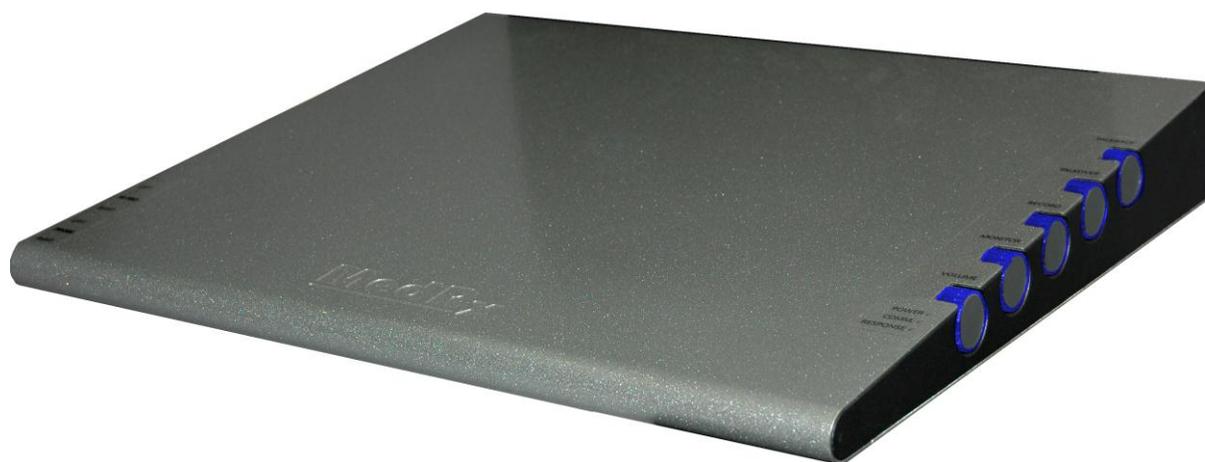


TRAINING MANUAL

AVANT[™]
Advanced Audiometric Technology



MedRx INC.[®]

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Introduction

The AVANT™ represents a new era of precision audiometry and in-situ verification for your office. Compact yet rugged, this PC-Based system supports all ANSI and IEC Real Ear tests. The AVANT™ combines diagnostic audiometry, Real Ear Measurement, Live Speech Mapping, a HiPRO Hearing Instrument programming interface and add-on capability for Video Otoscopy and a Hearing Instrument Test chamber.

The scope of this manual is to get you “up and running” with the AVANT™ system. Please consult the interactive Help System within the software for more detailed information of features and functionality. To access this tool, press the F1 key at any time, or click the Help icon or text menu with your mouse.

The AVANT™ Software

General Overview

The AVANT™ software can run stand-alone or from NOAH System or the TIMS NOAH-Compatible Office System.

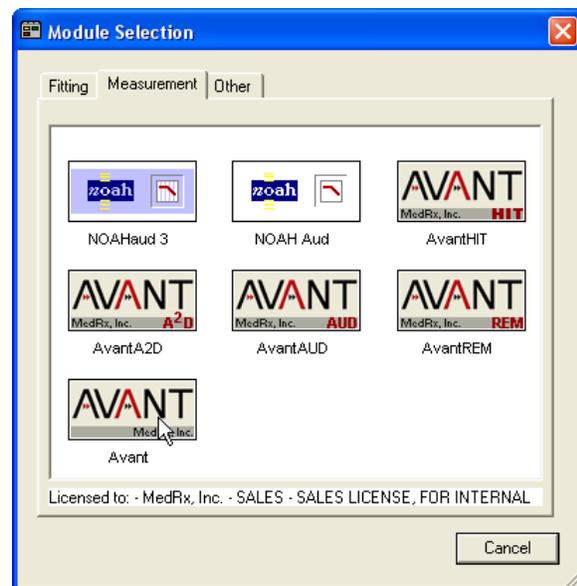
Launching the Software

Stand Alone



1. Double click the **Avant** shortcut on your Windows Desktop

NOAH and TIMS



1. Launch NOAH
2. Open the Module Selection screen
3. Click the Measurement Tab
4. Double click the **Avant** icon

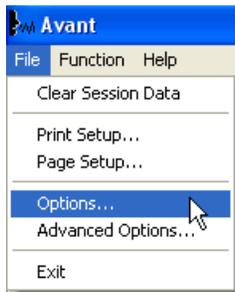
Software Options

Basic Options

Several options are available which allow the user to customize the AVANT Audiometer Software to meet their needs.

NOTE: Remember, that more information is always available in the Interactive Help System by clicking the Help Icon or pressing the F1 key.

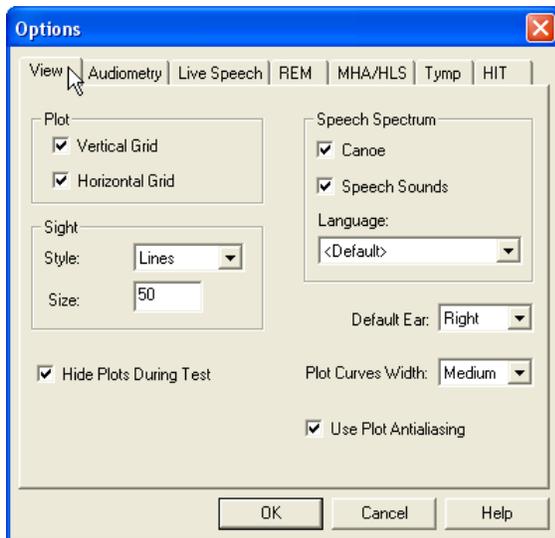
Access these options from the File Menu on the AVANT Audiometer Main Screen as shown below.



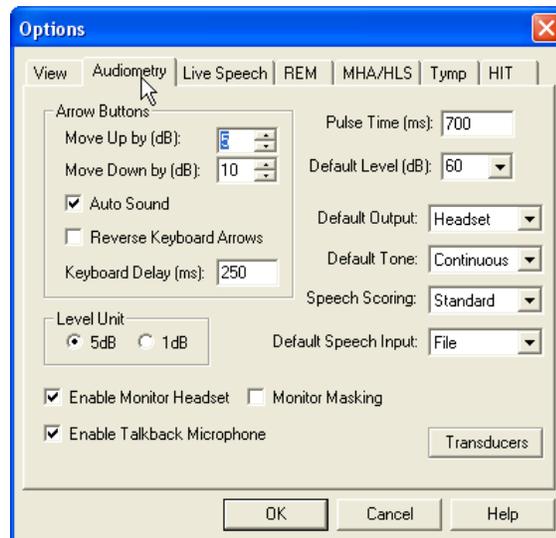
The Options may also be accessed from the Audio or other function screens by clicking on the Options text menu as shown below



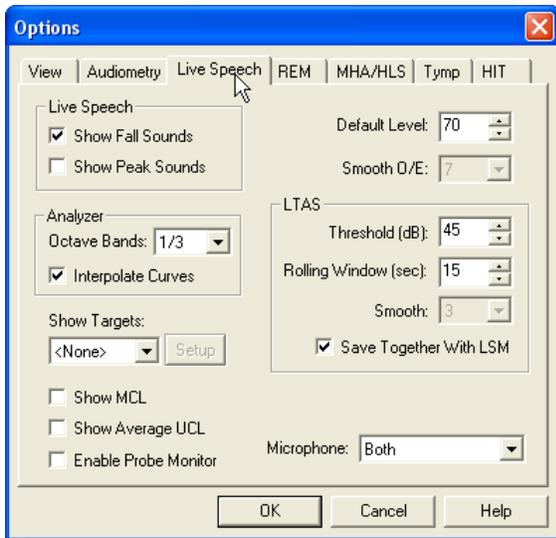
The screen shots below detail the Basic Options available in the AVANT™ software.



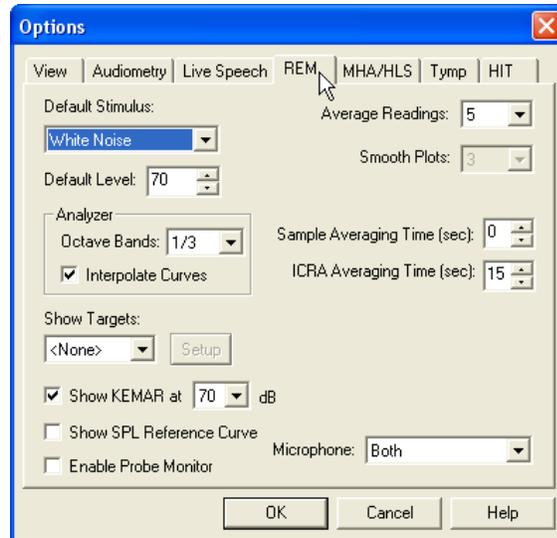
The View tab allows you to set the default appearance of the test environment.



