

# EduMic Verification Guide

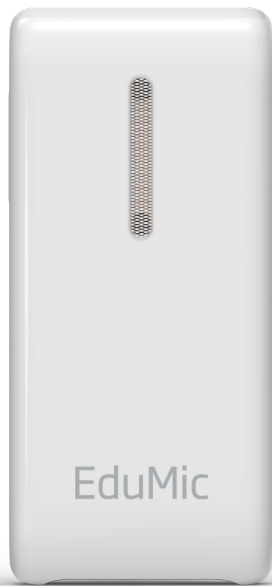
Verifit1 and Verifit2



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# Guide for Transparency Measurements

## Introduction

FM transparency is the condition in which equal inputs to the FM and hearing aid microphones produce equal outputs from the hearing aid (AAA guidelines, see below).

Transparency measures for remote microphone systems (RMS) and hearing aids are a crucial part of obtaining optimal amplification for those with hearing loss. This is a step-by-step verification guide for *test box* measurements with Oticon's EduMic using the Audioscan Verifit1 and Verifit2 systems. Note that this guide is not appropriate for a verification of EduMic with open fittings. Open fittings require On-Ear measurements (see Oticon white paper "[ConnectClip: A Guide to Better Communication](#)" (Gordey, 2019))<sup>1</sup>.

The guide is based on the American Academy of Audiology's (AAA) clinical practice guidelines from 2008 (updated April 2011)<sup>2</sup> for the use of RMS for children and youth from birth to 21 years with hearing loss.

## This guide will take you through:

- Preparation in Genie 2
- Preparation in Audioscan, Verifit1 and Verifit2
- Verification of EduMic - Step 1-3



<sup>1</sup> [www.oticon.global](http://www.oticon.global)

<sup>2</sup> [www.audiology.org](http://www.audiology.org)

# Preparation in Genie 2

Connect and program hearing aids in Genie 2<sup>3</sup>

1. Ensure that all acoustic parameters in the Genie 2 software are selected to match with the clients current hearing aid fitting (e.g. ear mold, venting, ear hook damping) [In **SELECTION** → under **Acoustics** in drop-down menu] (figure 1).

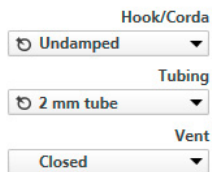


Figure 1: Example of acoustic parameters

2. Select adaptation step 3 [In **FITTING** pane → under **Fine-tuning** in drop-down menu] (figure 2).

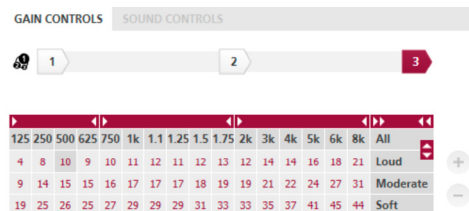


Figure 2: Adaptation step 3

3. Use EduMic default settings [In **END FITTING** pane → under **Accessories** in drop-down menu → **TV Adapter/EduMic**] (figure 3).

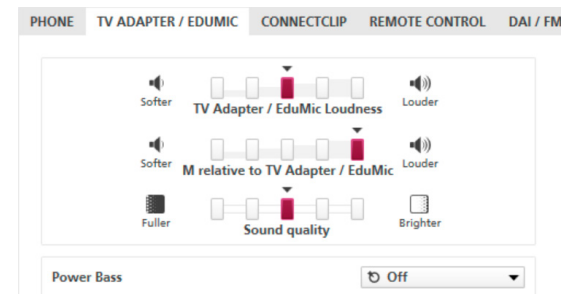


Figure 3: Example of EduMic default settings

<sup>3</sup> In this guide a moderate hearing loss was used (standard audiogram N3, Bisgaard et al. 2010, p.116)



# Preparation in Audioscan, Verifit1 and Verifit2

This guide is specific for the verification of transparency with Oticon's EduMic. If in doubt about detailed use of Verifit1 or Verifit2 in the following described steps, please refer to the manufacturers user guides<sup>4</sup>.

1. Calibrate reference microphone(s) in the test box.
2. Select main menu in Verifit → Test box → Speechmap (figure 4/5).

