Sequence Note

Face Mask Measurement Sequence

Introduction

The purpose of this sequence is to compare the response of an artificial mouth when face masks of different construction are mounted on the mouth. The sequence assumes a lightweight disposable mask and a heavy multi-layer cloth mask. A stepped sinewave from 10 kHz – 100 Hz is played from the unoccluded mouth and the operator is then prompted to mount and measure the two masks over the mouth. The three mouth responses are then displayed on one x-y graph and the difference curves (unoccluded mouth vs masked mouth) are displayed on another. Finally, the average attenuation created by each mask across the measurement range is displayed on a table.

Note that the curve names are constructed by selecting the "Use Input Data Name" option on the Curves tab of the Analysis editors. The appended text in parentheses (No Mask, Disposable Mask, Cloth Mask) comes from the custom naming of the three Recorded Time Waveforms so if you wish to edit these, it can be done by editing the Waveform names in the Acquisition steps.

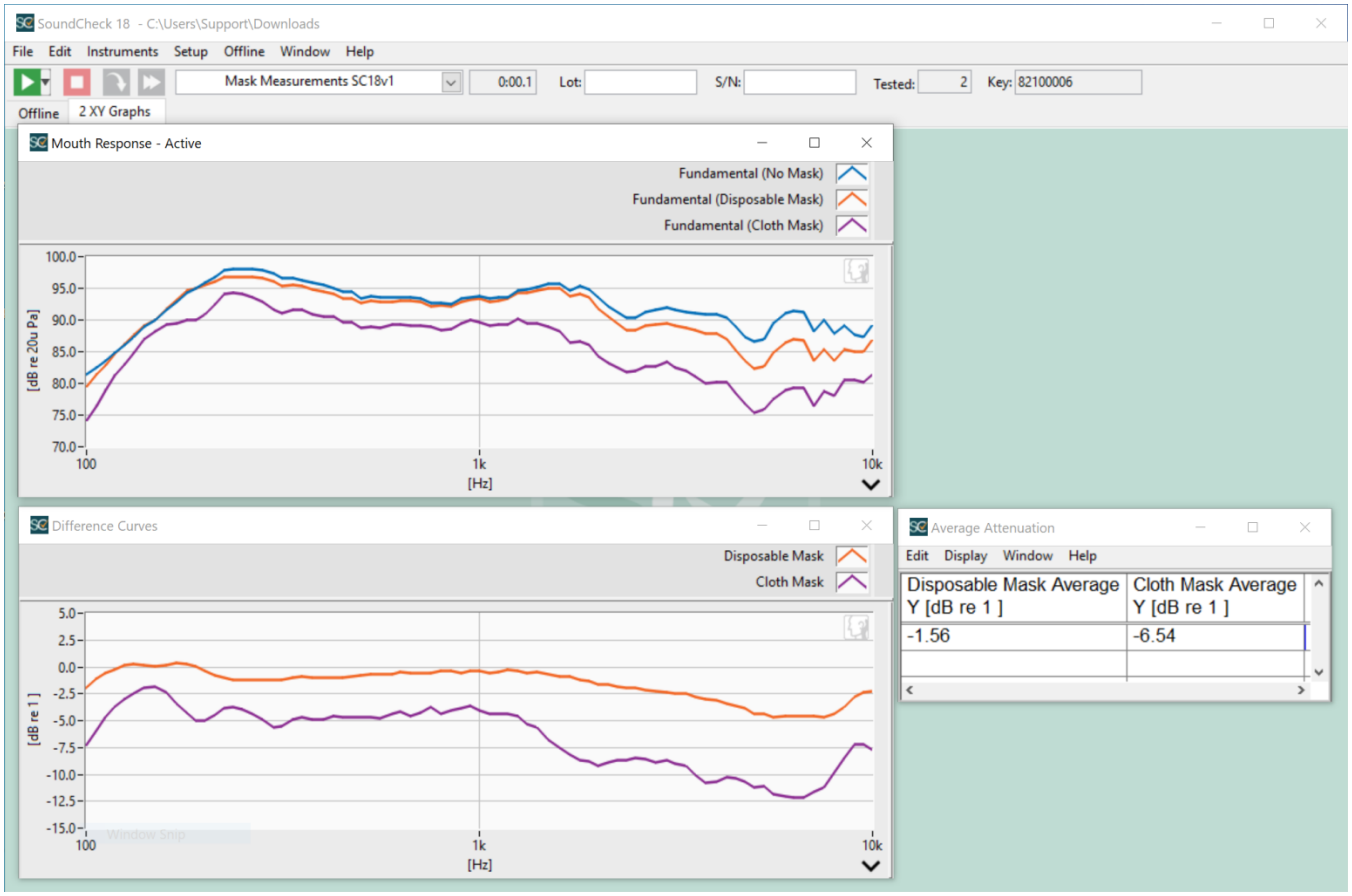


Figure 1 – Final Display for *Face Mask Measurement* Sequence

Required Hardware

- Listen AmpConnect ISC (Listen p/n 4042) or similar (e,g, audio interface, microphone power supply and audio power amplifier)
- Listen SCM-3 Reference Microphone (Listen p/n 4002) or equivalent
- Bruel & Kjaer HATS or 4227 Mouth Simulator or equivalent

Required Software

SoundCheck 18.0 or newer

Hardware Setup & Calibration

1. Calibrate the microphone as instructed in the SoundCheck user manual
2. Calibrate the artificial mouth as instructed in the SoundCheck user manual
3. Connect the hardware as shown in the System Diagram below

