

jünger

# INTEGRATED LOUDNESS MANAGEMENT

APPLICATION NOTE





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## WELCOME

With well over 20 years' experience in dynamic audio processing and over 20.000 channels installed worldwide, Jünger Audio is internationally recognized as the industry's leading solutions provider for broadcast audio processing in production, playout and distribution environments. From the very beginning, close customer contact has been our main focus. This has led to exceptional product developments that have been jointly driven by our enthusiastic customers and our highly motivated development team. Quality audio products "made in Germany" do have a long and impressive history and we at Jünger Audio are proud to continue this legacy.

This application note is intended to share some ideas we jointly developed with our existing customers having the focus to help you designing a future proof systems solution.

I very much hope that you will enjoy our collection of application notes and I look forward to seeing and talking to you soon.

Yours sincerely,

A handwritten signature in blue ink that reads "Peter Poers". The signature is stylized and fluid.

Peter Poers  
Managing Director

## INTEGRATED LOUDNESS MANAGEMENT

Wouldn't it be fantastic to integrate the control of loudness processors into an automated workflow? We believe that a broadcast automation (scheduling) system is the perfect base for all information a loudness processor needs to operate seamlessly within a playout environment. This article describes a workflow with different levels of integration and is intended to give you some ideas for your systems design.

### How a leveler operates:

A loudness based leveler is basically an automated console master fader driven by a so called "sliding analysis window" to gather loudness data of the current incoming program. This analysis window "slides" over the program and permanently compares the input loudness with the desired target loudness and generates the control signal for the master control stage. Finally this control information is used to control the master level stage to keep the output "on target" while permanently adopting time based parameters like attack or release to the content (adaptive processing) .

This is the automated version of an audio engineer using a loudness meter and permanently keeping the program loudness in the desired target range manually. With this automated process, the engineer may concentrate on the creative part rather than spending man power on a process that can easily be automated.

### How to optimize a leveler?

Levelers take automatic care of your output levels by comparing the input to a preset target level. Ideally a leveler should operate without audible artifacts. Within a consistent program this is easily achievable by selecting a quality leveler that optimizes settings according to the audio genre. This is not really 'rocket science' a set of e.g. 3 leveler presets will do the job:

- Live
- Movie
- Advertising

So basically inner-content leveling is easy to optimize.

## The real world however...

It becomes a little more difficult discussing inter-content areas. This is the transition between program A and program B. For better understanding here is an extreme example: Program A is archive material and leveled to "old" standards w Program B is a short teaser already leveled to "new" standards

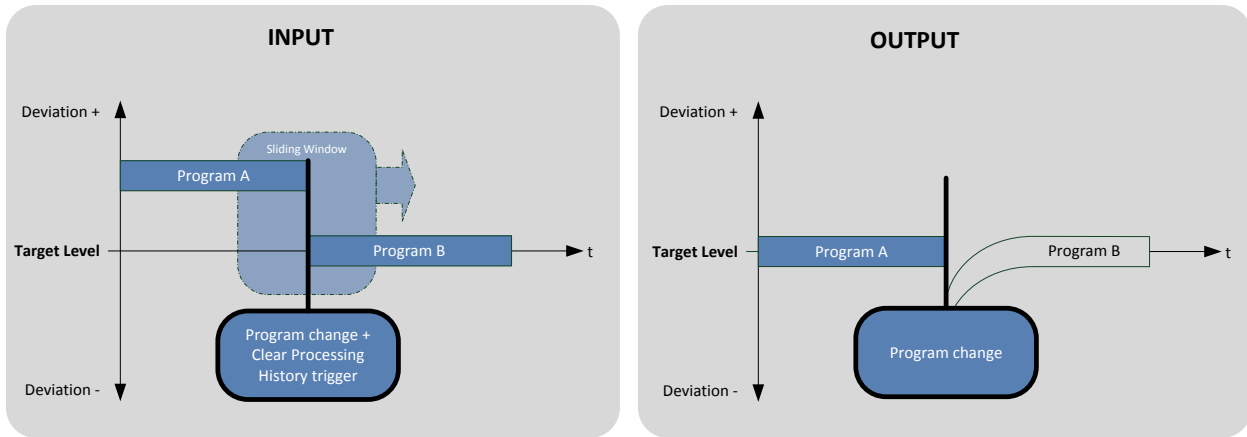


FIGURE: TRANSITION BETWEEN PROG A AND PROG B WITHOUT INTEGRATED LEVELLING

As program A is too loud, the leveler will decrease the level to reach target level. We at Jünger spend significant effort to make this "get the program to target" process by maximum control but inaudible as possible. The leveler is in attenuation mode when Program B becomes active [program change]. This will ultimately result in program B to start too soft and the level will increase as the analysis window slides into program B.

