

## AURICAL® PROBE MICROPHONE MEASUREMENT FITTING TIPS

### REAL EAR MEASUREMENT PROTOCOL USING AURICAL PROBE MICROPHONE MEASUREMENT (PMM)

The AURICAL is a PMM system that is used for the verification of Starkey hearing instruments. This includes, but is not limited to, matching to prescriptive targets and testing adaptive directional microphone functionality. The following procedures outline the general steps required to use the AURICAL PMM with version 4.75.01 software, although these steps can be translated into other software variations.

#### MATCHING TARGETS:

##### EQUIPMENT SETUP: INSPIRE

1. Connect and detect the hearing devices in Inspire.
2. Turn off frequency lowering technology.

##### EQUIPMENT SETUP: OTOsuite

1. Open **OTOSuite**, preferably through the Noah® module.
2. Turn on the AURICAL **Freefit Collar**, then select **Connect the Device**.
3. Select **F8** on the computer keyboard, then select the User Test **PMM -> US Fitting**.
4. Select **Calibrate** to calibrate the probe tubes. Position the AURICAL **Freefit Collar** directly in front of the speaker, at a distance of approximately 18 inches away.
5. Position the patient at 0 degrees azimuth to the speaker and at a distance of approximately 36 inches, then place the probe tubes in the ears and select the **Unaided Response Tab** to run an Unaided Response. .  
**NOTE:** To ensure the probe tubes are inserted properly, look for a peak in the response around 2kHz. If there is a dip below the base line response, consider a deeper probe tube insertion.
6. Ensure sure the hearing instruments are MUTED or turned OFF, then insert the hearing devices in the ears and select the **Occluded Response Tab** to run an Occluded Response.

- » The black line response visible is the Unaided Response.
- » The pink line response is the Occluded Response.

**NOTE:** For an open-fit hearing aid, the Unaided Response and the Occluded Response should overlap.

#### TEST INSTRUCTIONS

1. Select the **Aided Response** tab in the PMM Module.
2. Select the **Fitting Details** icon in the toolbar to enter the appropriate fitting information. Using e-STAT or NAL-NL2 as the fitting formula in Inspire, select **NAL-NL2** in the Target Rule section.

**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.

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.

## TEST INSTRUCTIONS, CONT'D

3. Close **Fitting Details**.
4. Select **OpenREM Calibration**, then calibrate with hearing devices IN ears and MUTED.  
**NOTE:** Select **Use Open REM Calibration** when fitting an open device, including devices with occluded domes.
5. UNMUTE the hearing devices, then select **Aided Response**.
6. Select the **On Top Mode** from the toolbar of OTOsuite to view both Inspire and OTOsuite at the same time.
7. Make any necessary hearing instrument adjustments, and repeat for each desired stimulus and intensity level.

## TESTING ADAPTIVE DIRECTIONAL MICROPHONES

The AURICAL PMM can be used to test the functionality of adaptive directional microphones while the patient is wearing the hearing devices, or while the hearing devices are in the Hearing Instrument Test (HIT) box.

1. Select **F8** on the keyboard to access the Test Selector dialogue box.
2. Select **User Test #20 – Directionality**.
3. Open Inspire software, then ensure that the hearing devices are in Adaptive Directional mode and turn off noise control features.
4. Open OTOsuite software, then select **On Top Mode** from the toolbar of OTOsuite.
5. Position the test ear(s) at 0 degrees azimuth to the AURICAL PMM speaker.
6. Change the signal from ISTS to **Pink Noise** for Button #1 and Button #2.
7. Select **Test Button #1** to run a Pink Noise signal at 65 dB HL.
8. Position the patient 180 degrees to the speaker.
9. Select **Test Button #2** to run the same signal and intensity from step 5. The response should indicate a reduction in gain for the Adaptive Directional microphone response.

## 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.