Aurical HIT Applications Part I

Applications for Hearing Instrument Fittings and Beyond

Wendy Switalski, MBA AuD
Audiology Development Manager
Otometrics/Audiology Systems

Jack Scott, PhD
Field Development Audiologist
Otometrics/Audiology Systems
National partnership of industry professionals, audiologists and local audiology & vestibular experts who work together to distribute products, educate and serve as a resource to our customers.

Our Product Line
Snapshot of the Next Hour

• Introduction

• Overview of AURICAL HIT and OTOsuite

• Applications of HIT systems
  • Programming/pre-programming instrument gain and output
  • Verifying advanced features
  • Assessing electroacoustic performance

Our Fitting Product Line

• Product solutions for:
  • Fitting
    • Video Otoscope
    • OTOcam 300
    • Audiometer
      • AURICAL Aud
    • Probe Microphone Measures
      • AURICAL PMM
    • Hearing Instrument Test Box
    • AURICAL HIT
Benefits of OTOsuite

• Improves workflow
  • One easy to use interface for different test modules
  • Provides counseling opportunities
  • Can facilitate testing protocols across clinics or even treatment rooms while still allowing for customized user tests
  • PC integration reduces time spent entering information and reduces errors

• Ensures that equipment stays relevant
  • Hardware can be updated/upgraded via software updates

OTOsuite within Noah – on top mode point, ease of use, integration
The AURICAL HIT

- The HIT box operates **independently** of the PMM, and requires only a **USB** connection to the computer
- User tests allow both **partial** and **full test sequences**
- It provides a **consistent picture** of every hearing instrument, regardless of manufacturer or type.
- **Intuitive** coupler based fitting with **RECD**, and pre-programming, and pre-fitting without the client’s presence
- The **unique design** makes it easy to access the hearing instruments in the test chamber during the testing
- Data is stored in **Noah**
Aurical HIT Elements

![Diagram of Aurical HIT Elements]

Relating Aurical HIT to on-ear measures:

- Probe Microphone = Coupler Microphone
- Reference Microphone = Reference Microphone
- FreeField Speaker = HIT Speaker

- With appropriate acoustic conversions, the HIT coupler can serve as a convenient substitute for most measurements.
Aurical HIT within OTOSuite

• Aurical HIT is used in 2 modules:

• PMM – for fitting-related measurements (aka Coupler Fitting)

• HIT – for quality measurements

Attaching HI to Aurical HIT Couplers
Standard BTE devices

Fig. 18: ITE positioning
Attaching HI to Aurical HIT
RIC/RITE and Custom devices

A note on programming devices....

• For programmers requiring a hardwire connection, loop programming cable around the groove of battery pill connector to keep it in place when Aurical HIT is closed.

• For wireless programmers using a patient-worn neckloop, place the loop around device and close Aurical HIT. Latch-free closure will not crimp or harm the programming coil.

• For wireless and wire-free programmers, the signal will travel through Aurical HIT without any interruption.
Aurical HIT...what is it used for?

• Coupler-Based Fitting
  • Everything done on ear can be done in the test box
  • Especially important for pediatrics and others who won’t tolerate fitting
    **Accessed through PMM module by selecting the COUPLER button**
  • Advanced Features
    • Verification and quantification of features without patient present
    • Can be done pre-fitting, dropped-off, or returned from repair
    • Especially important for pediatrics and others who won’t tolerate fitting
    **Accessed through PMM module by selecting the COUPLER button**
• ANSI Measures – (American National Standards Institute)
  • Rarely done now....why? Good question!
  • Relies on the manufacturer’s software to change hearing aid settings
    **Accessed through HIT module**

Coupler Based Fitting - Why for adults?