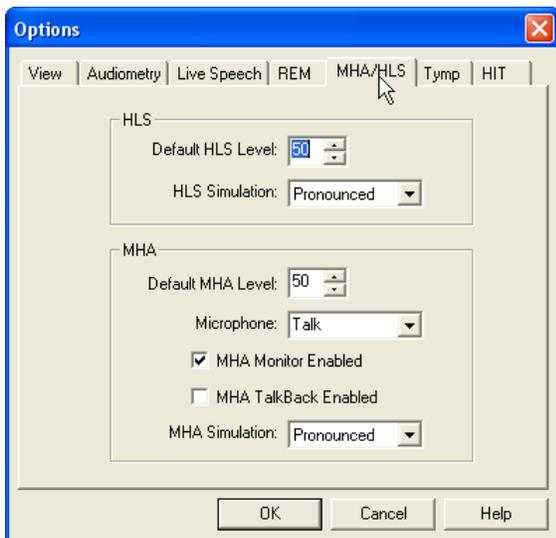
The Audiometry tab sets the look and behavior of the AVANT™ Audiometry functions.



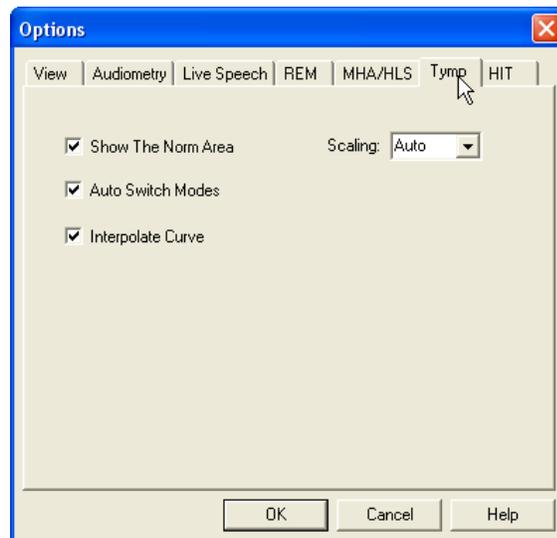
The Live Speech tab sets the look and behavior of the Live Speech Mapping function. Use the Show Targets pull-down to underlay DSL 5.0 or NAL NL-1 targets below your speech maps.



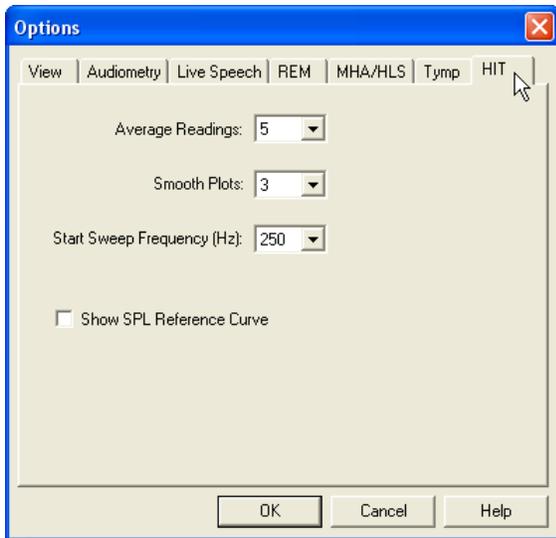
The REM tab sets the default look and behavior of conventional Real Ear Measurements.



The MHA/HLS tab sets the default look and behavior of the Master Hearing Aid and Hearing Loss Simulator.



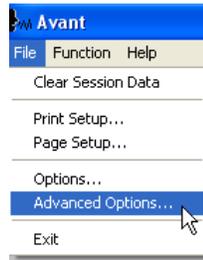
If your system has a Tympanometer connected, this tab will assist in configuring the look of the display.



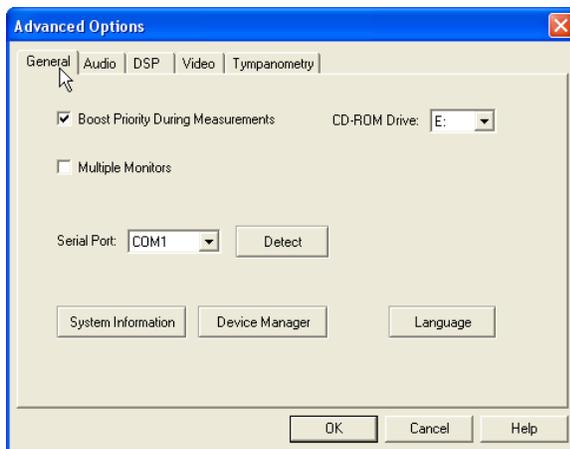
If your system has a Hearing Instrument Test (HIT) Chamber, this tab will allow you to control the behavior of the chamber.

Advanced Options

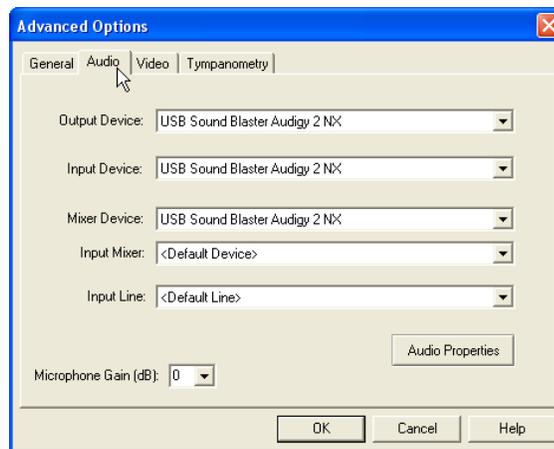
The Advanced Options screen allows you to configure your system to meet your individual clinical needs. It also provides MedRx Technical Support with tools for helping you troubleshoot technical issues. Access this screen from the File Menu on the Avant Main Screen as shown to the right.



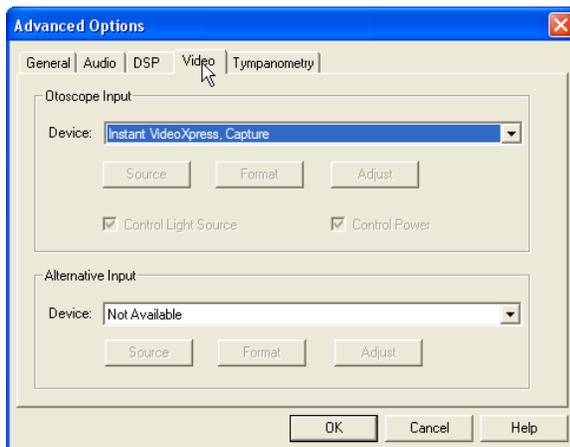
The key features of each tab are described below. For more in-depth information, consult the interactive Help system within the software by pressing the F1 key or clicking the Help icon.



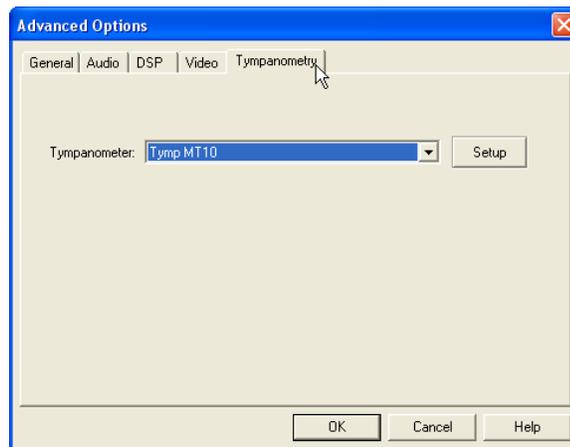
The General Tab configures the overall AVANT™ behavior. This tab also provides access to the Windows Device Manager.



Use the Audio Tab to select the proper audio device for your AVANT™. This tab also provides access to the Windows Audio controls.



If your system has a Video Otoscope, the Video Tab allows you to select the appropriate device driver.



If your system has a Tympanometer connected, use this tab to identify it and ensure it is configured correctly.

Preparing for Testing

Connecting the Peripherals



After you install the drivers for your AVANT™ (See AVANT™ Installation Manual) you need to connect the rest of the peripherals before testing a patient. Using the pictures below, locate each of the accessories and plug them into the labeled jacks above.

The standard AVANT™ configuration assumes you do not have a sound booth and will ship with the peripherals shown below.



Insert Earphones



TDH-39 Earphones



Bone Conductor.

NOTE: The AVANT™ system is shipped with either Eartone 3A Insert Earphones or TDH earphones, not both.



