

# Loudness metering for event sound systems research project – data gathering instructions

## Case Study proposal

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## Summary

A case study is an effective method of highlighting successful outcomes, improvements, or shortcomings.

The original research paper demonstrated the suitability of managing on- and off-site SPL limits at live events using EBU R 128 loudness metering calibrated to local  $L_{p,Aeq,T}$  limits. [1]

It would be useful to present a case study of an event with the protocol ‘in-action’. Or to showcase a practical connection between loudness measures and the benefits of Make Listening Safe initiatives. [2] Also of interest is the likelihood of mitigating effects for off-site annoyance.

The findings may contribute to the ‘work in progress’ updates of these publications:

‘Technical Document AESTD1007.1.20-05: Understanding and managing sound exposure and noise pollution at outdoor events’. Audio Engineering Society, May 2020. [3]

*WHO Global Standard for Safe Listening Venues & Events*, World Health Organization, 2022. [4]

The following sections describe how to record data and equipment needed.

If you or your organization are interested in contributing to this knowledge, please contact the Principal Investigator ([contact](#)).

Further, please note that the data gathering is equally useful regardless of whether Loudness Metering measures are being used at your event. In fact, an ideal comparison would be if one segment or session of the event *did* require engineers to work with Loudness Meters, and another segment or session *did not*: i.e. an A weighted time-averaged SPL limit, or no limit.

## Data needed

- a real-time 2-channel recording of:
  - Channel 1: a calibrated omni-directional measurement microphone at the FOH mix position
  - Channel 2: mono-sum line-level sound system feed
- file format: WAV or FLAC, 48 or 96 kHz sample rate, 16-bit, time-stamped
- line-level sound system feed should not include any system equalization (reference or record output)

## Measurement microphone details

- microphone description (manufacturer, model, class, and calibration chart – if available)
- include a recording of the microphone activated by a 94 / 114 dB SPL calibrator
  - (minimum duration 30 seconds; specify dB calibration level used; may be sent as separate audio file)
- reference microphone must be protected with a windscreen / pop-shield
- reference microphone should be positioned:
  - at least six metres away from the nearest audience;
  - at approximate audience *head-height*;
  - isolated from vibration;
  - with the nearest reflective surface being the floor

## Audio interface details

- audio interface description (manufacturer, model)
- gain and pad settings, per channel

## Audio Recording

- please record the event in a single time-stamped uninterrupted span
- this may include: background music, comperes, stings, silence, etc.
- note the location (e.g. ‘Herrington Park, Sunderland, UK’, along with [what3words](#) locators)
- please provide an estimate of the audience capacity (if known)
- where permitted, please record propagation tests and rehearsals

## SPL logs (optional)

- time-stamped data from any additional on- or off-site SPL meter(s) would be much appreciated.
  - please ensure the weighting and time constants are clearly stated, with an indication of distance and orientation in relation to the stage

## Off-site Recording (optional)

- of particular interest and value would be a real-time recording(s) of the event at one or more off-site locations, using a Class 1 / 2 microphone
- this may be a portable recording device or PC, connected to a microphone or SLM audio output
- the microphone should be recorded ‘flat’, i.e. no weighting or filtering
- included must be a recording of the microphone activated by a 94 / 114 dB SPL calibrator (minimum duration 30 seconds; specify level used; may be sent as separate audio file)
- refer to [measurement microphone details](#)

## Additional Information

- any impressions or comments from stakeholders or technical personnel would be extremely helpful. For example:
  - mix engineers: how easy or difficult did you find it working to a LUFS target today?
  - system engineer: how easy or difficult did you find it to calibrate the system? did you notice anything about the overall balance of the show? any issues with SPL limits?

## Data Sharing

- upload the files to a cloud service: OneDrive, pCloud, Google Drive, Dropbox, etc.
- please prefix file and folder names with the record date in ‘YYYYMMDD’ ISO format, e.g. 20260113\_WEMBLEY\_UK\_foh

- please include a plain text Read Me file with contact information, and details of recordings, locations, and equipment used
- finally, please email the Principal Investigator with the shared link to the data, and any additional information

## Privacy

- audio files are used for simple data analysis only
- all audio files and information are considered strictly confidential and will never be shared, broadcast, identified, or published
- your name, the artistes, and dates and locations will remain strictly confidential and will not be included in any paper or presentation without your express permission (generic description only: e.g. ‘summer of 2026 in the UK’)
- unless permission to archive is specifically granted all data will be deleted within six months of submittal, or sooner upon request
- you may opt-out and withdraw your data at anytime within one month of submittal without prejudice or explanation

## Contact

Principal Investigator | Mr Jonathan J Digby | [j.digby1@unimail.derby.ac.uk](mailto:j.digby1@unimail.derby.ac.uk)

## Thank you

Your assistance and help with this project is much appreciated.

## References

- [1] Digby JJ, Hill AJ. Enhanced Sound Level Monitoring at Live Events by Measuring Audio Program Loudness. In: Reproduced Sound 2024. Vol. 46. Bristol, GBR: Institute of Acoustics; 2024. [https://digbyphonic.com/research/rs2024/Digby\\_and\\_Hill-2024-Enhanced\\_Sound\\_Level\\_Monitoring\\_at\\_Live\\_Events\\_by\\_Measuring\\_Audio\\_Program\\_Loudness.html](https://digbyphonic.com/research/rs2024/Digby_and_Hill-2024-Enhanced_Sound_Level_Monitoring_at_Live_Events_by_Measuring_Audio_Program_Loudness.html)
- [2] Electro-Acoustics Research Lab (EARLab). Healthy Ears Limited Annoyance - HELA Initiative. 2026 [accessed 2026 Jan 19]. <https://helainitiative.com/>
- [3] Hill A, editor. Technical Document AESTD1007.1.20-05 : Understanding and managing sound exposure and noise pollution at outdoor events. 2020 [accessed 2026 Jan 30]. [https://www.aes.org/wp-content/uploads/2024/01/AESTD1007\\_1\\_20\\_05-1.pdf](https://www.aes.org/wp-content/uploads/2024/01/AESTD1007_1_20_05-1.pdf)
- [4] WHO Global Standard for Safe Listening Venues & Events. 2022 [accessed 2026 Jan 30]. <https://iris.who.int/bitstream/handle/10665/352277/9789240043114-eng.pdf?sequence=1>