

FRYE REM FITTING TIP

REAL EAR MEASUREMENT PROTOCOL USING FRYE EQUIPMENT

Real Ear Measurement (REM) equipment can be used to verify and validate the performance of Starkey hearing aids and various signal processing features. The procedures below outline the general steps required to perform verification tasks using Frye equipment but can be applied to other REM equipment, given they offer similar functionality and can generate similar signals. The detailed steps may vary depending on how the equipment is operated (as a Noah® module or direct use).

MATCHING TARGETS ON-EAR:

EQUIPMENT SETUP

1. Perform sound leveling per the manufacturer instructions.
2. Position speaker at a 45-degree angle about a foot from the patient. The speaker should be at or slightly above the patient's ear level.
3. Insert the probe tube into the patient's ear canal with placement of approximately 2-5mm from the eardrum.
4. If fitting an open style hearing aid, the reference microphone must be turned off.
5. Select **Target Settings**, then **Hearing Aid Information**, then select **Circuit Type**, **Channels**, and **Compression Threshold (50)** if using the Noah® module.
6. Set the patient audiogram (if not carried over from Noah®).
7. Under **Measurements and Targets** select **SPL** and **Real Ear**.
8. Select the **target rule** to be used.
 - » Using e-STAT in Inspire, choose NAL-NL2 as target.

NOTE: e-STAT is Starkey's proprietary fitting formula. It is based on an average of targets from two published (non-proprietary) formulas, NAL-R and NAL-NL1. e-STAT is tailored to Starkey's own compression architecture, with target gains defined precisely at soft, moderate, and loud speech input levels. e-STAT is intended to provide a good starting point for a first fit. Further fine tuning adjustments may be needed if matching to NAL-NL2 targets. Adjustments will vary depending on the degree and configuration of hearing loss and the acoustic configuration of the hearing aid. In general, e-STAT gain may need to be increased 2-6 dB SPL in the high frequencies to most accurately match NAL-NL2 targets.

- » Using NAL-NL2 in Inspire, choose NAL-NL2 as target.

NOTE: Professionals may change the fitting formula to NAL-NL2 in Inspire to recalculate the frequency response. Professionals may also request to have hearing devices shipped with NAL-NL2 as the default fitting formula.

9. Select **Digital Speech** as the input type and select the desired input level.
10. Select **Start**.

INSPIRE SETUP

1. Connect and detect the hearing aids in Inspire.
2. Turn off Feedback Cancellation (if feedback occurs, turn Feedback Cancellation on and set to Static), Directionality, Noise Control, and Frequency Lowering.

TEST INSTRUCTIONS

1. On the Frye equipment, run a test at a 65 dB SPL input levels.
2. Make adjustments to the hearing aids in Inspire, as needed.
3. Re-run test, as needed.

TESTING ADAPTIVE DIRECTIONAL MICROPHONES

1. Insert the hearing instrument or earmold and the probe tube into the ear.
2. In Inspire, set the directionality to **Omni**.
3. On the Frye equipment, play the 70 dB SPL stimulus for a short period of time and record the response as curve #1.
4. In Inspire, set the directionality to **Adaptive**.
5. Rotate the patient towards the non-test ear and position the speaker in the point of maximal attenuation.

NOTE: The location of the directional null may vary between hearing instruments, but is typically located between 115 to 180 degrees. To find the null, rotate the patient while running the stimulus, watching the response to identify the point of maximal attenuation.

6. On the Frye equipment, play the stimulus again. Wait for the directional microphones to fully activate (approximately 15-18 seconds). Record the response as curve #2.

TESTING FREQUENCY LOWERING

Verification of frequency lowering both on-ear and in the test box has not been systematically evaluated. Due to the behavior of Starkey's frequency lowering technique, which dynamically captures and recreates high-frequency speech cues in real time, the averaging of level that occurs in REM verification systems makes traditional REM an inaccurate representation of the feature. Do not be concerned about meeting audibility via the audiogram values or matching targets using real ear measurements with frequency lowering engaged. Making adjustments to frequency lowering based upon response curves obtained from verification equipment may lead to an over-prescription of the feature.

The recommended process for validating frequency lowering is through the use of a simple behavioral technique. Please refer to the *Frequency Lowering Validation* document for additional information.