• Pre-programming HI streamlines the fitting and frees up appointment time for counseling and instruction
  2 to 5 minutes at the assessment to measure the RECD (or use average) and then 5 to 10 minutes pre-programming the HI
  ... can result in a huge time savings at the fitting, and beyond!
• Programming HI when patient cannot be present at clinic due to geographical, health, or other reasons.
• Great method of evaluating HI settings - even if you cannot access programming
• Learn new fitting software without an audience
Coupler Fitting in Aurical HIT – Aided Response

2. Launch HI programming software and connect devices.
3. Attach HI to appropriate HIT coupler.
4. Launch OTOsuite and select PMM Module. (Note: PMM Module is used for verifying all fittings, both coupler (HIT) and on-ear (PMM).
5. Select ‘Aided Response’ tab, choose 2cc Coupler option, and choose relevant Fitting Details.
6. Using On Top mode, run measurement curves and adjust HI settings as needed.
Customizing the Fitting Details

• Select ‘Fitting Details’ using F5 or with toolbar icon.
• These selections ensure that the appropriate targets are generated. The same settings should also be selected in the HI programming software for fitting efficiency.

Targets Available
Within PMM Module: Toggle between Real Ear and 2cc Coupler

• Easily toggle between Real Ear verification and 2cc Coupler verification by a click of a button

What are the steps? As easy as 1, 2, 3.

STEP ONE: Present Average (65dBSPL) recorded speech. Adjust GLOBAL GAIN until target is matched within 5dB.

STEP TWO: Present Soft (55dBSPL) and Loud Speech (75dBSPL). Adjust GAIN until targets are matched within 5dB.

STEP THREE: Present 85dB Swept Tone. Adjust MPO to ensure that target is not exceeded, but monitor headroom for loud speech peaks.
Guides settings for appropriate/optimized gain and output

Verify that your fittings are within acceptable tolerances when compared to selected target.

The PMM Unit– On Top Mode
The PMM Unit – “On Target” Mode

Advanced Feature Assessment

• HIT can be used to confirm that advanced features are working and also to quantify how the HI reacts in response to various signals.

• Important considerations:
  • Due to the interactive nature of adaptive features, it is usually necessary to turn off all features except for the one being evaluated.
  • Duration, level, and type of signals needed will vary by HI. Keep this in mind if comparing features across HI’s.
  • Consult with manufacturer for further guidance and recommendations.
Advanced Feature Assessment: Noise Reduction

• Can easily be evaluated in approximately 30 seconds for a single setting, a bit longer when comparing different settings.
• With DNR active, present a 65 dB noise input signal for up to 25 or 30 seconds.
• An initial short term average curve is taken immediately after the signal is started continue stimulus presentation until DNR kicks in, taking another snapshot curve. This can range anywhere from 5-25 seconds.
• Compare the two curves. If DNR is working the 2nd curve will demonstrate less gain and output than the curve initiated before DNR is engaged.

Noise Reduction in Aurical HIT
Noise Reduction in Aurical HIT

Step-by-Step

• Using the fitting software, program the hearing instrument for the desired Noise Reduction setting.

• Configure the measurement buttons to compare the conditions you prefer (i.e., Off vs. On; or Mild vs. Strong).

• Select the time difference between the two measurements (ex: Second measurement after 14 seconds of noise).

• Click a measurement button in the control panel.

• The snapshot curves are displayed in the graph and the overall noise reduction is displayed in the curve legend.

• The F2B view gives you the opportunity to see and show the gain difference in an easy to understand graph.
Directionality in Aurical HIT (FreeStyle Mode)

Fixed Directionality in Aurical HIT Step-by-Step

- Face the hearing aid away from the speaker, or use rear HIT speaker.
- Make an initial measurement for a 65 dB speech or noise signal with the HI in omni-directional mode.
- Make a second measurement with fixed-directionality engaged.
- Make sure adaptive features are OFF (ex: NR).
- Expect to see a difference between the curves, with less gain when HI is in fixed-directional mode.
Fixed Directionality in Aurical HIT

