

## Introducing the Sencore MX399 Microphone Multiplexer

Achieving a good overall sound level and frequency response at every listening position in a room can be a challenging endeavor. If you put the microphone in one listening position in a room and make all the acoustic adjustments, it may sound good at that location but not others. What do you do?

Some variation in level and frequency response at various listening positions is normal. In a small room, room resonance modes cause varying low frequency response in different locations. Adjusting for smooth response in just one or two listening positions may leave other positions with uneven, boomy, or wimpy bass response. In larger rooms, zone adjustments, speaker coverage patterns and room reverberations can cause varying frequency response across the listening area.

Adjustments to achieve the best possible response for all the listening positions can be a long process of repeated measurements at multiple locations and change-and-check adjustments. Averaging multiple measurements manually is time-consuming and doesn't give you a real-time display to immediately indicate results of room adjustments.

### MX399 Introduction

The MX399 Microphone Multiplexer provides a means to automatically sample multiple listening positions and formulate one measurement screen that reflects the overall room frequency response. The MX399 is an accessory to either the Sencore SP395 or SP495 SoundPro Audio Analyzers. With the MX399, the RTA function of the SoundPro is transformed into a multi-listening averaged acoustical measurement reflecting the overall frequency response of the listening area.



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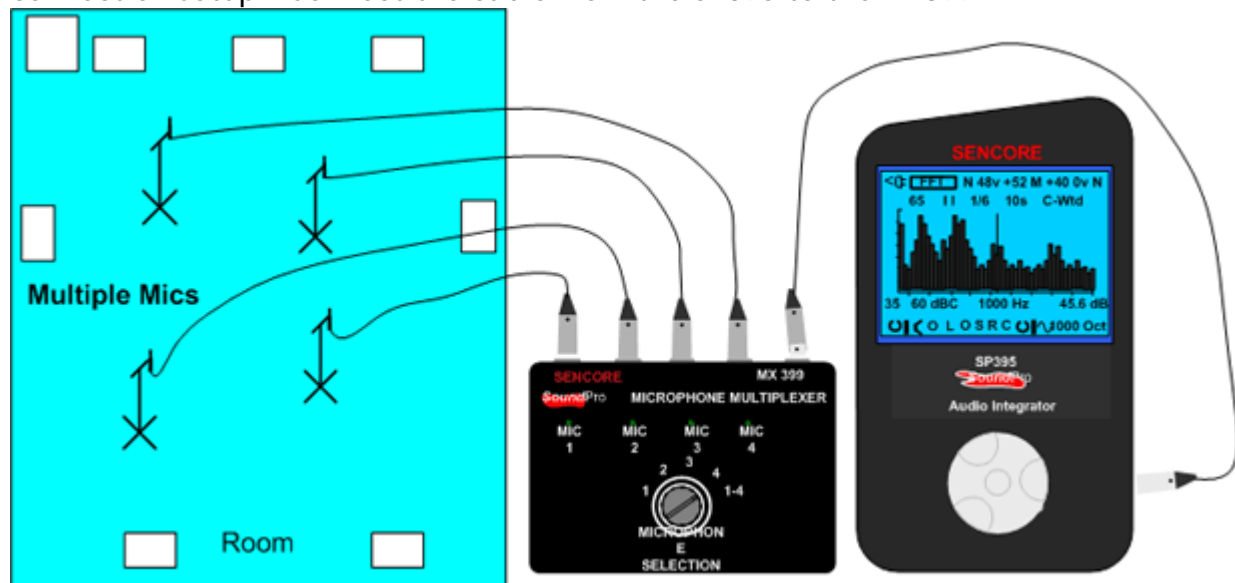
*Figure 1. The MX399 provides testing, adjusting, and documenting of the acoustically averaged frequency response of any size room.*

The MX399 provides testing, adjusting, and documenting of the acoustically averaged frequency response of cinema theaters, home theaters, churches, halls, banquet rooms, meeting rooms, clubs, or any other venue. The MX399 features common XLR input and output microphone connections for direct connection to the SoundPro.

The MX399 provides the versatility of averaging the output of two, three, or four attached XLR microphones, or monitoring individual microphones for gain equalization. Four microphone multiplexed sampling is used by all major cinema/sound reinforcement/home theater organizations for a good average of overall room response. This allows you to position subwoofers, adjust equalizers or make appropriate adjustments; you can immediately see the measured results on the SoundPro.

## MX399 - Testing Setup

To use the MX399 and SP395 SoundPro to measure a room's spatially-averaged frequency response, use the setup illustrated in Figure 2. Run the cables from the microphones to the respective MIC IN jacks of the MX399. Three microphones and four XLR microphone cables are supplied with the MX399 that provides a complete connection setup. Connect the cable from the SP395 to the MX399.



*Figure 2. Typical setup for analyzing a room with the MX399 and SP395 SoundPro.*

## Microphone Room Placement

The microphones should be placed in the room so they are in the reverberant sound field. Avoid placing the microphones directly in front of a speaker, to avoid direct sound energy from the speaker. Also avoid the center axes of the room; strong room mode peaks and nulls at these positions can unduly influence the measurement. Microphones should be mounted on microphone stands at the listeners' ear height. Point the microphones straight up for the best omni-directional pickup.

When measuring a room with multiple rows of seating, use a staggered parallelogram or diamond microphone placement formation. Each microphone should be a different distance from the side walls and a different distance from the end walls. This will provide a uniform sampling of the sound field in the room.

### Real Time Analyzing – Multiplexing Microphones for Spatial Average

Multiplexing microphones placed throughout the listening position provides a single continuous measurement of the overall response of the listening area. This permits easier equalization adjustments, because you can see an average of the entire listening area. Sequentially switching to each microphone briefly with the MX399 and accumulating a running active average on the SP395's Real Time Analyzer provides an average room response.



**Figure 3.** Multiplexing microphones placed throughout the listening position provides a single continuous active average measurement of the room's frequency response at all listening positions.

To perform a spatially averaged RTA measurement, connect the SP395, MX399 and microphones as shown. Place the microphones in the room. Set the MX399 Microphone Selection Switch to the "1-4" position. This position cycles through the microphone inputs, switching the sound from each microphone to the SP395 at approximately one second intervals.

The SP395 RTA function averages the alternately selected microphone measurements over a period of time, creating a spatially averaged display. The SP395 RTA averaging time period is able to be set to 1, 3, 6, 10 or 30 seconds. This setting is the second reading from the upper right on the top line of the display information. When using the MX399, use the 10 second, or longer, averaging time of the SP395 RTA.

To multiplex microphones for a spatial average RTA measurement:

1. Set up as shown in Figure 2.
2. Power on the SP395.

3. Set MX399 Microphone Selection Switch to position "1-4".
4. Select and perform the SP395 RTA test.
5. Set for a 10 second, or longer, Averaging Time.
6. Adjust speaker placement, equalization, treatments for best overall room response.

## Summary

If you have multiple listening position rooms, the MX399 in combination with an SP395 or SP495 makes fast and easy work out of equalizing the sound performance throughout the listening area. For more information on the Sencore MX399 Microphone Multiplexer call 1-800-Sencore (736-2673) or visit <http://www.sencore.com>.