This causes disturbing audible fading effects.

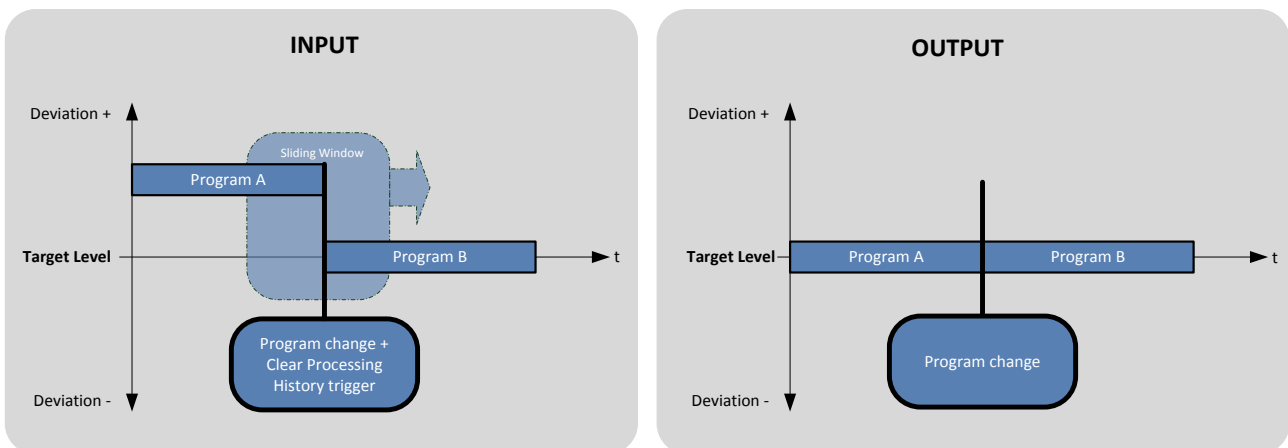
The solution for this effect is to enable the leveler to "know" what the next content might be like. This sounds complicated if not impossible but is easier than you might expect:

## The real world solution

Let's look at a bigger picture now. Of course a leveler in an isolated view will never have a chance to generate control information for future content, but we at Jünger enabled the leveler to gather future content information just in time:

