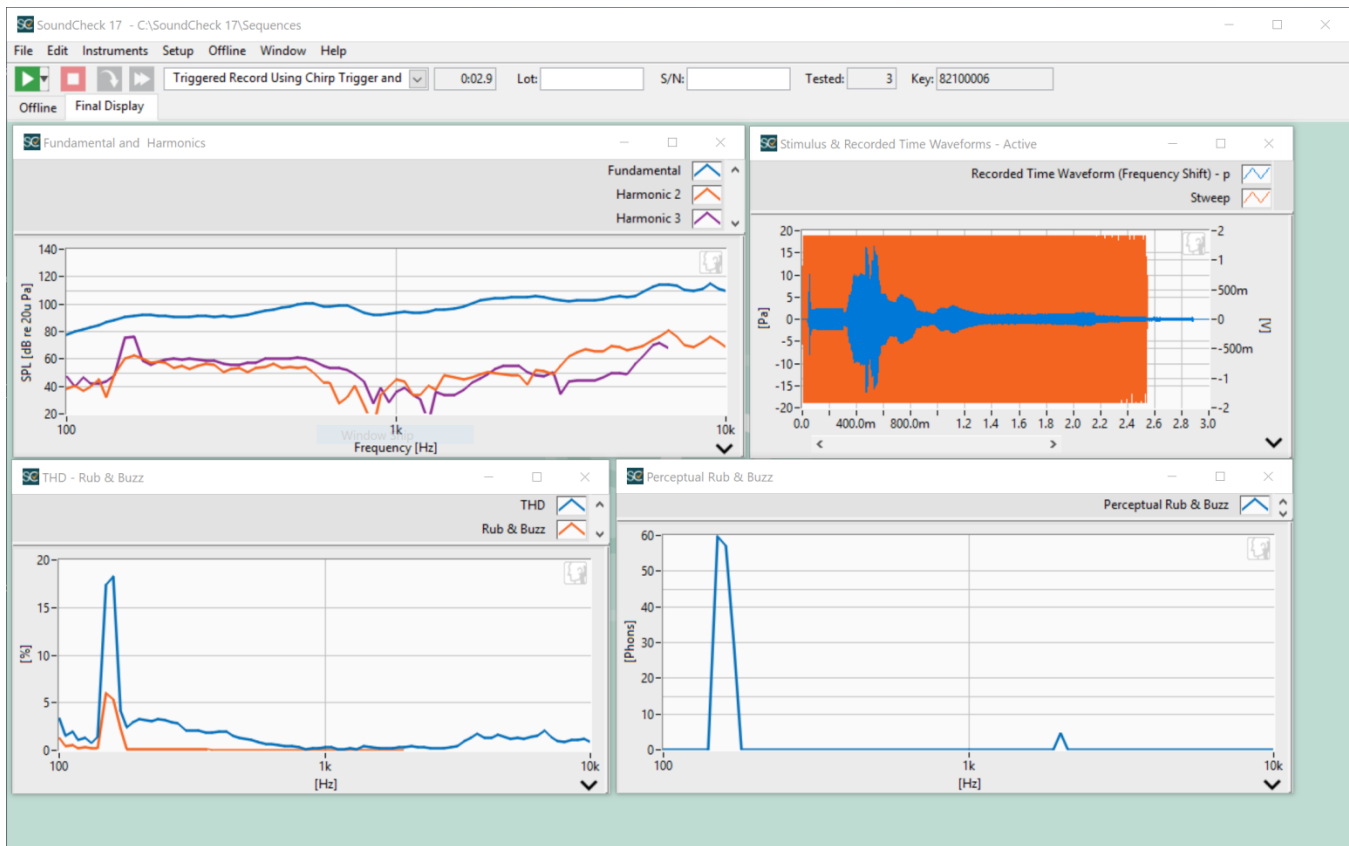


## Triggered Record Using Chirp Trigger and WAV File

### Introduction

The purpose of this sequence is to demonstrate SoundCheck's Triggered Record – Chirp Trigger function which allows you to test the output of devices without analog inputs such as smart speakers, wearables, smart home devices, tablets and cellphones. A stimulus WAV file is created in SoundCheck and transferred to the device under test, where it is played back and the response recorded in SoundCheck as if the stimulus were played directly from SoundCheck. The Acquisition step is triggered by the chirp in the stimulus file. Chirp triggers are more robust than level and frequency triggers which are susceptible to false triggering due to background noise.

