



Innovation Award

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Rational Acoustics LLC
Smart SPL

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COMPANY PROFILE

Rational Acoustics LLC is a New England-based software company that develops, distributes and supports audio measurement software for the worldwide professional sound industry.

- Small company established in 2008
- Primary product: **Smart**®

Basically, we focus on a niche market (measurement) of a niche market (pro audio)



COMPANY PROFILE

SMAART[®] measurement software:

(**S**ystem **M**easurement **A**coustic **A**nalysis **R**eal-time **T**ool)

- 25+ years of continuous development
- 8 released versions + related products
- Smart SPL released 2019



1995



1999



2000*



2002



2006



2010



2016



* SPL measurements first added in SmartLive v4

COMPANY PROFILE

What is *SMAART*® ?

A dual-channel FFT-based analyzer for measuring sound system response

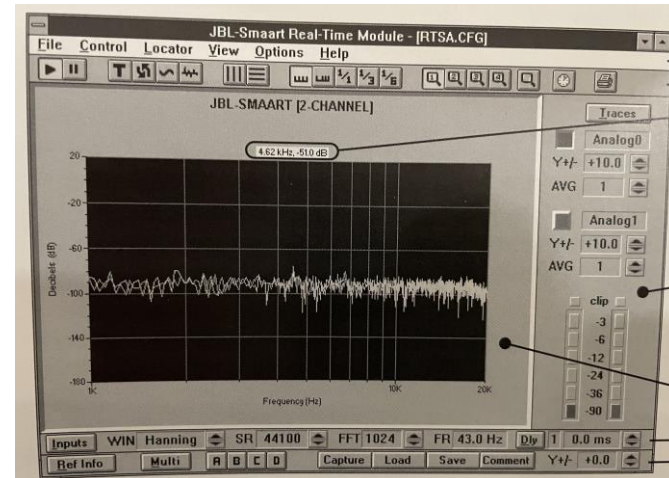
This type of analyzer began being used in pro audio in the late 80's and early 90's



Bruel & Kjaer 2032



Meyer Sound SIM



In 1995: Smaart

COMPANY PROFILE

The problems with Dual Ch FFT analyzers in the 1990's:

- Equipment
 - was rare and expensive, and not built for pro audio applications
- Knowledge/Training
 - sound engineers didn't have the technical background to understand the tool
 - Educational material that existed not written for pro audio applications
- Practices/Culture
 - Analyzers NOT trusted or embraced by main-stream sound engineers (“get that thing away from my system”)
 - Process for using them not streamlined/adapted to live sound production

COMPANY PROFILE

Today:

- Smart is an industry standard with
 - 10,000(+) active users worldwide
 - over 20,000 licenses sold since 2000 (and ?? pirated copies)
- **Rational Acoustics Training since 2008**
 - 25(+) instructors world-wide
 - 1000 (+) training sessions on 5 continents
 - Created training materials in 14 languages
 - 25 (+) educational partner institutions
- Continual development
 - 12 major updates – 26 minor

In Other Words...

- We took a technology that people didn't understand or trust
- We brought it into common adoption
- We developed accepted workflows and methods

COMPANY PROFILE



Problem Overview

In show production venues, live sound mixers, event crew and attendees are ***routinely exposed to damaging sound levels.***

Problem Overview

Why?

- Modern sound systems are powerful enough to hurt people. There are legitimate technical reasons for this, but with this power comes responsibility.
- Lack of awareness and regulation
 - Most live mixers do not have training in audiology or tangible fact-based resources for industry-specific NIHL risks.
 - Little to no regulation of sound exposure in listening venues

Problem Overview

Compounding Issues:

- Tools/Equipment
 - Most operators do not have the proper (functioning) tools for accurately measuring SPL
 - Standard/Basic SPL metrics do not provide data in an actionable format
- Knowledge/Training
 - Most sound system operators don't understand:
 - sound level measurement
 - the mechanisms of hearing damage
 - the mechanisms of hearing perception – (Loudness/impact is not level)
 - Most audience members do not know these things either
- Practice/Culture
 - Many performance aesthetics desire/value loudness (hearing protection = weakness?)
 - Most operator skills are learned through experimentation and tribal knowledge. Formal training is sporadic (but generally welcomed and well received)
 - Standard practices have been developed in an unregulated environment (with different priorities)
 - Most SPL regulations/restrictions are interpreted as an intrusion/imposition (lack of buy-in)