Patient Response Switch



Operator Mic & Monitor



Probe Microphones



HLS/ REM Speakers



HLS/MHA Microphone



USB Cable

If you are using the AVANT™ with a sound booth, you must order the “Booth Kit” which includes the following additional peripherals:



**Patient Talk Back
Microphone**



Microphone Plug Adapter



Booth Cable Kit

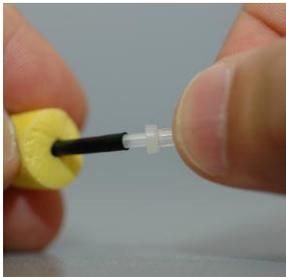
Placing the Earphones on the Patient

The AVANT™ standard configuration includes Eartone 3A Insert Earphones. TDH 39 earphones are also available by request. The figures below illustrate how to properly place these earphones on the patient.

Eartone 3A Insert Earphones

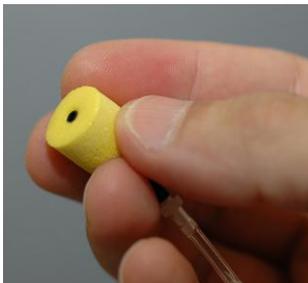


IMPORTANT: The foam tips used for the Eartone 3A earphones are for **SINGLE PATIENT USE ONLY**. Do not attempt to wash and re-use them.



1. Place a new set of foam tips on the earphone tubes as shown.

- **NOTE:** When removing foam tips after use, be sure the clear plastic tubing nipple remains attached to the long earphone tube.

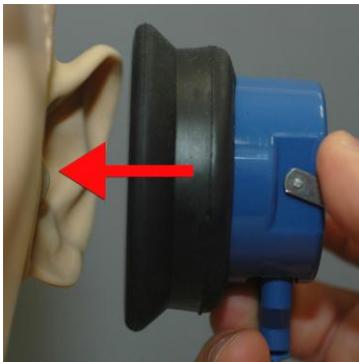


2. Carefully compress the tip between your fingers to allow it to fit into the patient's ear canal as shown. Do not roll the tip between your fingers.



3. Pull up and back on the patient's pinna to straighten the ear canal.
4. Place the compressed foam tip deep within the ear canal.
5. When properly placed, the outer surface of the insert tip will be flush with the opening of the ear canal as shown.

TDH Earphones



1. Place the earphone on the patient's head so the center of the earphones is directly over the opening of the ear canal.
2. Adjust the headband so the earphones remain in place, but be careful not to make it so tight as to cause patient discomfort.

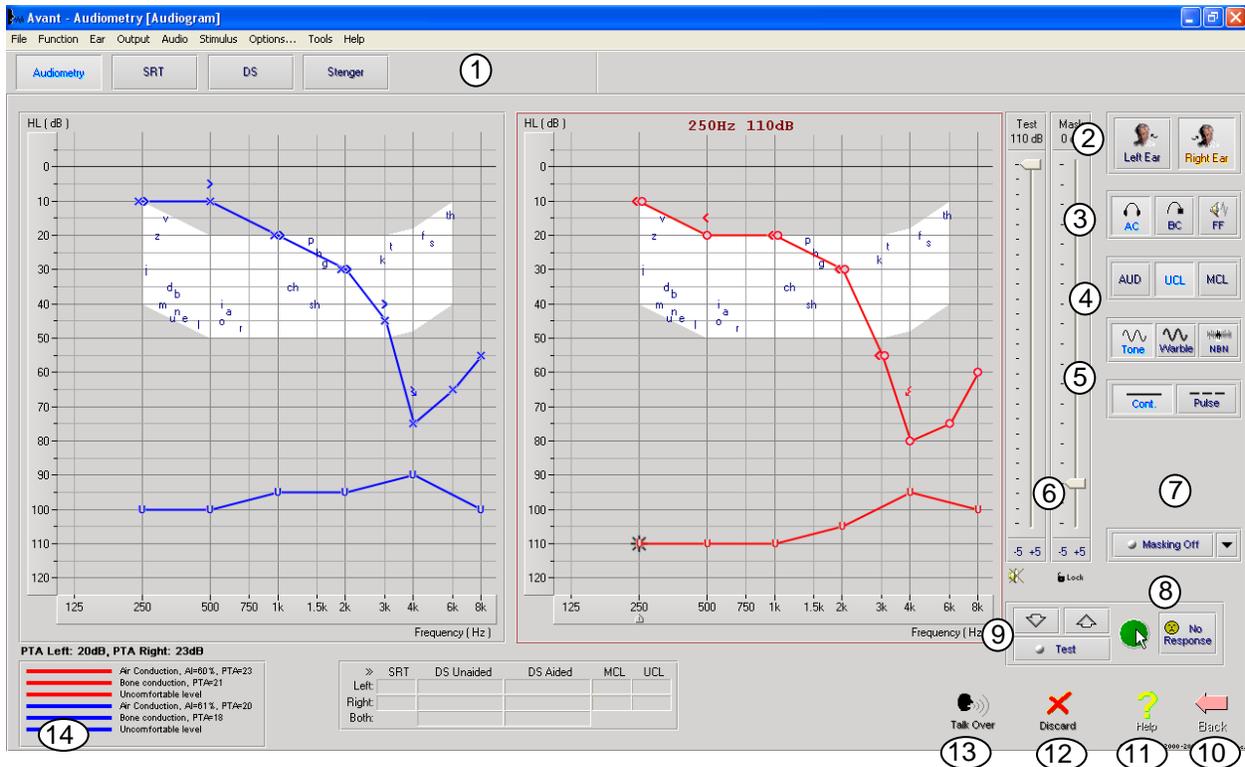
Placing the Bone Conductor



1. Locate the mastoid process behind the pinna. This is a bony shelf just behind where the ear meets the head.
2. Carefully place the bone conductor on the mastoid process and hold it in place.
3. Place the headband over the head to the opposite temple
4. Carefully and slowly loosen your grip to check if the bone vibrator and headband will stay in place.
5. If either moves, reposition until both the headband and bone vibrator are secure.

Performing Audiometric Testing

The screen shot below shows the controls which are available from the AVANT™ Audiometry main window. The sections of the manual that follow explain how to use these tools to perform hearing evaluations using your AVANT™.



- | | |
|---|-----------------------|
| 1. Test selection tool bar | 8. No Response button |
| 2. Ear selection | 9. Test Interrupter |
| 3. Output selector | 10. Back |
| 4. Test Type Selector | 11. Help |
| 5. Tone Type Selectors | 12. Discard |
| 6. Output Level Potentiometers | 13. Talk Over |
| 7. Masking interrupter and routing selector | 14. Legend |

Pure Tone Audiometry

Pure Tone Audiometry measures the patient's peripheral hearing sensitivity, or the softest levels they can hear pure tones at a variety of frequencies. These thresholds are plotted on a standard graph called an audiogram. The AVANT™ software controls the hardware, stores the data (if running within NOAH or TIMS) and prints a standard audiogram report. Pure Tone Audiometry can be performed via earphones, free field speakers (Air Conduction) or a Bone Conductor (Bone Conduction).

Prerequisites:

- Before performing audiometry, careful inspection of the ear canal should be performed. This is best done with Video Otoscopy. After ensuring the ear canal is clear, place the appropriate transducer on the patient as shown on pages 10 and 11.

Pure Tone Audiometry via Earphones (ER 3A Inserts or TDH 39)

1. From the main AVANT™ Window, click the  button on the right side menu bar.
2. By default, the  button will be selected once you enter the main Audiometry Screen. Other default settings (based on typical clinical practice and procedures) are:
 - a. Right Ear
 - b. AC (Air Conduction)
 - c. Tone Stimulus
 - d. Continuous Tone
3. Instruct the patient that they will hear several very quiet (soft) tones (beeps) and that they should signal (raise their hand, press the patient response button, etc.) as soon as they hear it. It is helpful to also say “even if it seems very far away.”
4. Begin at 1000 Hz in the Right ear (unless the patient reports better hearing in the left ear).
5. Present a tone at 60 dB by pressing the space bar or clicking the  button.
6. If the patient does not hear the tone (does not signal), raise the level 5 dB using the up arrow on your keyboard and present again.
7. Repeat steps 5 and 6 until the patient signals that they hear the tone.
8. When the patient signals they hear the signal, decrease the level by 10 dB and present the tone again.
9. Repeat steps 5 through 8 until the patient responds to a tone at the same level 2 times with the level ascending.
10. Using the right arrow key, change the test frequency to 2000 Hz and repeat steps 5 through 8 to establish the threshold at 2000 Hz.
 - a. NOTE: If the threshold at 2000 Hz is more than 20 dB different (less than or greater than) the threshold at 1000 Hz, repeat steps 4 through 8 at 1500 Hz (the “half octave” between 1000 Hz and 2000 Hz).
11. Repeat steps 5 through 8 for 4000 Hz, 8000 Hz, 500 Hz and 250 Hz.
12. Repeat steps 5 through 11 in the opposite ear.

