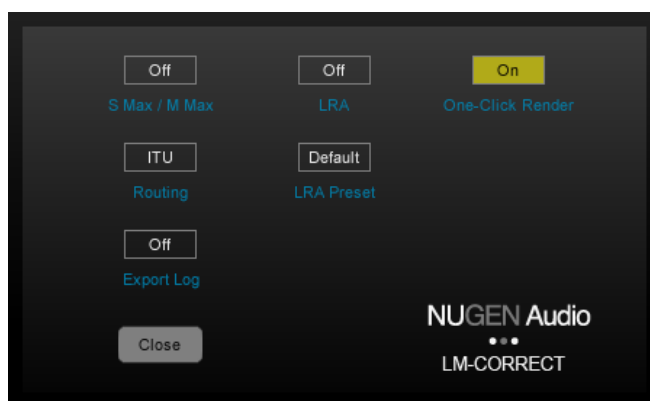
S Max / M Max. Determines whether S or M Max targeting is available in the main interface (interface will resize to simplify available options if set to 'off').

Routing. This control determines the channel routing for multichannel audio in 5.1 / 7.1 / 7.1.2 / 7.1.4

> It is important to choose the correct routing, as the Loudness Meter measurement weights individual channels differently for surround audio.

Channel Count	Name	Channel Order
5.1 Routings	DTS	L R Ls Rs C LFE
	ITU	L R C LFE Ls Rs
	Film	L C R Ls Rs LFE
7.1 Routings	DTS1	L C R Ls Rs Lr Rr LFE
	DTS2	L R S LFE Ls Rs Lr Rr
	Dolby1	L C E Ls Rs Lb Rb LFE
	Dolby2	L R C LFE Ls Rs Lb Rb
	SDDS1	L Lc C Rc R Ls Rs LFE
	SDDS2	L R C LFE Ls Rs Lc Rc
	NM	L R C LFE Ls Rs Sl Sr
7.1.2 Routings	PT 7.1.2	L C R Ls Rs Lsr Rsr LFE Lts Rts
	LR 7.1.2	L R C LFE Ls Rs Lsr Rsr Lts Rts
	NM 7.1.2	L R C LFE Ls Rs Sl Sr Lts Rts
7.1.4 Routings	PT 7.1.4	L C R Lss Rss Lsr Rsr LFE Tfl Tfr Trl Trr
	LR 7.1.4	L R C LFE Ls Rs Lsr Rsr Tfl Tfr Trl Trr
	LPX 7.1.4	L R Ls Rs Lsr Rsr C LFE Tfl Tfr Trl Trr
	NM 7.1.4	L R C LFE Ls Rs Sl Sr Tfl Tfr Trl Trr

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Export Log. If this is set to 'On' a text file log summary for each correction process is produced and saved in:

Documents > NUGEN Audio > LMCorrect2 > Logs

LRA. Determines whether LRA targeting is available in the main interface (interface will resize to simplify available options if set to 'off'). This option is only available if a license for the separate DynApt extension is available.

LRA Preset. Affects the processing applied by the DynApt algorithm. Choose from:

> **Default** - suitable for most audio material

> **Tight** - quicker response to loudness changes

> **Smooth** - slower response to loudness changes

> **Music** - setting for Music only programming

SR Weight. This parameter is used to determine the weighting of the rear channels for 7.1/7.1.2/7.1.4 audio. ITU1770-4 automatically adjusts the weighting based on the specified speaker positions for each routing option.

One-click render. This option can be used to set the plug-in to perform an analysis and then a correction render with one click. Changing this option will require a restart of the NLE/DAW before it takes effect.

File Extensions. This option is only applicable to the stand-alone version of LMCorrect. If processing de-interleaved files, you can set the naming convention used here. When opening a file, you can select any of the de-interleaved files and if the filename ends with one of these extensions then it will be treated as part of a deinterleaved set. See [Stand-alone Operation](#) for details.

5   **Plug-in Title.** Clicking the plug-in title 'NUGEN Audio LM-Correct' opens up the licensing/de-authorisation and diagnostic screen. De-authorisation can be initiated from here if you wish to move the plug-in authorisation to another machine. De-authorisation is an online process. The diagnostic tools are included for system profiling and may be referred to by NUGEN Audio support technicians in the event of a technical enquiry.

