Measuring Acoustic Parameters of a Room using REW Software

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1. Introduction

Room acoustics critically influence sound quality in studios, auditoriums, classrooms, and performance spaces. **Room EQ Wizard (REW)** is a free, powerful software widely used for:

- Measuring **Reverberation Time (RT60)**
- Measuring **Sound Pressure Levels (dB SPL)** at different locations
- Measuring **Frequency Response** of the room

This note guides practical measurement techniques, equipment requirements, and interpretation of results.

2. Required Equipment

1. **Laptop / PC** with REW installed (`https://www.roomeqwizard.com/`)
2. **Measurement Microphone**, preferably:
   - Calibrated USB mic (e.g., MiniDSP UMIK-1)
   - XLR condenser measurement mic with phantom power + audio interface
3. **Tripod** for mic placement at ear level
4. **Speaker or audio source** with flat frequency response
5. **Audio Interface** (if using XLR mic)
6. **Calibration files** for mic (if available)

3. Measuring RT60 (Reverberation Time)

3.1 What is RT60?

RT60 is the **time taken for sound to decay by 60 dB** after the source stops. It indicates room reverberance.

3.2 Steps for RT60 Measurement

1. Set up the mic at desired location(s).
2. Connect mic to REW and load calibration file if available.
3. In REW, select **"Impulse Response"** measurement.
4. Generate a **sweep signal** via speaker.
5. REW records the room's response and calculates RT60 using the **Schroeder integration method**.
6. Analyze RT60 across frequency bands (125 Hz – 4 kHz).

3.3 Interpretation

- **Studios:** 0.2 – 0.4 s
- **Classrooms:** 0.6 – 0.8 s
- **Auditoriums:** 1.2 – 1.8 s

Long RT60 → echoey; short RT60 → dry sound.

4. Measuring Sound Pressure Level (dB SPL)

4.1 Purpose

Assessing **sound distribution uniformity** to detect level variations in the room.

4.2 Procedure

1. In REW, open **SPL Meter**.
2. Calibrate SPL reading using a reference SPL meter if available.
3. Emit pink noise at known level.
4. Measure dB SPL at multiple locations and record results.

4.3 Application

Ensures even coverage in PA system design and identifies dead spots or excessively loud areas.

5. Measuring Frequency Response

5.1 Purpose

Assessing how different frequencies are reproduced in the room to identify:

- Room modes
- Standing wave issues
- Excessive absorption at specific frequencies

5.2 Procedure

1. In REW, choose **"Measure"** and set sweep range (20 Hz – 20 kHz).
2. Perform sweep; REW records frequency response curve.
3. Analyze peaks (room modes) and dips (phase cancellations or absorptive losses).
4. Apply smoothing (1/6 octave) for interpretation.

5.3 Application

- Planning acoustic treatment (bass traps, absorbers, diffusers).
- Optimizing speaker placement and listener position.

6. Best Practices

- Use **calibrated equipment**.
- Measure at **multiple mic locations** for averaging.
- Minimize ambient noise.
- Place mic at **ear height**.
- Repeat measurements after treatment for validation.

7. Limitations

- Assumes **linear time-invariant systems**.
- Microphone and speaker imperfections affect accuracy.
- Ensure sufficient sweep level for good SNR without distortion.

8. Recommended Reference Book

Master Handbook of Acoustics by F. Alton Everest and Ken Pohlmann (Sixth Edition, McGraw-Hill).

Comprehensive coverage of room acoustics fundamentals, measurement techniques, and practical treatment strategies.

9. Conclusion

Using REW for acoustic measurements is a **cost-effective and reliable approach** for room analysis and treatment planning, enabling optimal acoustic environment design for clarity, intelligibility, and sound quality.

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