NOTE: The software automatically calculates the 3-frequency Pure Tone Average (PTA) which is displayed inside the legend as shown below:



Pure Tone Audiometry via the Bone Conductor

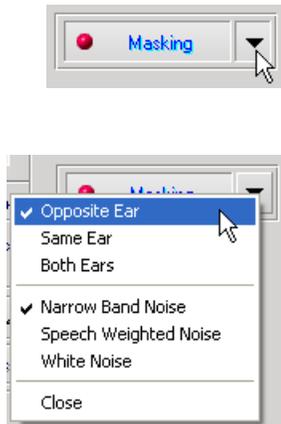
1. Following the instructions on page 11, place the Bone Conductor on the mastoid process behind the ear with better air conduction thresholds as measured above. If the thresholds are equal, place the Bone Conductor on the mastoid process behind the right ear.
2. Establish pure tone bone conduction thresholds as described above for 1000 Hz, 2000 Hz, 4000 Hz, 500 Hz and 250 Hz.
3. If the Bone Conduction (BC) threshold at a given frequency is less (better) than the Air Conduction (AC) threshold by 15 dB or more, you must confirm the threshold by performing masking.

Masking for Pure Tone Audiometry

There are several accepted methods for masking. This manual will not promote one over another, however, to use the masking function on the AVANT™, follow the steps below:



1. Click the Masking button. The red light will appear indicating that the masking is on.
2. Use your mouse to adjust the Masking Level slider shown on the left to the appropriate level based on your preferred method of masking.
3. If you wish to maintain the balance of signal and masking (for example, masking always 30 dB above the signal), click the Lock button after setting the masking and signal levels.



4. The default masking setup for pure tone bone conduction audiometry is to deliver narrow band masking to the ear opposite the test ear. If you wish to use a different stimulus, or route the masking to the same or both ears, click on the arrow to the right of the Masking On button.
5. Use your mouse to select the new masking type and routing for your specific application.
6. When you are finished making changes to the Masking, click Close.

Speech Audiometry

Speech audiometry evaluates how well the patient can hear and understand speech. The typical test battery includes tests of speech threshold and tests of speech discrimination.

The sections below detail how to perform these tests on the AVANT system.

Speech Reception Threshold (SRT)

The Speech Reception Threshold (SRT) is defined as the lowest level at which the patient can repeat Spondee words with 50% accuracy. Spondee words are two syllable words with equal vocal emphasis on each syllable such as “baseball” or “hotdog.”

Instruct the patient that they will hear a series of two-syllable words that will get quieter as the test progresses. They are to repeat the words as best they can, even if they sound very far away. If they are not sure of a word, they should take a guess.

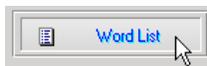
SRT is typically 10 dB more or less than the patient’s Pure Tone Average which is displayed on the lower left of the screen. Set the level of the test signal to 10 dB above the PTA and follow the steps below:



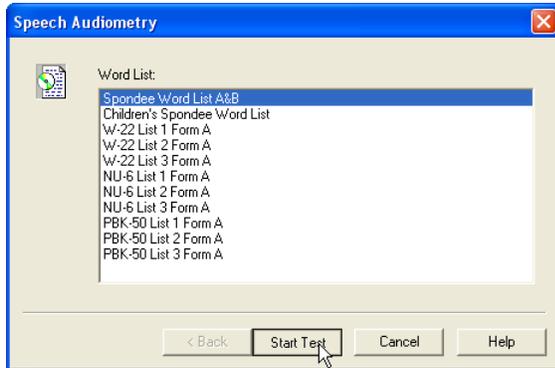
1. From the AVANT Audiometer main screen, click the Audiometry button.



2. Click the SRT button located on the toolbar on the top of the screen.



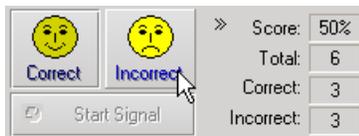
3. Click the Word List button.



4. Select Spondee Word Lists A&B from the list.
5. Click Start Test.



6. Click the Play button or press the F9 key to present a word. The word will play through the chosen transducer as well as display on the screen.



7. If the patient correctly repeats the word, click the Correct icon or press F7
8. If the patient incorrectly repeats the word, click the Correct icon or press F8

Note that the score is calculated and displayed automatically.

If the patient exceeds a 50% score at a given presentation level, stop the test and decrease the level by 10 dB and repeat the steps above.

If the patient fails to achieve a 50% score after 6 words at a given level, stop the test, raise the level 5 dB and repeat the steps above.

When the patient scores 50% at a given level, the test is complete. The software automatically plots the score on the SRT graph.

Speech Discrimination (DS)

Speech Discrimination (DS) is a discrimination, or recognition type test using speech as the stimulus. DS testing measures the percentage of mono-syllable words repeated correctly from a phonetically balanced list. Unlike the SRT test, the DS test is performed at a fixed intensity (dB) level. Typical patients will score their best on DS testing at a level between 35 and 40 dB above their SRT.

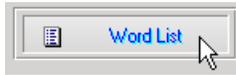
Before beginning the test, instruct the patient that they will hear a series of one-syllable words. They are to repeat the words the best they can. If they are not sure of a word, they should take a guess.



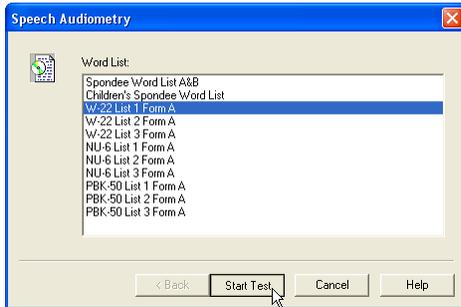
9. From the AVANT™ main screen, click the Audiometry button.



10. Click the DS button located on the toolbar on the top of the screen.



11. Click the Word List button.

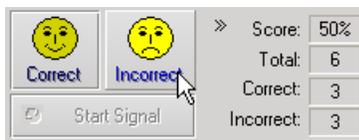


12. Select the desired Word List from the list. The W-22 or NU-6 lists are good choices for most typical adult patients. When testing children, the PBK lists should be used.

13. Click Start Test.



14. Click the Play button or press the F9 key to present a word. The word will play through the chosen transducer as well as display on the screen.



15. If the patient correctly repeats the word, click the Correct icon or press F7.

16. If the patient incorrectly repeats the word, click the Incorrect icon or press F8.

Note that the score is calculated and displayed automatically. The test is complete when all words in the list have been presented. The software automatically plots the score on the DS graph.

Hearing Loss Simulator

The **Hearing Loss Simulator** demonstrates the effect of the client's hearing loss for the significant third party. The program attenuates an input signal to simulate the audiogram. The third party listens to the free field speakers. The third party can hear how their own voice is distorted by the hearing loss when the Record input option is used.

The Hearing Loss Simulator requires the client's Audiogram data. This data can be manually entered in the Audio screen of this or any other task.

How to perform the Hearing Loss Simulator task

- Select the Hearing Loss Simulator tab on the toolbar.
- Enter the Audiogram values manually if the data is not automatically imported to this screen.
- Select the input signal type: *Mic*, *File* or *Record*. Select the track and the *Play* button on the control panel. See below for instructions on how to use the Record option.
- The HLS output is directed to the free field loudspeakers.
- Select *Normal* to play the input signal as a person with normal hearing would perceive it. Select *Simulated* to turn on the simulation of the client's hearing loss. Toggle between these selections as necessary.
- The **Reset** option restores the audiogram to the original state. Use this option if you have modified the audiogram but want to undo the changes. The changes to the Audiogram that are made on the HLS screen are temporary and will not affect the client's original audiometry record.
- A volume control adjustment bar allows for manual adjustment of the output level of the freefield speakers.
- To stop the playback, select the *Stop* button on the player.

Note: It is recommended you use a variety of tracks from the list to demonstrate the hearing loss.

Record Input Option

This option allows recording and playing back of the voice of the third party. **Record** input mode allows the clinician or third party to record a sample of their speech which can then be replayed for repeat comparisons under different amplification conditions for the patient. Refer to the interactive Help system by pressing F1 or clicking the Help icon to learn more about the recorder.

Master Hearing Aid

Master Hearing Aid is an alternative to using a stock hearing aid to demonstrate the benefits of amplification to an inexperienced user. The system applies the fitting rules by default to the patient's audiogram and simulates a hearing aid. The patient listens to this signal through the headphones. Options for editing the gain applied to the audiogram are provided.