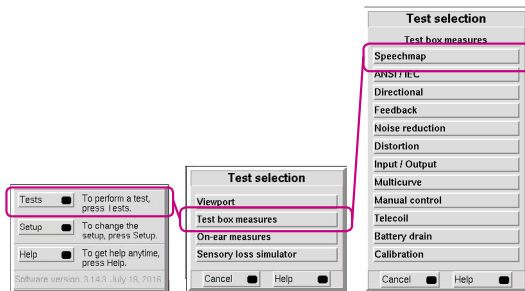


Figure 4: Verifit1 main menu

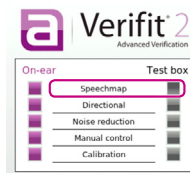


Figure 5: Verifit2 main menu

3. In the Speechmap screen select the hearing aid type being fitted (If BTE: With Verifit1 choose 'BTE+HA2'. With Verifit2 choose 'BTE+HA4' or 'BTE+Mold' depending on how the device is attached to the coupler). Click the Single view tab to get Dual view if measuring two hearing aids at the same time (figure 6/7).

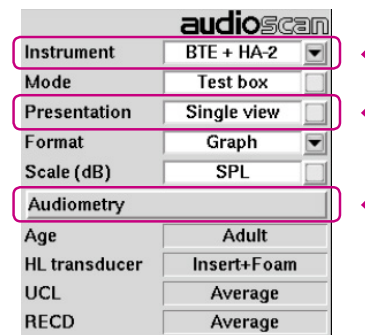


Figure 6: Verifit1 Speechmap menu

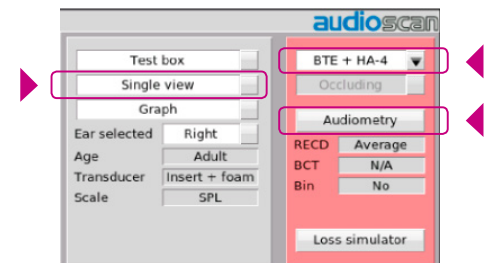


Figure 7: Verifit2 Speechmap menu

4. In [Audiometry] (figure 6/7) select the target rationale you want to use, age, HL transducer used for audiometry, and the RECD relevant for the fitting. If you do not want to focus on RECD select "No target" as an option to avoid displaying a prescriptive fitting target. Enter threshold data in the Audiometric Entry window.

<sup>4</sup> See audioscan user guides: [www.audioscan.com](http://www.audioscan.com)

# Verification of EduMic

## Step 1-3

### Before carrying out EduMic transparency measures:

Hearing aids should be verified for optimal audibility and maximum output for the individual user, using real-ear measures or coupler-based simulated real-ear measures that incorporate age-appropriate average or individually measured RECDs (Real-Ear-to-Coupler Differences).

## Step 1

### Evaluate the hearing aid response without the EduMic connected:

1. Connect the hearing aid(s) to the coupler (Verifit1)/coupler microphone using the provided attachments (Verifit2) and place reference microphone(s) 1-2 mm from the front hearing aid microphone port (figure 8/9).  
If using a Verifit2: Be sure to place the reference microphone so that closing the test box lid doesn't move it. This can be done by angling the reference microphone from the side, horizontally (figure 9, left picture), or from underneath. Close the test box.



Figure 8: Position of hearing aid and microphone in Verifit1

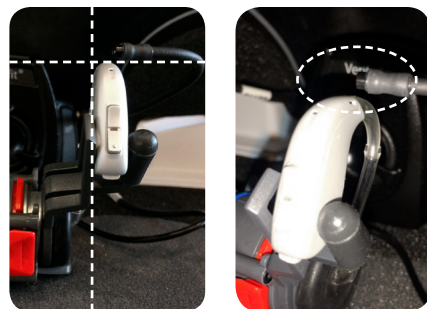


Figure 9: Position of hearing aid and microphone in Verifit2



2. Click the test 1 button in the Speechmap screen to start the test (figure 10/11). Here, choose speech stimuli<sup>5</sup>, select 65 dB (average) as the input test signal and and click the "continue" (Verifit1) or "record" button (Verifit2).