Practical Operation
General Operation (plug-in version)

This section is intended as a quick guide to getting started with LM-Correct and contains suggestions for meeting different loudness delivery criteria.

Suggested uses

- Correcting a mix to a recognised loudness standard.
- Conforming audio (eg. Interview dialogue) to the same loudness to avoid loudness jumps between different sections.
- Standardising components to internal loudness requirements (eg. Music beds) to ensure dialogue clarity.

Open the plugin

LM-Correct is an Avid Audiosuite plug-in, and is opened in the same way as any other Audiosuite plugin. This method differs slightly from editor to editor, so please refer to the Avid manual for more details.

Select audio for analysis

LM-Correct works on audio segments rather than in real-time, so you may need to bounce down a mix to a single track before beginning measurement. Select an audio part or section of audio for analysis using the standard method for your edit system.

Choose target criteria

The easiest way to do this is to choose a preset from the in-built preset menu. This will set-up all of the internal parameters to meet the common loudness standards. Alternatively you can adjust parameters individually to meet your specific requirements.

Check Routing

If you are using audio routings above stereo, check the routing configuration in the options panel and change if required.

Analyse the audio

Clicking the 'analyze' button will start the process of analysing the selected audio. This will typically happen at speeds up to and beyond 50 x real-time depending upon processor power. When the analysis is finished, the source values will be shown. If source values do not comply with target criteria, these will be shown in orange to indicate a potential problem.

Conform Audio

To conform the audio to the chosen loudness criteria, click the 'Process' or 'Render' button. The audio will then be adjusted to meet the target criteria. The source file values will be automatically updated to reflect the new file.

If you have the 'One Click Render' option turned on then there is just a single 'Render' button. This will perform the analysis first and immediately follow it with a render.

Stand-alone Operation

The operation of the stand alone application is similar in concept to the plug-in (see above), except that the Analyse and Correct features are provided within the program rather than the NLE Editor/DAW Host.

1   **File.** Opens the file dialog to load a .wav or .aif file into LM-Correct. Mono through to 7.1.4 interleaved files may be loaded. The loaded file is indicated in the file name window [2]. Multi-mono files with channel name extension may also be loaded. The extensions used can be changed in the options. Add one file from the group and LMCorrect will seek the remaining files in the same folder and treat them as a single audio stream. The corrected file(s) will be in the same format as the original file(s).

The default de-interleaved channel extensions used by Pro Tools are:

5.1	7.1	7.1	7.1.2	7.1.4
L R C Ls Rs LFE	L R C LFE Lss Rss Lsr Rsr	Alternative L R C LFE Ls Rs Lc Rc	L R C LFE Ls Rs Lsr Rsr Lts Rts	L C R Lss Rss Lsr Rsr LFE Tfl Tfr Trl Trr

2   **File name | Progress bar.** Shows the name of the loaded file, prefixed with an indication of the file format found (or multi-mono file structure).

Possible prefixes:

- M (mono)
- S (stereo)
- 2.1 through 7.1.4
- [d] (de-interleaved files found)

Note that you can drag files onto this window instead of finding them by clicking the 'File' button. You can only drag a single file at a time. If you wish to process a de-interleaved set, just drag one of the files and the other files will be found automatically.

3   **Analyse.** Analyses the selected file and shows the resulting loudness measurements in the 'Source' column.

4   **Correct.** Processes the file and cornforms it to the target loudness parameters, creating a new file in the same folder. The new file will have the loudness targets added to the filename to distinguish it from the original.

Adobe Premiere Pro

Note: The LM-Correct panel requires a separate installer.