Our Solution

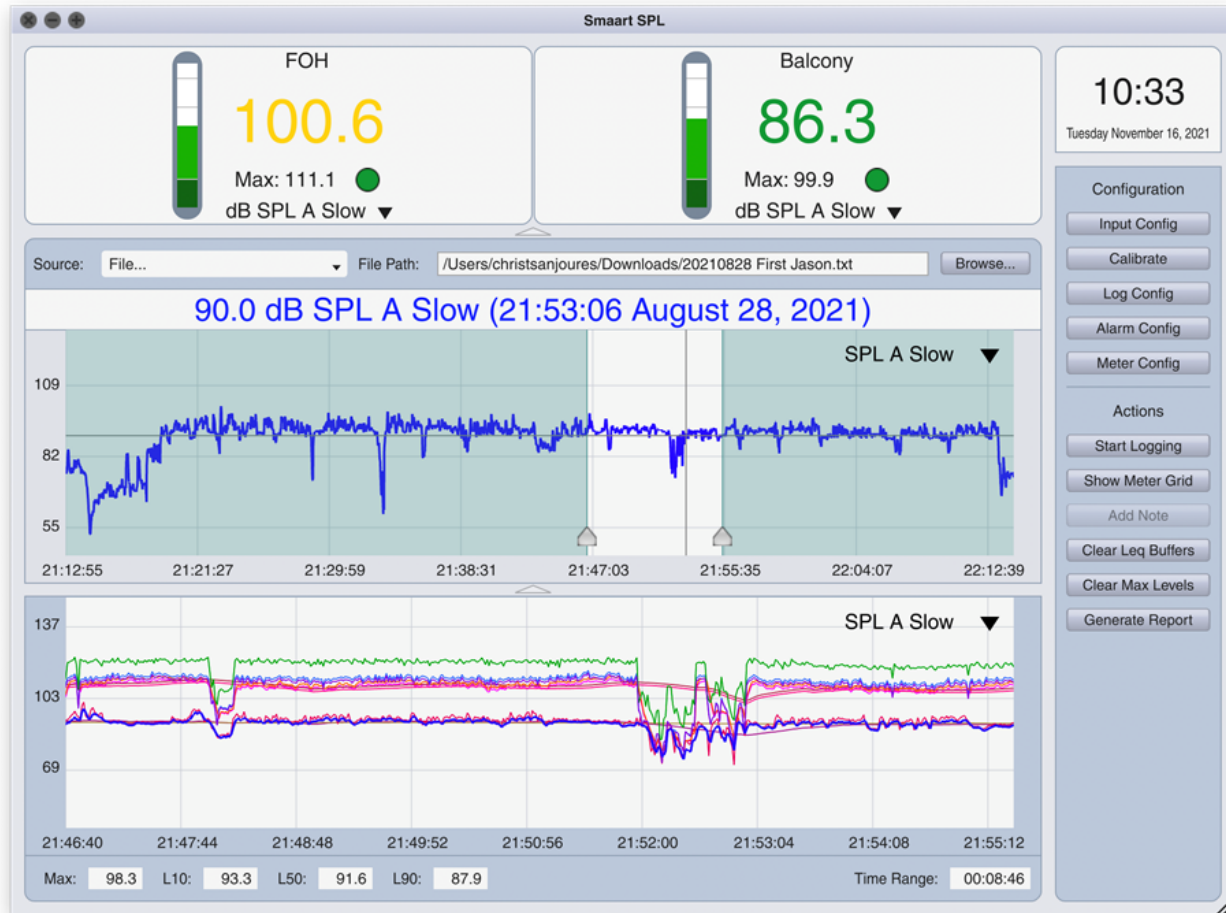
Innovation: A three-pronged approach

- Tools/Equipment
 - Expand our SPL measurement toolset, including OSHA and NIOSH sound exposure dosimeters
 - Enable sound exposure calculations by default
 - Work with live sound engineers on SPL metrics display to provide actionable data during performance
 - Expand our reporting toolset – both live and logged – including remote monitoring and alarm/warnings
- Knowledge/Training
 - Expand our training curriculum and support documentation to contain comprehensive information on SPL metrics, sound exposure, and their relationship to the mechanisms of hearing damage
 - Participate in and sponsor industry events that raise sound exposure awareness
 - Share our SPL measurement software and training materials with our established training partner network.
- Practice/Culture
 - Work with industry professionals to develop and teach mixing techniques to increase loudness/impact without increasing exposure
 - Create Educational materials for the non-technical stake holders – Artists, Producers, Audience

INNOVATION DETAILS

- Benefits to:
 - Mix Engineers
 - Other event crew / staff
 - Artists
 - Audience!