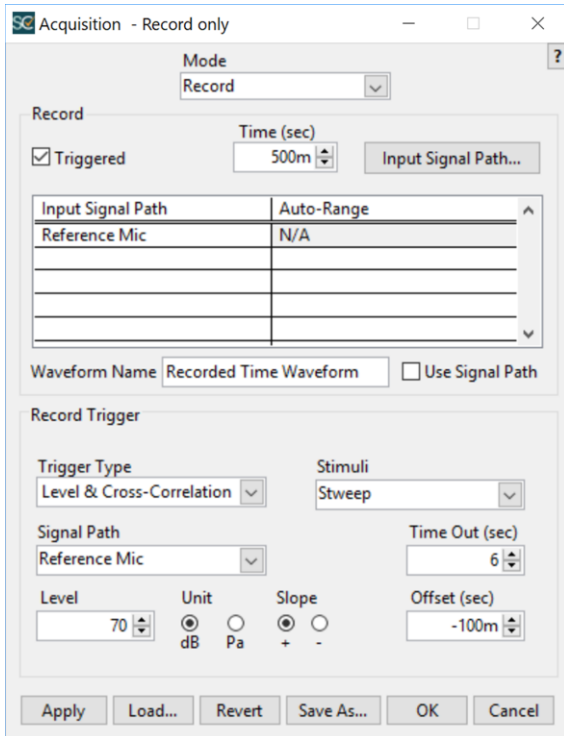


Final Display for *Triggered Record* sequence

The stimulus WAV file to be used on the device under test (DUT) may be customized in the Stimulus step. The stimulus default is an R40 stepped sine sweep from 10 kHz to 100 Hz, prepended with a 10kHz-20kHz chirp which is used to activate the trigger. The stimulus can be saved as a WAV when the sequence is run. The WAV will have the same sample rate and bit depth as set in your system Hardware configuration. By default, the WAV file is automatically normalized to 0 dB FS in the autosave step, so the stimulus level is not important.

- The parameters of the sweep in the stimulus step are used when creating the WAV file. The duration of this stimulus must be considered in the “Time” field of the acquisition step. See page 2.
- The stimulus step must remain in the sequence and the stimulus settings cannot be changed without re-saving the stimulus WAV file.
- The stimulus WAV file used in this example is included in the sequence folder.
- Changing the sample rate or bit depth in the hardware configuration also requires re-saving the WAV file.

## Acquisition Step Settings



Acquisition - Record only

Mode: Record

Record

Triggered Time (sec): 500m Input Signal Path...

Input Signal Path	Auto-Range
Reference Mic	N/A

Waveform Name: Recorded Time Waveform  Use Signal Path

Record Trigger

Trigger Type: Level & Cross-Correlation Stimuli: Stweep

Signal Path: Reference Mic Time Out (sec): 6

Level: 70 Unit:  dB  Pa Slope:  +  - Offset (sec): -100m

Apply Load... Revert Save As... OK Cancel

- **Mode:** Record
- **Record Type:** Triggered
- **Time (sec):** Default=3 sec. Must be set to slightly longer than length of original stimulus sweep plus the Trig. Offset value
- **Input Channel:** Set to Reference Mic
- **Trigger Type:** Level & Cross-Correlation
- **Trigger Level:** Default=70 dB. Should be set relative to the desired playback level from DUT
  - **Stimuli:** Select the stimulus waveform from this dropdown list
  - **Trigger Unit:** Default=dB. Can be set to dB or Pa according to user preference
  - **Trigger Signal Path:** Reference Mic
  - **Trigger Offset (sec):** Default=-50ms. Sets the amount of time that the Acquired Signal is shifted, relative to the point at which it is triggered.

- **Slope:** For triggering on WAV files this should be set to positive
- **Time Out (sec):** Amount of time the step will wait to trigger before continuing to the next step

## Final Display

The waveform window in the display shows the stimulus waveform as well as the recorded time waveform. This display can be used to make sure the stimulus is well within the start and stop time of the acquisition step.