To access the LM-Correct panel from within Adobe Premiere Pro, select Window > Extensions > NUGEN LMCorrect2 from the menu. The panel below will be displayed:
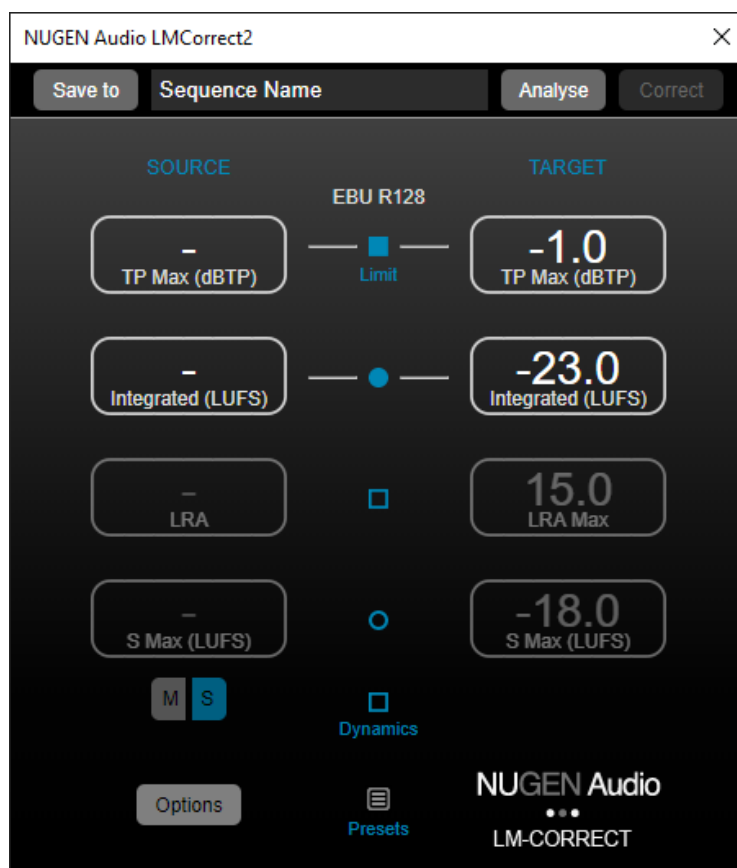

The panel is intended to function in a very similar manner to the standalone and plug-in versions of LMCorrect2, but there are some subtle differences in operation that you should be aware of.

The top line of the panel shows a button labelled 'Save to'. Select this button to specify the folder to save the corrected file to. If you are only analysing, you do not need to specify a destination. The 'Correct' button will be disabled until a target folder is specified.

The name box next to the 'Save to' button displays the name of the currently active sequence, or "No active sequence" if no sequence is currently active. It is this sequence that is processed when the 'Analyse' or 'Correct' buttons are clicked on.

You cannot process any audio without an active sequence.
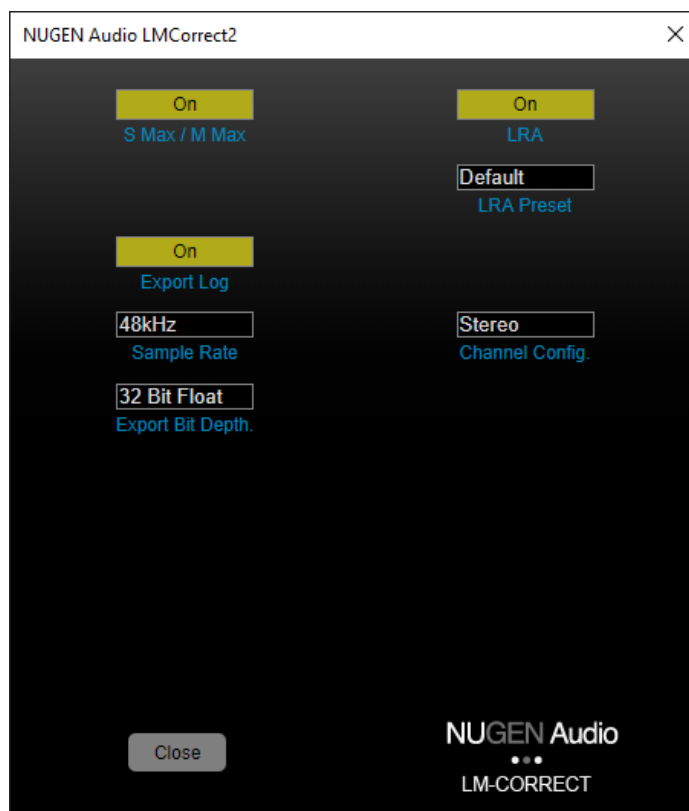
Before you perform an analysis or correction, you must tell LMCorrect2 what the sample rate and channel count are for the active sequence. To do this, click on the options button, and you should see the options panel below:

Note that some options may not be visible based on the availability of a DynApt license, and the number of channels selected in the Channel Config box. Make sure that the Sample Rate and Channel Config options match the settings for your master track. If you select 5.1, 7.1, 7.1.2, or 7.1.4 for the Channel Config, make sure you set the Routing option accordingly. Click on the 'Close' button to return to the main GUI.