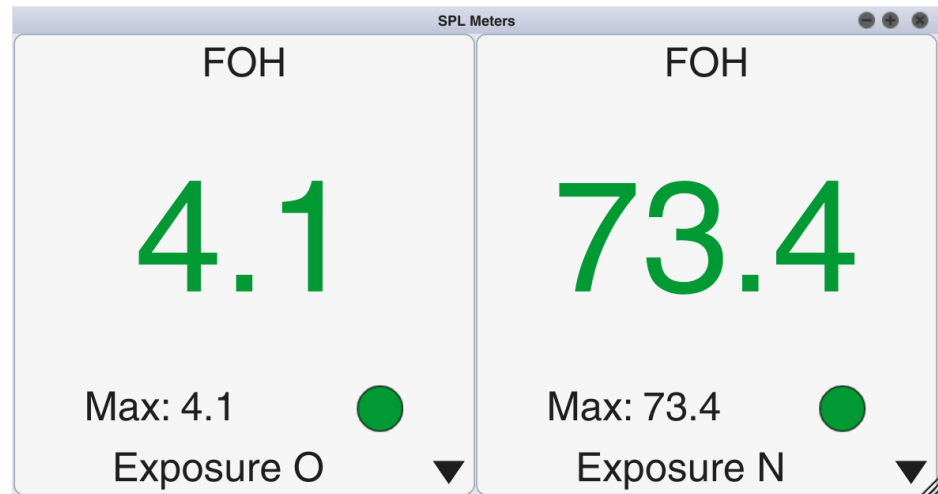
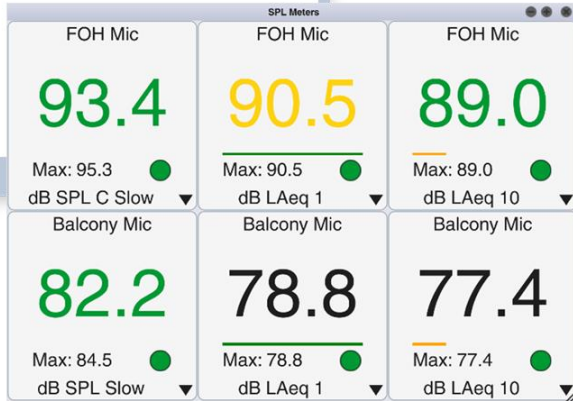
Smart SPL



