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# RF Reverb Chamber

## Radio Frequency Reverberation Chamber



*Viewing an experiment in the radio frequency (RF) reverberation chamber, also known as a mode stirred chamber. The chamber is an isolated RF test chamber containing an irregularly shaped paddle capable of measuring a device's radiated emissions, radiated immunity, shielding effectiveness, and antenna efficiency from 500MHz to 18GHz. The chamber is electromagnetically isolated from extremely low frequencies and is highly reverberant, which creates the fundamental wave chaotic properties required to make statistical measurements.*

### Facility

The reverberation chamber is an Intelligence and Space Research (ISR) division, Space Data Science & Systems group (ISR-3) facility and is located at Los Alamos National Lab Technical Area (TA) 3, in the east wing of building 40, room E132.

- The reverberation chambers overall dimensions are approximately 8x12x10 feet (Length x Width x Height).
- One irregularly shaped paddle, controlled from outside the chamber, stirs the RF modes.
- The lowest usable frequency by design is 500MHz.

- The chamber is electromagnetically isolated from extremely low frequencies to 18GHz.
- Filtered AC power and lighting is available inside the chamber.
- The lab is equipped with two fiber optic E-Field probes, and multiple log-periodic and horn antennas covering the full operational frequency of the chamber.
- Rack mounted measurement equipment is located adjacent to the chamber patch panel, consisting of a four and two channel network analyzer, real-time oscilloscope, sampling oscilloscope, power meter, and various sources and amplifiers.
- Most chamber acquisition equipment and sources can be automated and controlled by GPIB or a local reverb lab network.

### Reverb Chamber

A reverberation chamber is an isolated, highly reverberant room with a movable, irregular shaped, paddle which strongly interacts with the electromagnetic waves inside the chamber. Due to its wave chaotic nature, the ideal reverberation chamber creates a statistically uniform, isotropic and randomly polarized field within the chamber, which can be changed by simply rotating the paddle. This unique environment is useful for making a variety of measurements.

The International Standard IEC 61000-4-21, "Electromagnetic compatibility (EMC) – Part 4-21: Testing and measurement techniques – Reverberation chamber test methods", is used to validate the chamber and as a measurement guide. Standard applications include measuring:

- Radiated immunity,
- Radiated emissions,
- Shielding effectiveness, and
- Antenna efficiency.

Because of the high quality factor, the chamber is ideally suited to generating high fields for immunity measurements or to detecting low power emissions. Under some circumstances the chamber can also be used as a "screen room" for RF isolation.

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