

The QuickSIN™ (Etymotic Research, Inc.) test

PRODUCT INSIGHTS

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INTRODUCTION

The QuickSIN™ (Etymotic Research, Inc.) is a quick and established test, available in English, which estimates a patient's ability to understand speech in noise. The difficulty of hearing speech in presence of background noise is one of the most common problems faced by people suffering from hearing loss. A hearing-impaired person usually requires an increase in signal to noise ratio (SNR) to understand speech in noise, compared to a normal hearing person. The amount of required dB is defined as SNR loss. Since SNR loss cannot be reliably predicted from pure tone audiograms or other standard audiometric tests, Speech-In-Noise (SIN) tests were designed to measure it.

Among the SIN tests, the QuickSIN™ was developed to provide clinicians with a quick way to quantify a patient's ability to hear in noise. In addition to estimating the SNR loss, the QuickSIN™ provides speech material specifically designed to assist professionals in deciding which hearing aid features can be most helpful for each patient's needs.

The QuickSIN™ test has been developed so that a normal hearing person needs an average SNR of +2 dB to identify 50% of key words. If a hearing-impaired person requires an SNR of 8 dB to correctly understand 50% of key words, his/her SNR loss will be 6 dB, which corresponds to the increase from the average normal hearing person.

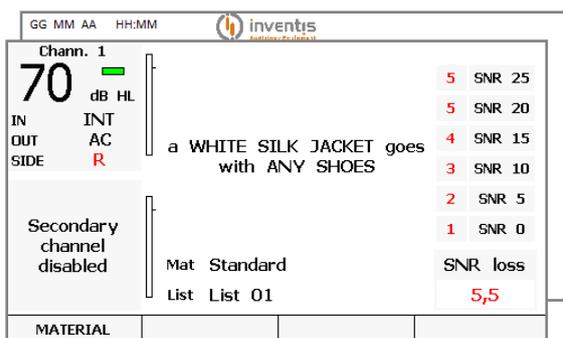
The QuickSIN™ speech material contains eight blocks of sentences in noise (4-talker babble noise). Different blocks allow the clinician to perform either basic SNR loss testing, or more specific tests on patients with ski-slope hearing loss, or test to verify the usefulness of hearing aids directional microphones. For more information, please refer to Etymotic Research's QuickSIN™ Speech-in-Noise Test manual, version 1.3.

HOW TO PERFORM THE TEST WITH INVENTIS DEVICES

The QuickSIN™ test can be performed with different Inventis devices, either stand-alone (i.e. Harp Plus,

Piano Basic, Piano Plus, Viola Plus) or PC-based (Piccolo Speech, Cello, Trumpet, controlled by Inventis Maestro software) using headphones, insert earphones, or free field speaker. It is an optional exam, available under license. Stand-alone devices offer ten trial exams. Before performing the exam, the speech material calibration must be performed. Calibration procedure is described below, dividing the explanation according to the devices used.

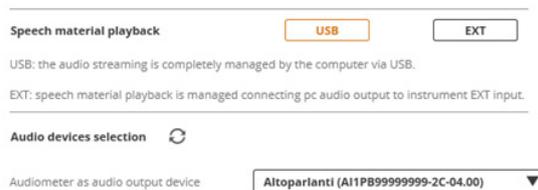
Stand-alone devices (Inventis Harp and Piano): enter the QuickSIN item from the exam menu. Choose Calibration material to select the 1-kHz calibration tone and adjust both the first and second channel VU meters to read "0". Input for channel 1 and channel 2 are already set to, respectively, INT1 and INT2.



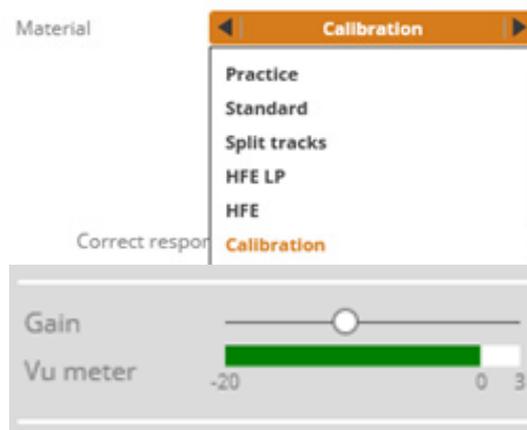
Pc-based devices (Inventis Piccolo, Cello, and Trumpet), or stand-alone devices used in hybrid mode (Piano and Harp): after the QuickSIN™ speech material has been installed, connect the device to the PC and launch Maestro software. From the Test selection bar choose QuickSIN.