About the Master Hearing Aid Display

The Master Hearing Aid screen displays a graph with dB Gain on the vertical axis and Frequency in Hz on the horizontal axis. The plot on the graph represents the gain applied to the patient's Audiogram. The NAL-RP is applied by default. A new rule can be selected from the list on the right side of the display. A volume adjustment bar allows for manual adjustment of the output level. The control panel on the right of the display provides options for input signal source and the task icons for Normal and Simulate.

The Master Hearing Aid applies gain separately for each ear. If audiogram values are entered for the left and right ear, the selected fitting rules will be applied to each ear separately. Different rules may be entered for different ears (i.e. NAL-RP for left ear and BERGER for right ear). If an audiogram is entered only for one ear, the gain will not be adjusted for the opposite ear and the sound for that ear will be normal.

If **Binaural** mode is selected, the sound will be heard from both channels (left and right). If **Monaural** mode is selected, the sound will be heard only from the channel corresponding to the active ear when the channel for the opposite ear will be muted.

Input signal

Live voice (microphone) allows you to use the talk-over microphone for live speech input to the inserts. The clinician or significant third party can speak into the microphone for this activity. Note: there is a processing delay between the input and playback. Make sure that the client cannot hear the voice directly but only through the headset. If this is not possible, use the Recorder (described below) to simulate speech input.

File allows the user to play sound files. The program supports MP3 and WAV files and comes with pre-set MedRx Sounds Sensations set of files. After the option is activated, use the player panel to control the playback.

CD allows the user to play music CDs. After the option is activated, use the player panel to control the playback.

Record input mode allows the clinician or third party to record a sample of their speech which can then be replayed for repeat comparisons under different amplification conditions for the patient. Refer to the interactive Help system by pressing F1 or clicking the Help icon to learn more about the recorder.

How to use the Master Hearing Aid:

1. Select the *Master Hearing Aid (MHA)* icon from the main screen.
2. Enter the Audiogram values manually if the data is not automatically imported to this screen.
3. Select the input signal type: *File, CD, Mic, or Record*.
4. Select *Monaural* or *Binaural*
5. Select the *Normal* icon, which will send the input signal through to the inserts without modification. The patient is listening to the signal without any amplification benefit. Select the *Simulate* icon to modify the input signal according to the selected rule. This selection allows the patient to hear the benefits of amplification. Toggle between these two selections as necessary.
6. If the simulated frequency response needs to be adjusted, based on feedback from the patient, manually edit the response by clicking on the gain curve at the desired frequency and new gain level. The gain curve of the selected test ear on the control panel can be edited. To edit the other ear, click the appropriate test ear icon on the control panel first.

Hint: Use the *track return* icon on the player control panel to replay one track continuously.

The **Reset** option restores the rule to the original state. Use this option if you have modified the rule but want to undo the changes.

Live Speech Mapping

Preparing for Testing

Connecting the Probes



1. Locate the Probe Microphone case.

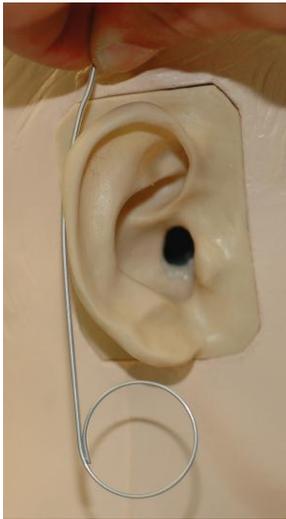


2. Carefully remove the probe microphones. Note that these are precision instruments and must be handled with care. Avoid dropping them or striking them against hard surfaces such as counter or desktops.



3. Connect the probe microphones to the AVANT™ main unit as shown above. The cables will only connect when the white mark on the cable connector faces straight up.
DO NOT FORCE THE CONNECTOR INTO THE SOCKET.

Bending the Ear Hook



1. Remove the ear hook from the package.
2. Place behind the pinna.
3. Hold wire so the circular portion sits just below the ear lobe.
4. Mark the top of the helix with your thumb.



5. Bend the wire to follow the contour of the top of the pinna as shown.

Attaching the Probe Microphone Assembly to the Ear Hook



1. Hold the probe microphone assembly so that with the ear hook is facing the front of the head, the microphone ports face away from the patient.
2. Carefully align the wire loop of the ear hook with the groove in the microphone assembly housing as shown.



3. Carefully snap the wire loop into the groove and rotate the probe microphone assembly so the ear hook is on top and the black microphone cable is on the bottom.

Calibrating the Probe Tube

For reasons of infection control and reliability of results, MedRx recommends that a new probe tube be used with each patient. **To ensure accurate measurements, it is necessary to calibrate the probe tube each time it is replaced.**

1. Place a new probe tube on the probe microphone port as shown below.

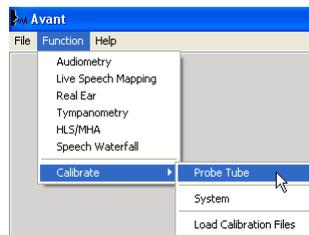


2. Place the probe tube between the calibration nibs as shown. Be sure that the opening of the probe tube is centered on the grill of the reference microphone.



In the AVANT™ software, click

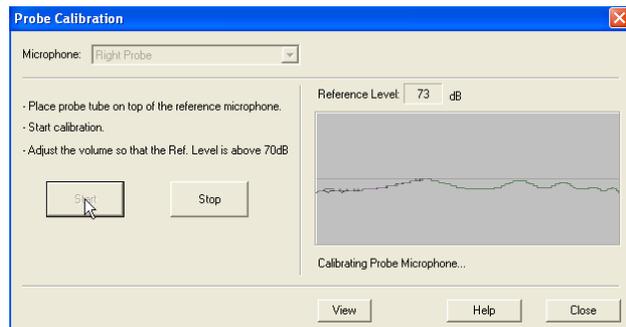
- **Function**
- **Calibrate**
- **Probe Tube**



Position probe microphone between 19 and 39 inches from the loudspeaker and click Start. The signal must be at least 70 dB to complete a valid calibration. If the screen prompt indicates the signal is too low, increase the volume on the loudspeaker or move the probe microphone assembly closer and re-start the calibration.

Repeat for the other probe. Valid calibrations have the same approximate shape as the gray target curve, but may contain a few spikes in the very low or very high frequency area of the response curve. This is acceptable.

If the measured calibration curve differs greatly in shape or amplitude from the target curve, replace the probe tube and re-calibrate. If this does not correct the problem, contact MedRx technical support at (888) 392-1234.



Using the MedRx Probe Tube Stabilization System

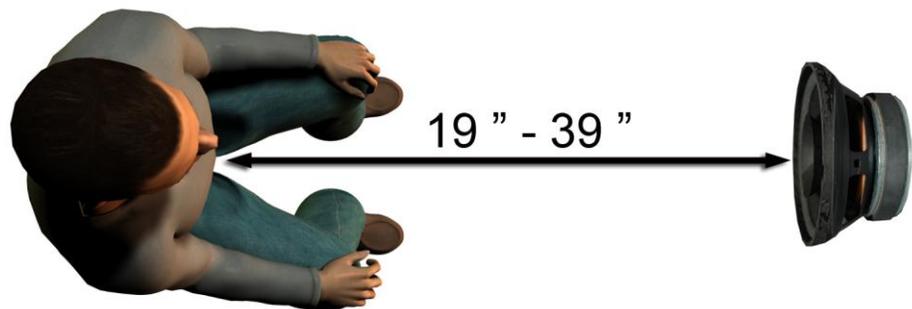
To assist in maintaining proper probe tube position during Live Speech Mapping and Real Ear Measurement, MedRx has developed the Probe Tube Stabilization System.

After bending the ear hook and attaching the probe assembly and tube, slide the Stabilization System onto the ear hook as shown. Align the larger hole with the ear canal and thread the probe tube through. The black tube depth marker should rest just inside the larger hole.



Positioning the Speakers

Proper positioning of the loudspeakers relative to the patient's hearing aids is critical for making accurate and repeatable measurements. Seat the patient so their ear is between 19 and 39 inches from the loudspeaker.



Make sure the grill of the loudspeaker is level with and directly in front of the patient's head.

When using Live Speech inputs, position the patient so the mouth of the person speaking is in the same position as the loudspeaker shown here.