Also displayed are the Fundamental, H2, H3, THD, Rub & Buzz and Perceptual Rub & Buzz.

Jitter and playback sample rate of the DUT are in the Memory List Values Tab and can also be displayed.

## Requirements

### Software:

- SoundCheck Plus - version 17 or newer
- Module 2006 – Time Selective Response (includes “chirp” log frequency sweep stimulus option)

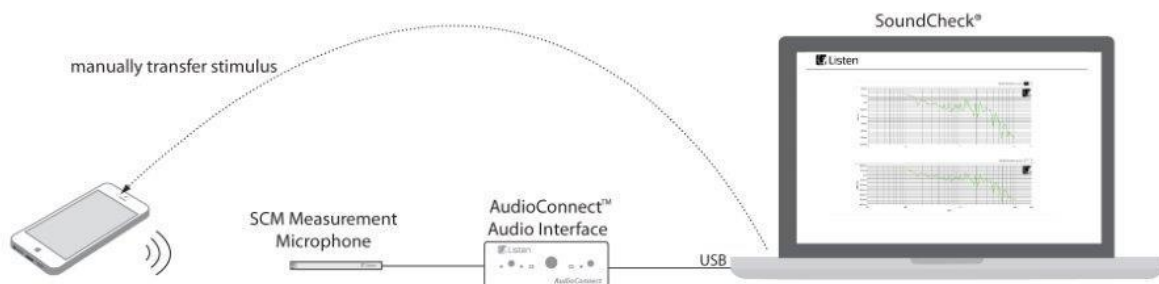
### Hardware:

- WAV playback device with speaker or line output (Cell Phone, tablet, MP3 player, etc.)
- p/n 4002 – Listen SCM 3 reference microphone or equivalent
- p/n 4050 – Listen Audio Connect audio interface/microphone power supply or equivalent

## Hardware Setup & Calibration

1. Calibrate the SCM 3 Reference Microphone as instructed in the SoundCheck manual.
2. Connect the output of the mic supply to input channel 1 of your audio interface.
3. Copy the default stimulus WAV file to the Device Under Test (DUT) or modify the stimulus parameters to suit your DUT. If you modify the stimulus file, proceed to step 4. If not, jump to step 5
4. The sequence prompts you to save the stimulus waveform as a WAV file. Enter a name for the WAV file. The default location for the file is: C:\SoundCheck xx.x\Data\
5. Load the WAV file on the DUT and make sure the WAV file plays properly.
6. Set the playback level of the DUT to the desired level.
7. Position the DUT so the speaker is at an appropriate distance from the reference microphone.
8. Start SoundCheck sequence, click “No” to start acquisition and then play the WAV file on the DUT.

## System diagram



## Sequence Logic

Type	Step Name	#	Out	In	Comment
Sti	Stweep-10k-100Hz (R40)	1	Direct	Out 1	// Must remain in sequence. If modified, must re-save WAV file.
Mes	Save WAV Prompt	2			// Prompt to save WAV file or run test.
Aut	Save WAV File	3			// Saves Stimulus WFM as WAV file.
Acq	Triggered Rec	4		Reference Mic	// Records output of DUT. // Corrects for clock errors between DUT and the SoundCheck hardware.
Pos	Frequency Shift	5			// Analysis compares Recorded WFM from DUT to original Stimulus WFM.
Ana	Rub & Buzz	6			
Dis	Final Display	7			

## Further sequence development

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

1. Edit the stimulus frequency range and/or resolution to suit your DUT
2. Add an Autosave step to save your data during each sequence run
3. Add a 2<sup>nd</sup> Input Signal Path to test a stereo device (e.g. headphone)
4. Replace the Reference Microphone signal path with a Direct In path for electrical measurements (e.g. output from a headphone jack)
5. Edit the Triggered Record step's configuration so the step will Halt on Fail (Timeout will create a failed verdict) or jump to a Message telling the operator that the step has timed out.

## Frequency Trigger/Level Trigger Details

Consult the SoundCheck user manual for further details on the Triggered Record function and its various configuration settings.