From the main menu click Audiology, Audio management settings and verify that the connected audiometer is the current audio output device. Select USB as speech material playback.



From the speech material menu, choose Calibration to select the 1-kHz calibration tone and adjust the first and second channel VU meter to read "0".



TEST PROCEDURE

Each sentence of the QuickSIN™ test contains five key words to be identified. During the test, a list of six sentences is presented together with a 4-talker babble noise. Sentences and noise are pre-recorded so that SNR decreases from 25 (first sentence, very easy to understand) to 0 (sixth sentence, extremely difficult to understand), in 5-dB steps. At the end of each sentence, one point is given for each key word correctly repeated. Once all six sentences have been scored, SNR loss is calculated for the list as: $SNR\ Loss = 25.5 - Total\ number\ of\ correct\ words$. For more details on the formalization of the equation, please refer to Etymotic Research's QuickSIN™ Speech-in-Noise Test manual, version 1.3.

Instruct the patient to repeat each sentence he/she will hear. In particular, make patient acquainted that sentences will become progressively more difficult to understand, since noise will become louder.

Adjust the presentation side (Right, Left, Bilateral), transducer (AC, AC-INS, FF), and level: for pure tone average ≤ 45 dB HL, set the dial to 70 dB HL. If pure tone average is equal or greater than 50 dB, set the dial to a level that the patient judges loud but not annoying. Practice material can help finding the correct presentation level and familiarizing with the test. Select the desired Material and List and press PLAY: the first sentence will be reproduced. At the end of each sentence, the player pauses: record how many words are correctly repeated by the patient (from 0 to 5) and press PLAY to continue with the subsequent sentence. At the end of the sixth sentence, press the STORE button to compute the SNR loss.

For greater accuracy, it is recommended to test at least two lists per ear.

QuickSIN™ results are recorded in term of SNR loss, keeping trace of used transducer, material, and list

	Material	List	SNR loss		Material	List	SNR loss
AC R	Standard	List 01	10,5	AC L	Standard	List 01	3,5
AC R	Standard	List 02	11,5	AC L	Standard	List 02	3,5
AC R	Standard	List 03	9,5	AC L	Standard	List 04	4,5

The SNR loss is then categorized based on the definition seen in the following table, taken from Etymotic Research's QuickSIN™ Speech-in-Noise Test manual, version 1.3.

SNR LOSS	DEGREE OF SNR LOSS	EXPECTED IMPROVEMENT WITH DIRECTIONAL MIC
0-3 dB	Normal / near normal	May hear better than normal hear in noise
3-7 dB	Mild SNR loss	May hear almost as well as normal hear in noise
7-15 dB	Moderate SNR loss	Directional microphones help. Consider array mic
>15 dB	Severe SNR loss	Maximum SNR improvement is needed. Consider FM signal

SEPARATED SPEECH AND NOISE CHANNELS

Split tracks material was recorded with speech and noise on two separate channels, i.e. target sentences on the first channel and babble noise on the second channel, both at constant levels. When this material is selected, the user is asked to choose to perform the exam either in an Objective or Subjective way. In the former case, it is possible to customize the second channel in terms of the presentation side, independently from the first channel. At the end of the test, the SNR loss can be stored. If the Subjective mode is chosen, the second channel can be customized in terms of both presentation side and level: the tester must control the SNR by manually changing the level of speech and of noise. At the end of the test, only the number of correctly understood words is stored.

As stated by the developers, these tracks have been designed to provide a quick way to verify the effectiveness of hearing aids that have switchable directional microphones. For further details on the suggested procedure, please refer to Etymotic Research's QuickSIN™ Speech-in-Noise Test manual, version 1.3.



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