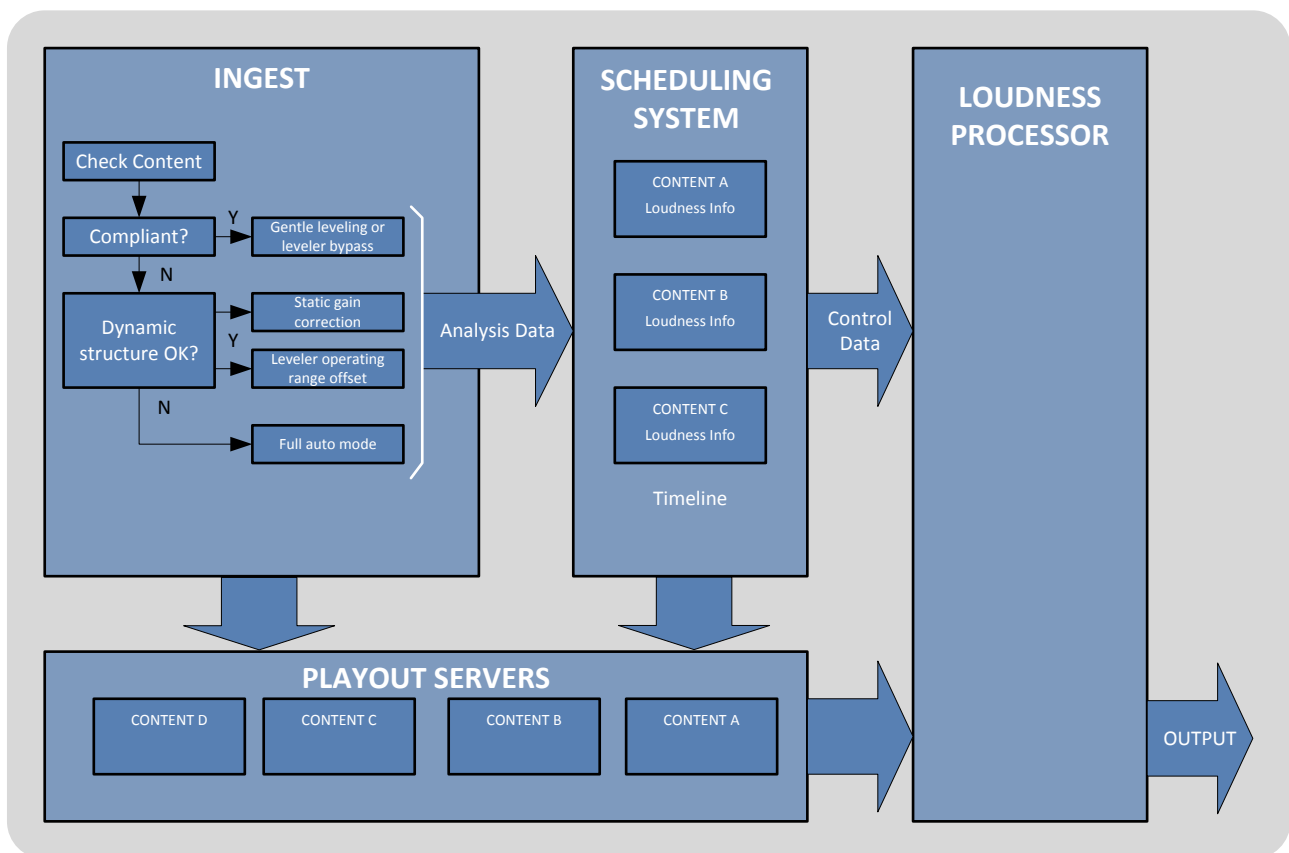
### NEW CONTENT TRIGGER

The Broadcast Scheduling System might send a trigger identifying a new content. This trigger might be presented as network trigger or as simple as GPI. No matter what the physical trigger mechanism might be, all Jünger solutions provide the possibility to access individual parameters by individual physical triggers. This is how the transition situation above would look like with a simple trigger to reset the processing history:



## Broadcast Scheduling Systems (a workflow description)

In this workflow description the broadcast scheduling system (BSS) becomes the central controller not only to trigger the content playout but also to control a loudness solution downstream. This requires the BSS to hold content related information (metadata) to identify loudness related parameters for the loudness processor. Please keep in mind that the central role of a BSS in a playout environment is to control playout servers according to a playout schedule or timeline. Why should the loudness related content information not be generated during ingest?



### CONTENT COMPLIANT

During ingest the content will be QC checked and identified as loudness complaint (content already produced compliant with the current loudness regulations). A flag in the BSS might identify this content as "COMPLIANT" triggering the leveler to bypass or to operate in a very gentle setting.

### CONTENT NOT COMPLIANT [STATIC GAIN CORRECTION]

While ingesting non-compliant material like archive material an automated measuring stage will generate a gain offset bias to get the content compliant by static gain offset during playout. This gain offset might be transferred to the loudness controller (for each individual program) to get the leveler prepared right before the content comes to transmission.

#### CONTENT NOT COMPLIANT [LEVELER OPERATING RANGE OFFSET]

This is an alternative to the static gain offset example: while ingesting non-compliant material, e.g. archive material an automated measuring stage will generate a gain offset bias to get the content compliant by changing the leveler's operating range.

#### LIVE CONTENT [FULL AUTOMATIC MODE]

For live content it might be advisable to get the leveler to operate quick and fast as the input signal might come from abroad or is not correctly leveled at all or some such.

You see, it is more than beneficial to integrate the loudness control system into your playout environment as the BSS is then controlling details of your processor content by content in a fully automated manner.



## HOW TO GET EXTERNAL CONTROL OF JÜNGER DEVICES?

Basically it doesn't really matter which physical interface you choose for external control. All our products support both of the interfaces below:

### External control via GPI/O

A very simple and straight forward way for external control is the use of GPI/O's. This makes integration quite easy and lowers the programming and configuration effort needed for set up. On the other hand only a limited set of triggers are available.

### Open Control Protocol

With the idea in mind to enable external control systems to access each and every parameter of Jünger equipment, we decided to use an open protocol standard based on the EmBER protocol set. This protocol is becoming an industry standard for accessing individual parameters across different manufacturer's equipment to unify the operational aspects across a broadcast facility. This open control protocol was introduced by LSB.