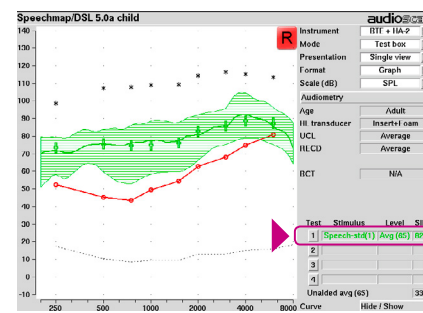


Figure 10: Verifit1. Result of Step 1. Speech stimuli: Speech-std(1), speech level: 65 dB

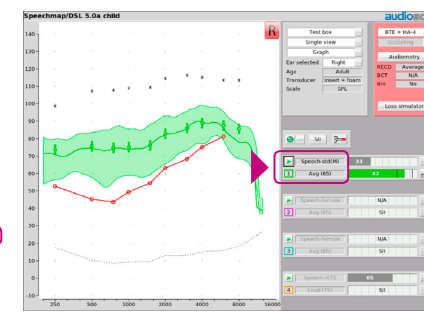
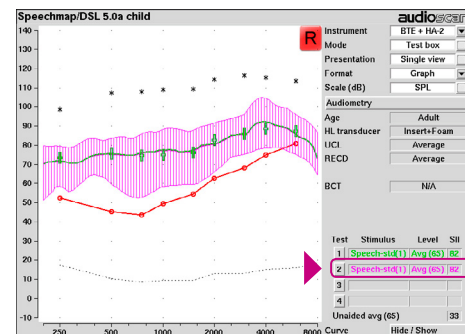


Figure 11: Verifit2. Result of Step 1. Speech stimuli: Speech-std(M), speech level: 65 dB

<sup>5</sup> In this guide speech stimuli was recorded male speech – the use of a calibrated real speech signal is preferred over speech-weighted noise inputs according to the AAA's clinical practice guidelines (p.54)

**Evaluate the hearing aid response with the EduMic connected:**

3. Mute EduMic by pushing its button briefly (status indicator is flashing green).
4. Put the hearing aid(s) back on the coupler and close the test box with the EduMic placed outside the test box.
5. Click the test 2 button in the Speechmap screen to start the second test. Again, choose speech stimuli, select 65 dB (average) as the input test signal level and click the "continue" (Verifit1) or "record" button (Verifit2) (figure 13/14).



Speechmap DSL 5.0a child

140  
130  
120  
110  
100  
90  
80  
70  
60  
50  
40  
30  
20  
10  
0

250 500 1000 2000 4000 8000 16000

Test tone  
Single view  
Graph  
Ear tested: Right  
Age: 8  
Hearing loss: 80  
Locus simulator: N/A

Speech (dB HL): 8.3  
Avg (dB HL): 6.2  
Speech (dB HL): 8.3  
Avg (dB HL): 6.2  
Speech-Frequency: N/A  
Avg (dB HL): 50  
Speech-Freq: 60  
Avg (dB HL): 50

6. Evaluate the result of Step 2 and compare to results of Step 1 to determine if there are changes in the output of the hearing aid response with the EduMic attached. The response curve in Step 2 should not differ from the response curve in Step 1 (figure 13/14 – green and purple curves are overlapping).

## Step 3:

### Evaluate EduMic response:

1. With hearing aid(s) still attached to the coupler and test coupler microphone, place the hearing aid(s) outside the test box (use extension cable from Audioscan) (figure 15/16).

**ATTENTION:** The hearing aid microphone is still active. The test room should be quiet, and hearing aid placed as far away as possible from any sound source (e.g. noisy computer)



Figure 15: EduMic and hearing aid position in Verifit1.



Figure 16: EduMic and hearing aid position in Verifit2.



2. Unmute the EduMic by pushing its button briefly (steady green light is shown), and place it in the test box with the reference microphone 1-2 mm from EduMic microphone as shown in figure 15/16 + 17/18. Close the test box.



Figure 17: Position of EduMic, Verifit1. The top of the EduMic should be pointing towards the left test box speaker as shown.



Figure 18: Position of EduMic, Verifit2. The top of the EduMic should be pointing directly towards the test box speaker. Left picture shows the position of both reference microphones, when measuring on two hearing aids simultaneously. Right picture shows the position of one reference microphone, when measuring on the right hearing aid.