Step-by-Step Guide to Live Speech Mapping

Ensure the Audiogram is Entered

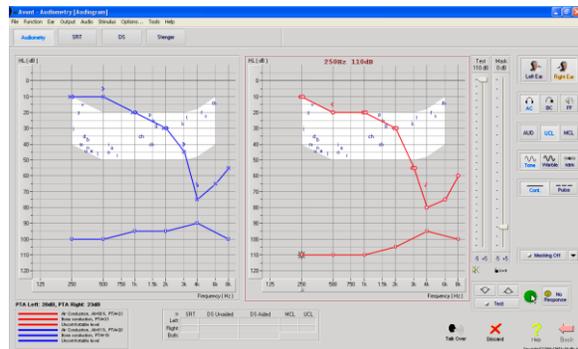
Before making Live Speech Mapping measurements, the patient's pure tone audiogram must be available to the software. This can occur several ways:

1. The audiogram was automatically entered by MedRx AVANT™ software.
2. The audiogram was manually entered into the NOAHaud 3 software and saved.
3. The audiogram was entered using another manufacturer's audiogram module.

If none of these have occurred, you may manually enter the audiometric data into the AVANT™ software as follows:



1. Launch the audiometric module by clicking on the Audio button on the right side of the AVANT™ main window.



2. Using your mouse, select the test ear.
3. Select the test type Air.
4. Enter thresholds by clicking the intersection points with the mouse.
5. Repeat for UCL (Bone and MCL optional).
6. Repeat steps 3-5 for the left ear.

After the audiogram is entered, click the Back button to return to the AVANT™ Main screen.



1. From the AVANT™ Main screen, click LSM



2. In the next Window, click LSM again

Speech Mapping with Live Voice Inputs



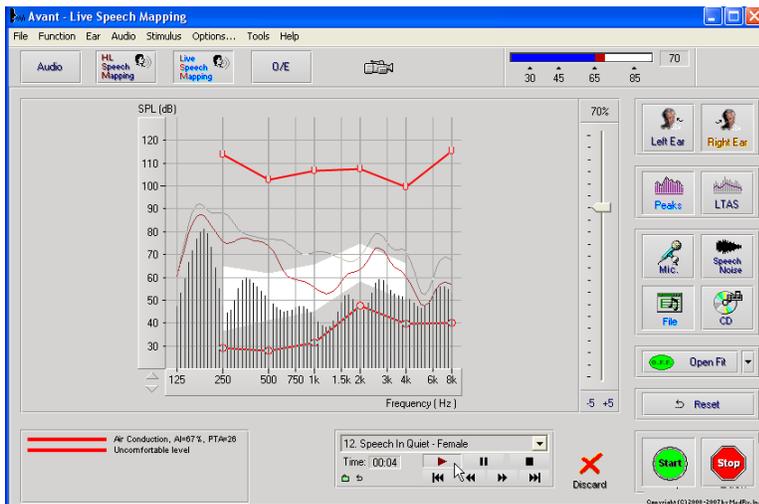
The screenshot on the left shows the Live Speech Mapping (LSM) window. The system was designed to capture and display the human voice in the ear canal, so we recommend using the microphone input and peak measurement.

Using the microphone allows measurement of both the professional's voice and that of the patient's significant others.

To improve repeatability of measurements, it is recommended that the speaker read a standard passage such as the "Rainbow Passage".

NOTE: The screen shot above shows the MedRx Modified Speech Spectrum (Canoe). It is also possible to underlay DSL i/o or NAL-NL1 targets on this screen. Click Options in the text menu bar on the top of the screen to select and configure these underlays to meet the needs of your practice.

Speech Mapping with Recorded Inputs



For those who prefer a standard, repeatable stimulus for Speech Mapping, the software provides several digital audio files. These are accessed by clicking the File button on the right and then selecting the desired track from the pull-down menu in the audio player.

Once the desired track is selected, click the Start button to begin measuring. When enough data is collected, click the Stop button to stop the recording and measurement.

It is also possible to use an audio CD, such as the patient's favorite music to perform Speech Mapping. Simply click the CD button and then select a track as above. Using the sound level meter on the upper right of the screen, adjust the output of the speaker to approximately 65 dB.

NOTE: The screen shot above shows the MedRx Modified Speech Spectrum (Canoe). It is also possible to underlay DSL i/o or NAL-NL1 targets on this screen. Click Options in the text menu bar on the top of the screen to select and configure these underlays to meet the needs of your practice.

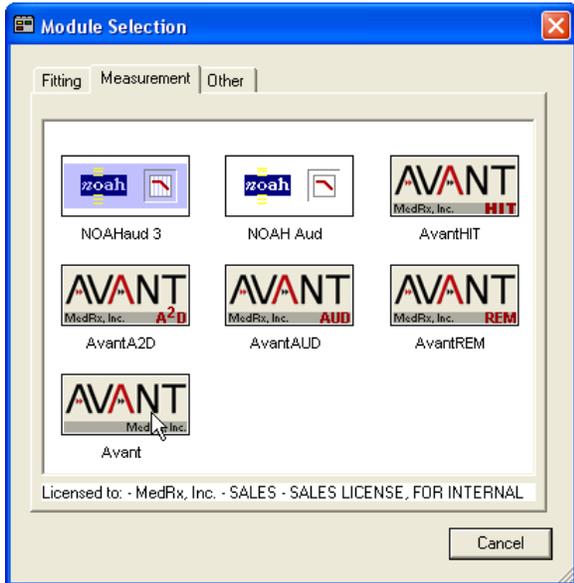
The screen shot below provides an overview of all the tools and controls on the Live Speech Mapping screen. For more information on these features, please consult the Interactive Help system by pressing the F1 key or clicking the Help icon.

1. Reference Microphone Level
2. Ear selection
3. Measurement type
 - a. Peaks
 - b. LTAS
4. Input Selector
5. Open Fit Function
6. Reset Button
7. Test Interrupter
8. Discard, Help and Back buttons
9. Legend
10. Target area – can be any of the following:
 - MedRx Modified Speech Spectrum
 - DSL i/o
 - NAL-NL1

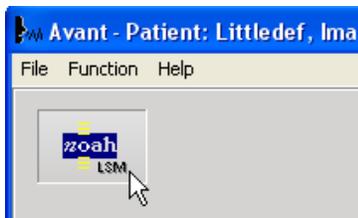


Running Speech Mapping "On-Top" within NOAH

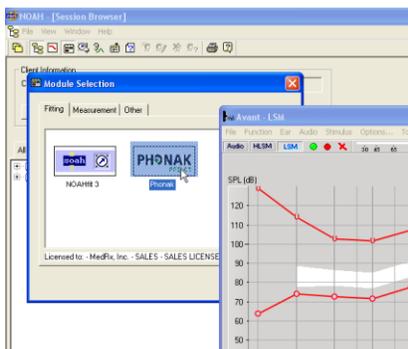
It is well established that verifying the output of hearing instruments in the patient's ear will improve the accuracy of the fitting. In the past, it has been difficult to verify these fittings since many real ear systems have been disconnected from the fitting system. The AVANT™ system is tightly integrated with NOAH, the industry standard for audiometric and fitting data storage and retrieval. The "on-top" mode of the AVANT™ software allows you to effortlessly alternate between measurement and fitting adjustments.



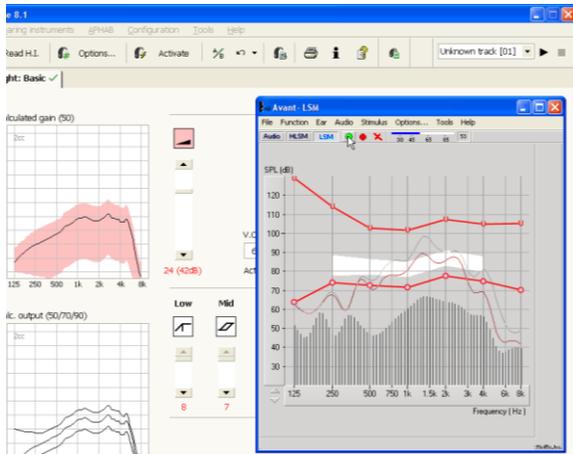
1. Opening the AVANT™ software from within NOAH as shown to the left.



2. From the AVANT™ main screen, click the NOAH LSM button. The AVANT™ LSM window will reduce in size and "float" on top of the NOAH screen.



3. Open the fitting module from the NOAH Module Selection Screen.



4. Use the text menus and green and red buttons in the floating LSM window to make Speech Mapping measurements. To make adjustments to the hearing instrument, click on the fitting module window and modify the settings according to the manufacturer's instructions, being sure to activate, apply or save the settings to the instrument.
 - Repeat this measure/adjust/measure cycle until the fitting is optimized.