Find out more about L-S-B here:

[www.l-s-b.de/en](http://www.l-s-b.de/en)

### Our Broadcast Scheduling System partners today:

**mosart**<sup>®</sup>



## RELATED PRODUCTS

### Loudness management:

#### D\*AP8 TAP EDITION DIGITAL AUDIO PROCESSOR



This creative toolset is based on the processing platform D\*AP8 and designed to make your transition to loudness controlled broadcasting smooth and easy. With 8 processing channels, 3G SDI, Dolby® support and optional loudness logging features, the D\*AP8 TAP EDITION covers every requirement broadcasters are facing today.

#### D\*AP4 LM EDITION DIGITAL AUDIO PROCESSOR



The D\*AP4 LM EDITION is based on the processing platform D\*AP4 and designed to make the processing features offered by the D\*AP8 TAP EDITION available for smaller 4 and 2 channel systems without any compromise in processing quality.

#### HIGH DENSITY LINE – COMPACT 64 AND COMPACT 256



The high density line is designed for system installations requiring loudness processing for high channel counts. With up to 64 channels in 1RU (COMPACT 64) and up to 256 channels in 3RU (COMPACT 256), the COMPACT solutions feature a rackspace to DSP channel ratio that marks the limits of today's DSP capabilities.

#### MODULAR LINE C8000



The C8000 is a modular system comprising of multiple DSP, I/O interface cards and frames and can be easily configured to suit each broadcaster's individual audio processing requirements.

### Ingest QC:

#### D\*AP8 MAP EDITION (CHANNEL MONITORING CONTROLLER AND MEASUREMENT SYSTEM)



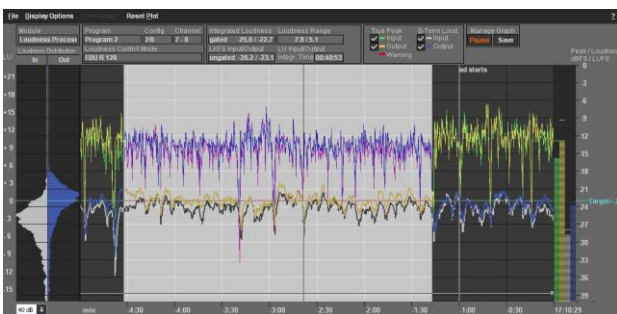
This ground-breaking tool combines an audio monitor controller with network-enabled loudness measurement plus optional Dolby® real-time metadata emulation features in one unit. It provides comprehensive quality control and loudness monitoring for anyone working in a broadcast production, post-production or playout environment.

## J\*AM JÜNGER APPLICATION MANAGER

The J\*AM Application Manager is a powerful MS Windows™ software platform that manages all Jünger Audio devices in a network and allows to launch current and future Jünger Audio software applications.

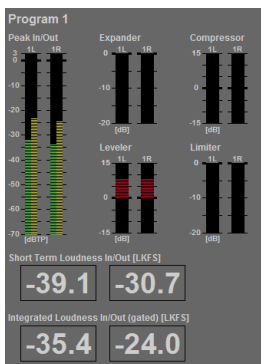
This powerful application grants the user additional insight into the DSP processing of Jünger Audio devices. Other than monitoring the true peak and loudness level progression as a live plot, the operating specialist is given valuable statistical information regarding the input vs. output loudness distribution. For an even clearer view of the system performance, all measurements are recorded to a log-file for further inspection. The J\*AM offers the necessary tools for evaluation, analysis and comparison, allowing the user to refine parameter settings and achieve the best possible result.

## LOUDNESS-LOGGER



- Long-term loudness logging (infinite, restricted by storage space only)
- Off-line analysis of measurement data

## METERING



- Network enabled real-time measurement
- True peak measurement
- Real-time metering of processing parameters, including true peak measurement
- Loudness measurement according to: EBU R128, ITU BS.1770 (all versions), ATSC A/85 and ARIB TR-B32, Free TV OP-59 and Portaria 354

## About Jünger Audio

Established in Berlin in 1990, Jünger Audio specializes in the design and manufacture of highest quality digital audio dynamics processors. Jünger Audio has developed a unique range of digital processors that are designed to meet the precise needs of the professional audio market. All Jünger Audio products are easy to operate and are developed and manufactured in-house, ensuring that the highest standards are maintained throughout. Jünger Audio's customers includes the world's top radio and TV broadcasters, IPTV providers, music recording studios and audio post production facilities.

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