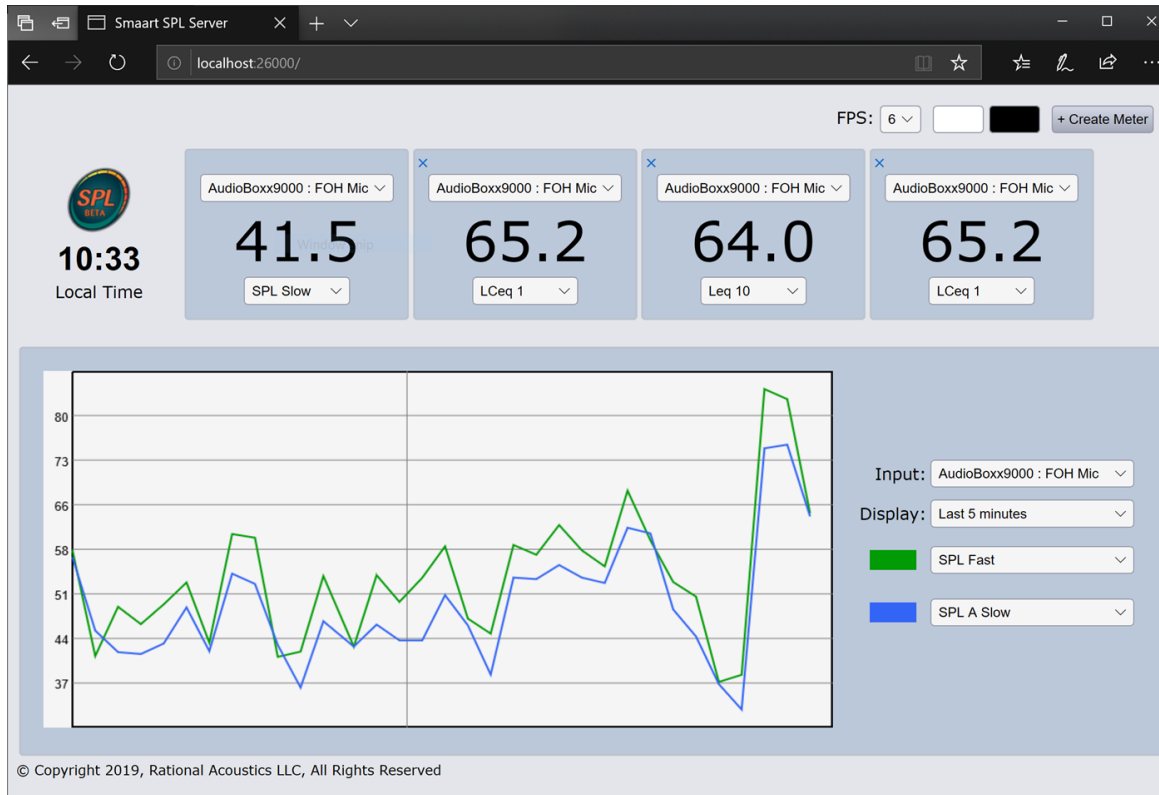
Smart SPL

Advanced Meter Config

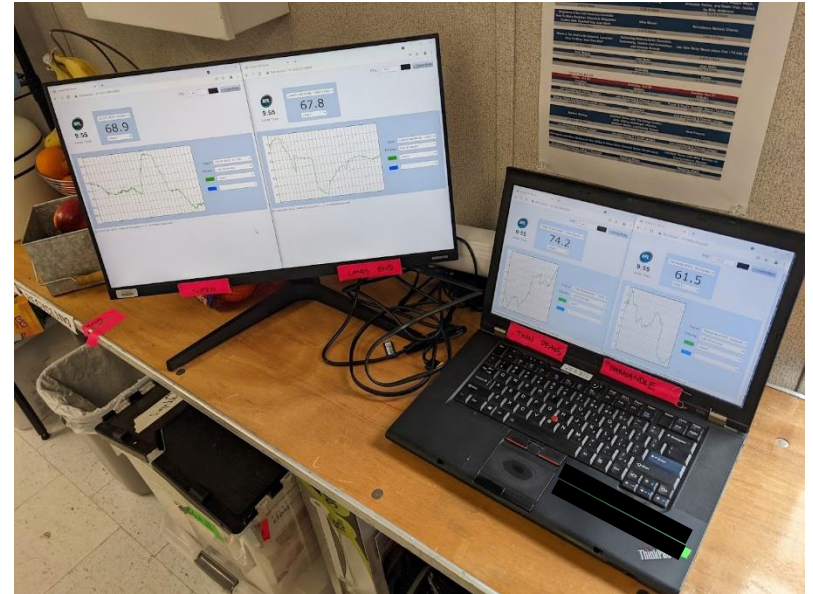
Type	Time	Weight	Frequency
1 dB Leq	15	A	Broadband
2 dB Leq	30	A	Broadband
3 Exposure O	N/A	A	Broadband
4 Exposure N	N/A	A	Broadband
5 Peak	N/A	Octave	31.5 Hz
6 Peak	N/A	Octave	63 Hz
7 dB Leq	10	C-A	Broadband



Smart SPL



Application: Outside Lands Festival 2021



Outreach

- Presentations about concert sound exposure for National Association of Music Merchants (NAMM), Event Safety Alliance
- Workshops that educate mix engineers on SPL and sound exposure
- Numerous Audio Engineering Society papers and research about sound level monitoring and sound exposure
- Forthcoming World Health Organization standard

FUTURE OF SMAART SPL

- Continue to expand toolset for working audio professionals
- Increase reach of our training materials on sound level monitoring and sound exposure
- The more ubiquitous SPL monitoring tools become in concert environments, the better off everyone will be.

LESSONS LEARNED

- The biggest challenge has been to deepen our own understanding of these topics and figure out how to distill them down and frame them to be accessible to working sound engineers without backgrounds in audiology
- Community outreach is key: making a powerful tool is not enough – people need to understand what it is and how to use it. It needs to be useful and valuable to them.

SIGNIFICANCE OF THE AWARD

- Grants professional credibility and solidifies our position as an industry leader on sound level measurement topics, tools, and workflows.
- Increases awareness of our work in this area, providing more opportunities to share this information

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