Completing the On-Top Mode Process

1. Save the hearing instrument fitting and close the manufacturer's fitting module as usual
2. When the AVANT™ Main window appears, click the Back icon
3. Click on the Exit icon
4. Click Yes to save the session to NOAH

MedRx Live Speech Mapping Protocol

Unlike other products, the AVANT™ system places full control over the measurement environment firmly in the hands of the hearing care professional. The system is powerful, yet extremely flexible, allowing each provider to use Live Speech Mapping in a way that compliments their practice style rather than compromising it.

In order to get you “up and running” with the AVANT™ system, MedRx has developed the following protocol. This simple procedure has been found to be effective with both audiologists and hearing instrument specialists. After mastering the basic operation of the system utilized in this protocol, you are encouraged to further expand your use of Live Speech Mapping in your practice. Feature-specific help is available by simply pressing the F1 key or clicking on the Help icon or text menu.

1. Basic Diagnostics
 - a. Using your audiometer and NOAH, measure and record the following values:
 - b. Pure Tone Air and Bone conduction thresholds
 - c. Narrow Band Noise or Pure Tone UCL at 500, 2000 and 3000 Hz
 - d. Other tests if needed in your practice or jurisdiction
2. Complete a careful otoscopic examination as instructed by the manufacturer of your otoscope.
 - a. For MedRx Video Oscopes, refer to the Help system within the software by pressing the F1 key or clicking the Help icon or text menu
3. Position patient as described earlier in this manual.
4. Calibrate Probe Tube as described above.
5. Measure and place the probe tube in the ear canal.
6. Complete a Live Speech Mapping measurement UNAIDED using the default settings below:
 - a. Microphone input
 - b. Peak Measures
 - c. 1/3 Octave resolution
7. Carefully place the hearing instrument in the ear without disturbing the probe tube.
8. Complete a Live Speech Mapping measurement AIDED.
9. Using the On Top Mode, make any adjustments needed to the hearing instrument so that:
 - a. The LSM curve for Quiet Speech (50 to 60 dB) is at the bottom of the white modified speech spectrum (canoe)
 - b. The LSM curve for raised vocal effort speech is in the upper third of the space between threshold and UCL
 - c. The LSM curve for loud sounds (very loud speech, clapping hands, etc.) is approximately 10 dB below the UCL curve.

Real Ear Measurements

In addition to Live Speech Mapping, the AVANT™ supports all conventional Real Ear Measurements (REM). All these tests are accessed from the main REM screen.

To begin, click the



button on the right of the AVANT™ main screen.

In general, REM tasks are performed as follows:



1. Select the REM test you wish to perform from the top row of buttons.
2. Select the test ear.
3. Select the test stimulus.
4. Click Start. The test will stop itself after sufficient data has been collected and averaged.
5. If you wish to delete a curve, simply select it with your mouse and then click the Discard icon or press the Delete key.
6. When all measurements are complete, click the Back arrow to return to the AVANT™ Main Screen.

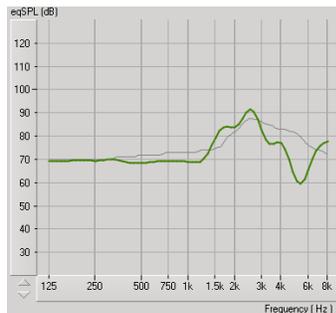
To activate specific REM tests, click the buttons as follows:

| | |
|-----------|---|
| Audio | Opens the audiometry data entry screen. Use this if audiometry has not been previously measured and entered into NOAH. |
| FittingRx | Allows the selection of gain-based fitting rules to generate targets. The following rules are supported: ½ Gain, POGO I, POGO II, Berger, 1/3 Gain, NAL-RP, FIG6, DSL, NAL-NL1. |
| REUR | Real Ear Unaided Response - Measures the additive effect of the ear canal's resonance to a stimulus. Reported as dB SPL of output. |
| REUG | Real Ear Unaided Gain - Measures the additive effect of the ear canal's resonance to a stimulus. Reported as dB SPL of gain. If a real ear unaided response (REUR) curve has been measured, the corresponding real ear unaided gain curve is automatically plotted to the REUG screen. |
| REIG | The difference between the REUG and the REAG is called the Real Ear Insertion Gain (REIG). This Insertion Gain information is used to compare hearing instrument gain to the target gain curve selected for the client. |
| REAR | The Real Ear Aided Response (REAR) is the sound pressure level in the ear canal measured with the probe microphone close to the eardrum and the operating hearing instrument inserted in the ear and turned on. ANSI defines REAR as the SPL, as a function of frequency, at a specified measurement point in the ear canal for a specified sound field, with the hearing aid in place and turned on. |
| REAG | The REAG is simply the REAR expressed as gain rather than output. Selecting REAG allows you to see the gain at each frequency for each of the REAR curves measured. |

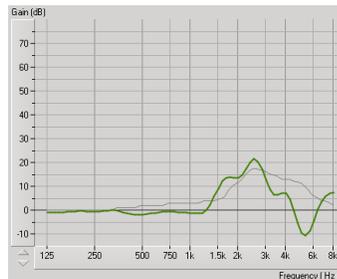
| | |
|---|---|
| <p style="text-align: center;">REOR</p> | <p>REOR measures the effect on the natural external ear effects resulting from inserting an ear mold or a hearing instrument, before it is turned on, into the ear canal. The REOR is also referred to as Insertion Loss REOR is also useful for validating the effectiveness of venting or canal length changes to the mold.</p> |
| <p style="text-align: center;">REOG</p> | <p>The Real Ear Occluded Gain (REOG) is the difference in decibels, as a function of frequency, between SPL in the ear canal and SPL at the reference microphone at the entrance of the ear canal with the hearing aid in the ear and turned off. For each REOR measurement curve, the corresponding REOG curve is calculated and automatically plotted to the REOG screen. The REOG function is useful in determining the acoustic seal of a hearing aid, relative to a sound field outside the ear.</p> |
| <p style="text-align: center;">O/E</p> | <p>Some clients report they seem like they are “speaking in a barrel” or “feel blocked up”. These are signs of a build up of low frequency energy in the ear canal. This excessive occlusion can be measured objectively in the Occlusion Effect task.</p> |
| <p style="text-align: center;">RECD</p> | <p>The Real Ear to Coupler Difference (RECD) is used to simulate real ear measurements by coupler measurements and is useful when fitting children or “difficult” to fit patients. See the section on RECD later in this manual for more detail.</p> |

Sample REM Screens

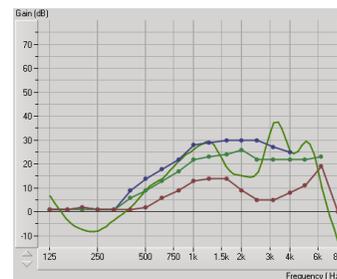
The AVANT™ system supports all current ANSI and IEC Real Ear Measurements. The screenshots below were made using the software defaults. These defaults set the test parameters for each test according to these standards; however the test environment is fully configurable to meet individual professional's needs.



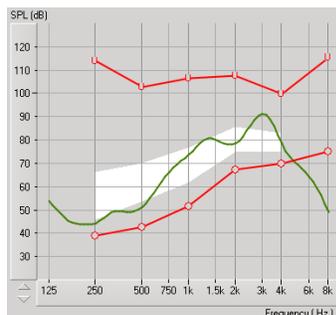
REUR



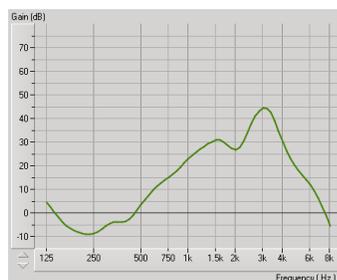
REUG



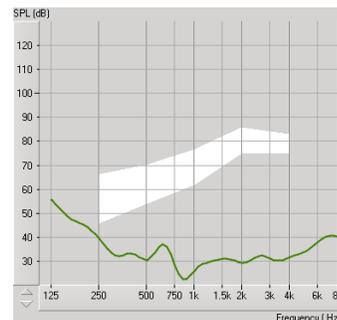
REIG



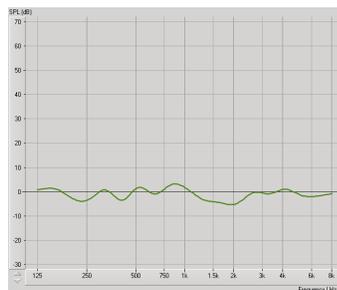
REAR



REAG



REOR



Occlusion Effect

Additional Tests & Features

Real Ear to Coupler Difference (RECD)

The Real Ear to Coupler Difference (RECD) is used to simulate real ear measurements by coupler measurements and is useful when fitting children or “difficult” to fit patients. The RECD values are used as a correction to coupler measures for that client’s hearing instruments. By performing all subsequent measures in the coupler and applying the RECD corrections to the coupler measures, the “real ear” factors are incorporated into the results. The resulting simulated measurements provide information to

select and make adjustments to the hearing instrument and verify adjustments in the hearing instrument test box rather than in the uncooperative client's ear. This is particularly important in the case of children, whose small volume ear canals enhance high frequency amplification more so than in average adults. This is an essential consideration in determining the maximum output of the hearing instrument.