- Position HI towards front speaker and set Adaptive Directionality feature to maximum strength
- Present speech signal from the front HIT speaker, followed by the same signal from the back HIT speaker. Expect to see little to no difference between these curves. (ex: Rainbow Passage)
- Repeat this process with a noise-only signal at an intensity high enough to trigger the directionality effect. Expect to see a difference between these curves, i.e. ‘directionality effect.’ (ex: Pink Noise)
- Again repeat process with speech-and-noise combined signal. Expect to see a result in between the previous curves, demonstrating that in the presence of speech directional effect is less stringent to allow audibility of speech. (ex: Scene – Station)

Adaptive Directionality in Aurical HIT
Step-by-Step

- Duration and type of signals needed may vary by HI. Please consult with manufacturer for further guidance and recommendations.
Adaptive Directionality in Aurical HIT

1. Rainbow Passage
2. Speech from the Front
3. Speech from the Back

Adaptive Directionality in Aurical HIT

1. Pink Noise
2. Noise from the Front
3. Noise from the Back
Adaptive Directionality in Aurical HIT

Scene - Station
Speech + Noise from the Front
Speech + Noise from the Back

Adaptive Directionality in Aurical HIT
Electroacoustic Analysis (EAA) – still needed?

• EAA (aka ‘ANSI testing’) used to be common clinical practice to ensure that both new and in-use hearing aids were performing to manufacturer specifications.

• Holder et al (2016) found that analysis of 73 new BTE devices from four manufacturers showed that 7% were out of acceptable tolerances, suggesting quality control issues.

J Am Acad Audiol. 2016 Sep;27(8):619-27

EAA – still needed? Cont...

• The relevance remains, even if use patterns don’t suggest that:
  • Patient reports make it difficult to discriminate between programming/fit issues and mechanical problems.
  • Automatic and adaptive features add still another layer of complexity.

• Clinics can realize greater efficiency and provide more timely and thorough follow-up care by incorporating EAA into their practice.

• Where allowed, consider utilizing support staff for procedures.
EAA in Aurical HIT

Step-by-Step

1. Launch Noah and select patient file
2. Launch OTOsuite software and select HIT module.
3. Launch HI programming software and access ‘Test Mode’ – check with manufacturer for additional information.
4. Attach HI to appropriate coupler and plug in battery pill (optional).
5. Run selected tests individually, or as a sequence.
6. Compare to manufacturer’s specifications, or to previously obtained results. Focus on OSPL 90, FOG, THD, and Battery Drain.
### EAA - Tolerances

Do Modern Hearing Aids Meet ANSI Standards?  
**Authors:** Holzer, Jordan T. Pincus, Dori M., Grunewald, JAH., Rocketta, Todd A.  
**Source:** Journal of the American Academy of Audiology, Volume 27, Number 9, September 2016, pp. 619-623(5)

- Max OSPL 90 +/- 3dB Measure at FOG  
- HFA OSPL 90 +/- 4dB Measure at FOG  
- HFA FOG +/- 5dB Measure at FOG  
- THD +3% Measure at RTS  
- EIN +3dB Measure at RTS  
- Battery Drain within 20% Measure at RTS

*Fonix ANSI 2009 Workbook*

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### HI Transition

- Ever had a client who doesn’t want to change technology?  
- When a “new” HI doesn’t “sound like” what they are used to, particularly for severe-to profoundly impaired listeners, the adaptation period can be prolonged.*  
- Procedure to use the current HI as “target” for fitting. *Can be done using CBF or PMM.*

*Convery, E. & Keidser, G. 2011*  
**HI Transition**
Hearing Instrument Transition

Comparing “Current” to “New” HI

“Current” MPO
“New” MPO

Hearing Instrument Transition

Adjust HI with “On Top” Mode & Re-measure
Hearing Instrument Transition

Final outcome with a dB difference display

Thank you!

For more information, please see:
www.otometrics.com/fitting

Jack Scott PhD
jscott@otometrics.com

Wendy Switalski AuD
wendy@audilogysystems.com