3. Click the test 3 button on the Speechmap screen to start the third test. Again, choose speech stimuli, select 65 dB (average) speech as the input test signal and click the “continue” (Verifit1) or “record” button (Verifit2). (figure 19/20)

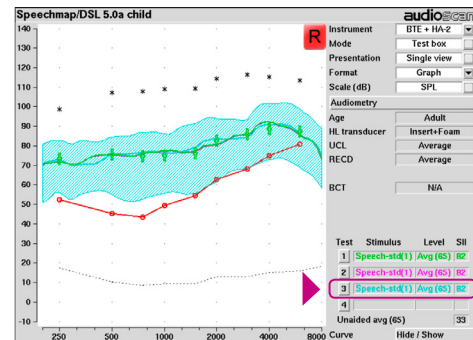


Figure 19: Verifit1. Result of Step 3. Speech stimuli: Speech-std(1), speech level: 65 dB

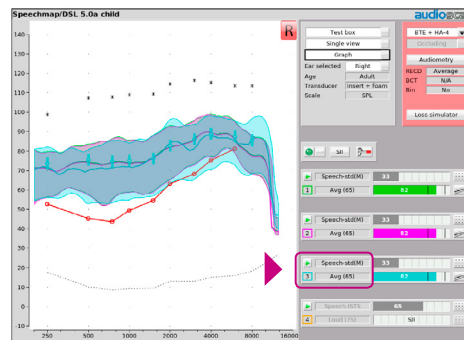


Figure 20: Verifit2. Result of Step 3. Speech stimuli: Speech-std(M), speech level: 65 dB

4. Click the ‘Graph’-button to see a Table presenting the measured values across frequencies. Calculate a 3-frequency average of the differences between the hearing aid response in Step 2 and the EduMic response in Step 3 from the frequencies 750, 1000 and 2000 Hz as recommended by the AAA guidelines.  $[(\text{Test 3}_{@.75\text{kHz}} - \text{Test 2}_{@.75\text{kHz}}) + (\text{Test 3}_{@1\text{kHz}} - \text{Test 2}_{@1\text{kHz}}) + (\text{Test 3}_{@2\text{kHz}} - \text{Test 2}_{@2\text{kHz}})] / 3$ . Numbers are marked in figure 21/22.

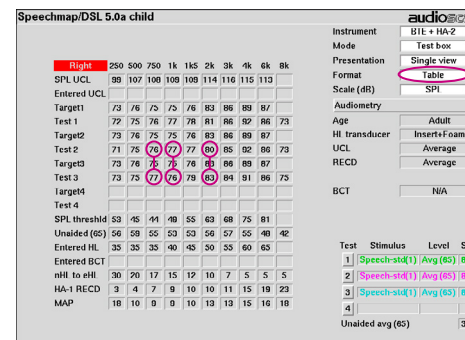


Figure 21: Table in Speechmap, Verifit1

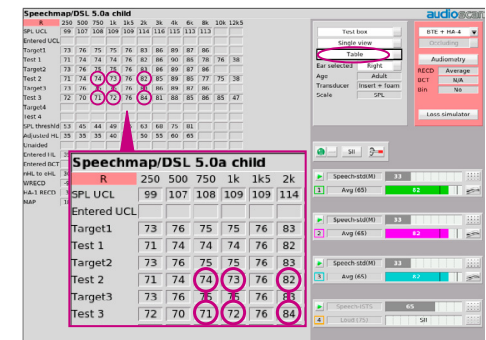


Figure 22: Table in Speechmap, Verifit2

A calculation based on numbers in figure 22 would be:  $(77-76)=1$ ,  $(76-77)=-1$ ,  $(83-80)=3 \rightarrow (1 + -1 + 3)/3 = 1$ .

If the average difference is  $\leq 2$  dB, then transparency is confirmed. If the difference is  $> 2$  dB, start by checking positions of the hearing aid(s), EduMic and reference microphones. If transparency is still not met, try to adjust the EduMic Loudness, M relative to EduMic, Sound quality and Power Bass for the EduMic program in the hearing aid by use of Genie 2 (figure 3) as required<sup>6</sup>. Re-evaluate to confirm transparency.

<sup>6</sup> To make changes in EduMic settings: 1) Turn OFF the EduMic 2) Connect hearings aids to Genie and make adjustments 3) Save changes in Genie 4) Turn on the EduMic and re-pair with hearing aids