If RECD data is present, the software will display an option to choose between Ear or Coupler measurement on all Real Ear screens where measurements in a coupler are appropriate.

There are two ways to measure the REAR response: using an insert headphone or a hearing instrument.

If a hearing instrument is used, its volume control setting and other parameters should *remain the same* for both REAR and coupler measurements. It is also recommended to set the volume control to moderate, and turn the compression and noise reduction circuits off.

How to perform the RECD

First, perform the REAR task to obtain a REAR curve. This can be measured with a hearing instrument or an insert earphone.

REAR with a hearing instrument



- Adjust volume of the hearing instrument to a comfortable listening level. It is also recommended to turn the compression and noise reduction circuits off.
- Position the client less than one meter from the speaker and facing the speaker.
- Place the hearing instrument and the probe microphone tube as for all REM measurements.
- Select *START* to open the measurement type selection screen.
- Choose the REAR with a Hearing Aid option.
- Select *OK* to begin the test and wait until it concludes.

REAR with an insert headphone



- Place the probe microphone tube as for all REM measurements but use the insert headphone instead of a hearing instrument.
- Select *START* to open the measurement type selection screen.
- Choose the REAR with an Insert Headphone option.
- Select *OK* to begin the test and wait until it completes.

RECD Coupler response

When the REAR is complete, you are prompted to perform a coupler measurement.



- Attach the hearing instrument or the insert headphone (*must* be the same as in the REAR test) to the appropriate coupler and place the probe tube inside the coupler as shown.
- If a hearing instrument is used, be sure to perform this measurement at the same volume control setting as the first measurement.
- Select *START* to open the measurement type selection screen.

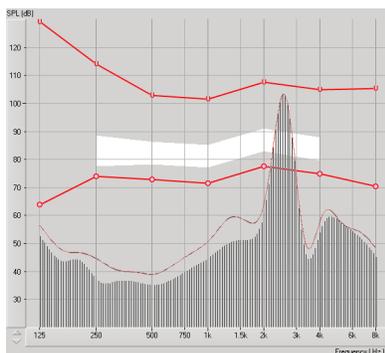


- Choose the Coupler Response option or Use Stored to skip the measurement (see note below).
- Select *OK* and wait until the test completes.
- The calculated RECD curve is automatically displayed on the screen and is stored in memory for correction of subsequent test box measurements made from the RECD function.

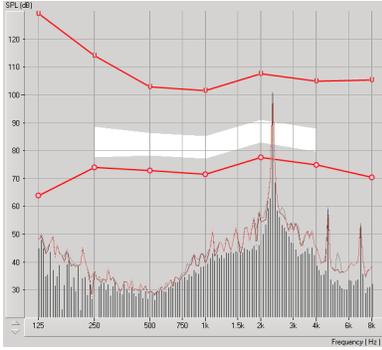
Note: If the REAR and the coupler response were measured with the insert headphone, the program saves the coupler response curve for later use. In this case to obtain another RECD, only REAR with insert headphone measurement is necessary. This is possible because the coupler response does not change provided that *neither the coupler nor the insert earphone has changed*.

Measuring Acoustic Feedback

Feedback (whistling, howling) is one of the most common complaints of hearing instrument users. Even though many modern hearing instruments have sophisticated feedback management systems, knowing exactly where the feedback is occurring can greatly reduce the time required to resolve the problem. The Avant REM Speech system does an excellent job measuring and displaying acoustic feedback.



1. Place the calibrated probe tube in the ear canal as instructed on page 34.
2. Place the hearing instrument in the ear without disturbing the probe tube.
3. Begin a Live Speech Mapping session as instructed above.
4. When feedback is present, click the Start button.
5. Acoustic feedback appears as a large spike in the LSM response.



If a more specific frequency analysis of the feedback is desired, change the resolution of the system to 1/24 octave by clicking the Options menu item and changing the Analyzer selection using the pull-down menu. This image shows the same feedback as above at 1/24 octave.

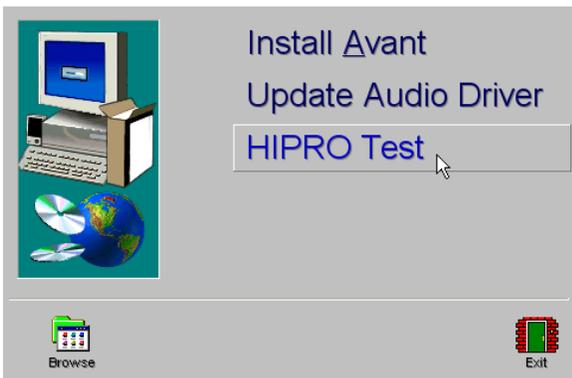
Using this information, make any needed adjustments to the hearing instrument to reduce or remove the feedback.

Using the Integrated HiPRO Interface

The AVANT™ system includes a Hi-PRO interface. The Hi-PRO is the industry standard for wired connection to hearing instruments. After successfully loading the AVANT™ system drivers as described in the AVANT™ Installation Manual, the Hi-PRO should function normally.



1. Locate the appropriate Hi-PRO cable as instructed by the Hearing Instrument Manufacturer.
2. Carefully plug the Hi-PRO cables into the AVANT™ system unit as shown on the left.



If you are having technical issues with the Hi-PRO, run the HiPRO Test as follows:

1. Place the AVANT CD in the CD Drive
2. When the screen on the left appears,
 - **Click HIPRO Test**

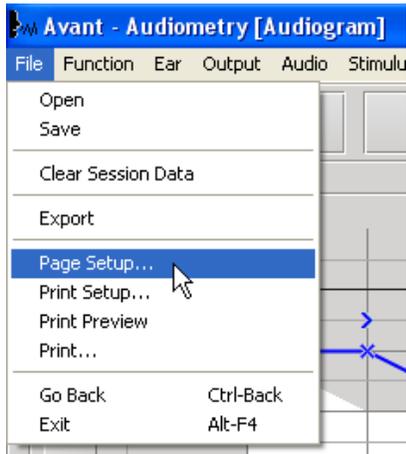
If this screen does not appear,

- Click on Start
- My Computer
- Double-click the CD Drive

If you still have difficulty with the Hi-PRO, contact MedRx Technical Support at (888) 392-1234.

Printing

Printing within the AVANT™ software is very simple.



From the File menu, click one of the following options:

Page Setup – Allows you to set margin sizes and the default text header for your reports.

Print Setup – selects the printer you want the report to be sent to.

Print Preview – Shows you what your report will look like before you print it.

Print – Sends the report to the printer. This option opens the Windows Print dialog which allows the user to select any installed printer and modify the properties (quality, number of copies, etc.) for the print job.

Limited Warranty

MedRx, Inc warrants this product to be free from defects in material and workmanship for one year from the time of purchase. If this system fails to perform as specified during this period, the purchaser is responsible for calling MedRx at (888) 392-1234 or (727) 584-9600. The company's representative will advise the owner to either return specific components or the entire system to:

**MedRx, Inc.
1200 Starkey Road #105
Largo, FL 33771 USA**

MedRx will repair or replace any defective devices, fully test the system and/or components and ship the system promptly back to the owner. There is no cost for the repair or return shipping, provided the system is one year old or less and has not been misused, abused or damaged. Such damage includes, but is not limited to, dropping, exposure to excessive heat greater than 100°F and water/liquid damage.

Repair or replacement of the system as provided under this warranty is the sole and exclusive remedy of the purchaser. MedRx shall not be liable for any consequential or incidental damages or for breach of any express or implied warranty. Except to the extent of applicable law, any implied warranty, merchantability or fitness of this product is limited to the duration of this warranty.

MedRx will, at its discretion, service and repair out of warranty products at the purchaser's request, charging for parts and labor as necessary.

The limited warranty is deemed void if software or hardware is installed on this product which is not pre-approved by MedRx, Inc. Approved software includes NOAH™ and HIMSA approved hearing aid manufacturer programming modules for fitting hearing aids.

MedRx, Inc is not responsible for problems resulting from installation of unapproved software or hardware. In the event of unapproved software or hardware installed on the system causing a conflict, MedRx will service the product for a fee to be determined at the time of service.

Any extension of this warranty past the initial one-year warranty is subject to the following (where applicable).

1. A \$300 deductible per repair.
2. Extended warranty does not include cables, connectors or peripherals.
3. Extended warranty of the Video Otoscope covers optics only.