You are ready to start the sequence.

Note: The mouth is calibrated so the stimulus level can be entered in dBSPL but by default the EQ is not enabled in the Stimulus editor. You may enable it if so desired but it won't have an effect on the resulting difference curves.

System Diagram

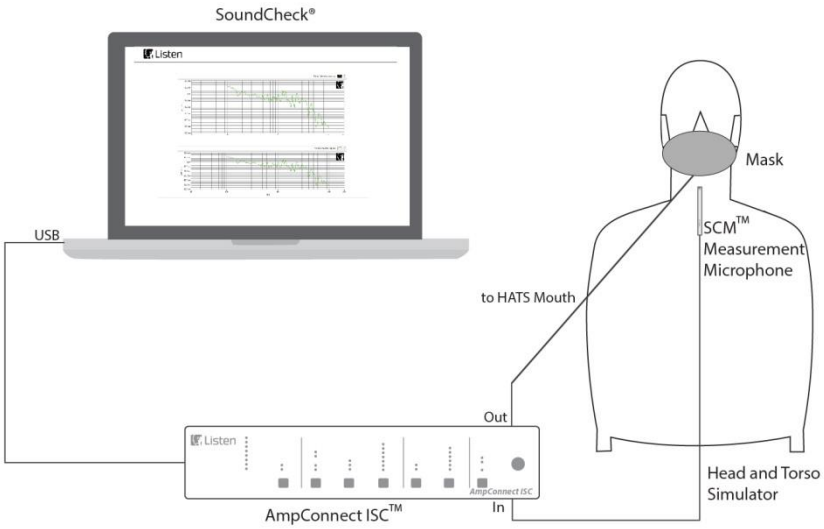


Figure 2 – Hardware Schematic for *Face Mask Measurement* Sequence

Sequence Logic

Type	Step Name	#	Out	In	
Sti	Stweep - 10k - 100Hz	1	Mouth Sim		
Mes	Operator Message	2			
Acq	Play & Record	3	Mouth Sim	Reference Mic	// Acquisition - unoccluded mouth
Ana	HarmonicTrak	4			// Analysis - unoccluded mouth
Mes	Operator Message	5			
Acq	Play & Record	6	Mouth Sim	Reference Mic	// Acquisition - disposable mask
Ana	HarmonicTrak	7			// Analysis - disposable mask
Mes	Operator Message	8			
Acq	Play & Record	9	Mouth Sim	Reference Mic	// Acquisition - cloth mask
Ana	HarmonicTrak	10			// Analysis - cloth mask
Pos	Curve division	11			// Disposable mask difference curve
Pos	Curve division	12			// Cloth mask difference curve
Pos	Curve Average	13			// Average value of difference curves
Dis	2 XY Graphs	14			

Further sequence development

This sequence has been designed for simplicity and has been written for a stereo channel system, to be accessible to 100% of SoundCheck customers. Ways in which you could modify or further develop the sequence include:

- Adding Autosave steps to automatically save sequence data
- Add an off-axis microphone signal path or spin the HATS on a turntable for off-axis or polar measurements
- Add or subtract Acquisition and analysis steps to accommodate more/less masks
- Substitute stepped sine stimulus and HarmonicTrak analysis for a speech WAV file stimulus and RTA analysis (optional modules required)