Select the desired preset by clicking on the 'Preset' button (note that the preset list changes depending on the Channel Config selection). You can adjust the target parameters by entering different numbers into the right-hand column.

Click on Analyse to analyse the current session, or Correct to create corrected audio. Note that if you are correcting, you do not need to Analyse first as the correction process always performs an analysis prior to correcting.

The first time you run the process it may take a while to begin processing as the panel will first launch Adobe Media Encoder. The entire session is mixed down using the Sample Rate, Channel Config and Export Bit Depth settings from the options panel before the analysis/correction process begins. You can minimise the Adobe Media Encoder window whilst the audio is being exported as the progress is displayed along the top of the LMCorrect2 panel.

Once the mix-down is complete, the analysis and optional correction are performed. The GUI updates continuously throughout the process to show the readings so far and the progress.

When a correction completes, the corrected audio is imported back into the project at the end. You can then place this on a new track and solo it to replace the original audio with corrected audio that has been mixed down and corrected to the desired standard.

Tips

- The peak limiter can generally be seen as a back-stop measure. Unless the audio in question is highly dynamic, loudness normalisation will often mean that the limiter remains in-active due to an overall reduction in level as the Integrated or Short-term target is met. If the final TP Max value is less than the target value after processing, then the limiter was not active.

- Targeting both Integrated and M/S Max. Some delivery specifications define both Integrated and M/S Max values as target criteria. Where this is the case there are two approaches, depending upon the precise definitions and objectives.

  1 Activate dynamic processing and target both automatically. LMCorrect will initially target the integrated loudness value, and check the new source values to see if the M/S Max value has now been reduced to meet specification. If not LM-Correct will intelligently process the file to dynamically limit the M/S peaks to deliver to both Integrated and M/S Max targets.

  2 If you wish to avoid any dynamic processing, switch Dynamics off and initially process for Integrated program loudness and check the new source values to see if the M/S Max value has now been reduced to meet specification. If not, it may now be possible/desirable to target the M/S Max value and deliver Integrated loudness under target value (leaving the Dynamics option unchecked). Note that not all delivery specifications will accept an integrated loudness reading that is below the target value.

Reporting a Problem

If you encounter a problem with any of NUGEN Audio's products, please let us know, to help us improve them.

You can email the NUGEN Audio support team at support@nugenaudio.com.

To make it easier for use to resolve the issue you are seeing:

· Please give a clear explanation of the problem, including any steps required to reproduce it if appropriate.
· Please state how frequently you've experienced the problem.
· Please supply details of the system you are using, in particular:
    · The operating system (Windows/Mac OS) and version.
    · Host application and version.
    · CPU speed and RAM available.

Please be patient with any problems you may experience, particularly with products at a beta stage of release. At NUGEN Audio we take problems with our software seriously, and will endeavor to correct them as quickly as possible.

Version History

2.0   Initial release

2.1   Avid Media Composer 8 compatibility fix
             De-interleaved file handling in stand-alone version updated

2.2   Added support for Leq(m)
             Configurable de-interleaved file extensions

2.3   Added support for Adobe Premiere Pro Panels

2.4   Added new "Copy Source to Target" function
             Added additional time-line support within Avid Media Composer

2.5   Added support for Leq(a)
             Added additional options for export bit depth in Premiere Panel
             Added additional presets, including 1770-4 dynamic channel weighting
             support

2.7   Support added for 7.1 Dialog anchor
             Updated the method for processing files using Dolby Dialog
             Fixed a bug where the previous folder was not remembered between file
             opens
             Fixed SMax and MMax default values in Leq(a)

2.8   Support added for 7.1.2 in LMCorrect2 standalone and AudioSuite
             YouTube and Spotify presets added to 5.1 and 7.1 configurations
             GUI updates and fixes

2.9   Added support for dragging files into the stand-alone version
             Fixed support for running in Mac OS Catalina and above
             Fixed an issue that could result in negative LRA readings
             Moved the Premiere Pro Panel into its own installer.

2.10   Added support for 7.1.4
             Apple Silicon native support
             Link to feedback form in menu

Notes:

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