

TRAINING MANUAL

AVANT™

AUDIOMETER



MedRx INC.®

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#0086



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Introduction

The AVANT Audiometer represents a new era of PC-based diagnostic audiometry for your office. This PC-Based system supports current ANSI and IEC audiometric tests. This manual assumes that the system hardware, software and drivers are installed and working properly. Please refer to the MedRx AVANT Audiometer Installation Manual for assistance. The AVANT Audiometer Installation Manual is included in the original AVANT Audiometer packaging in both printed and PDF formats.

The scope of this manual is to get you “up and running” with the AVANT Audiometer 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 Audiometer Software

General Overview

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

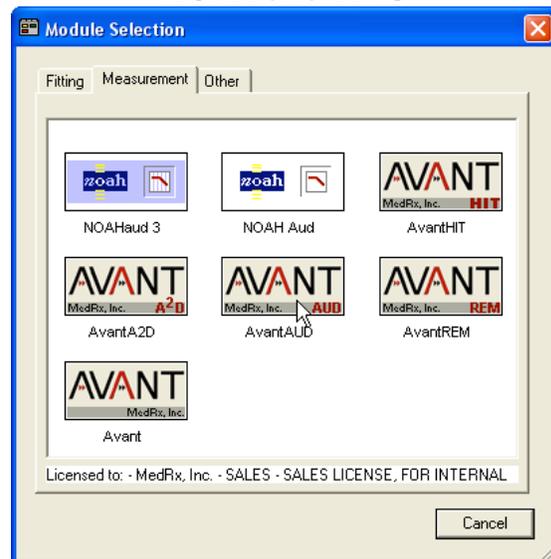
Launching the Software

Stand Alone



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

NOAH and TIMS



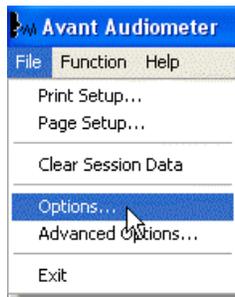
1. Launch NOAH
2. Open the Module Selection screen
3. Click the Measurement Tab
4. Double click the **AvantAUD** icon

Software Options

Basic Options

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

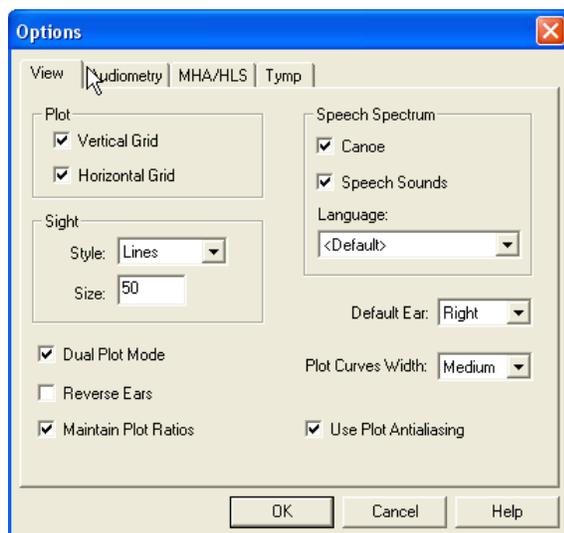
Access these options from the File Menu on the AVANT Audiometer Main Screen as shown below.



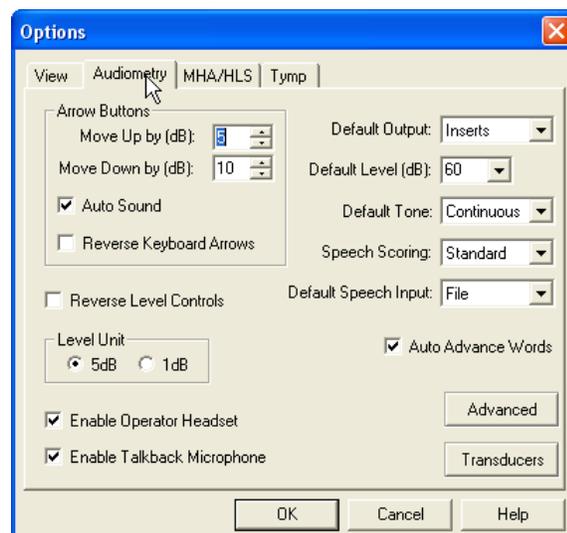
The Options may also be accessed from the Audio screen by clicking on the Options text menu as shown below



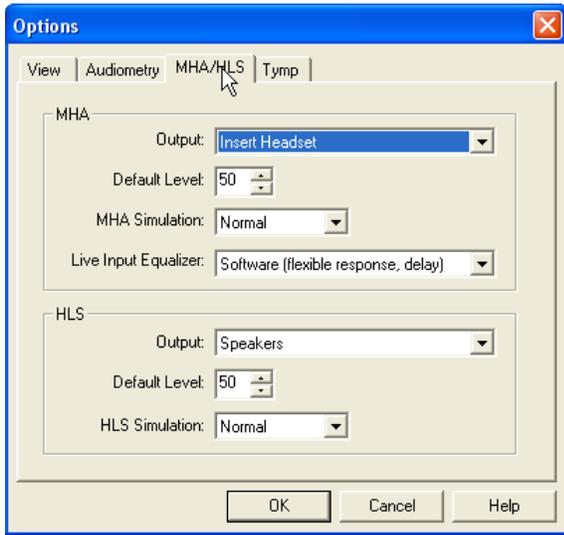
The screen shots below detail the Basic Options available in the AVANT Audiometer software.



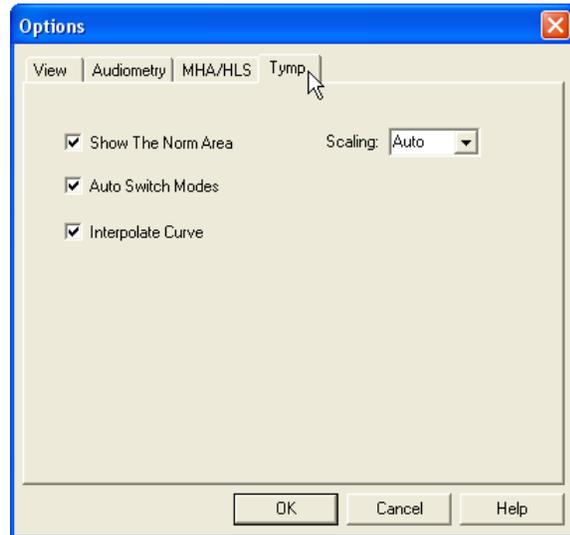
The View tab allows you to set the default appearance of the test environment.



The Audiometry tab sets the look and behavior of the AVANT Audiometer.



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

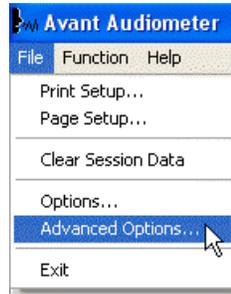


If your system has a Tympanometer connected, this tab will assist in configuring the look of the display.

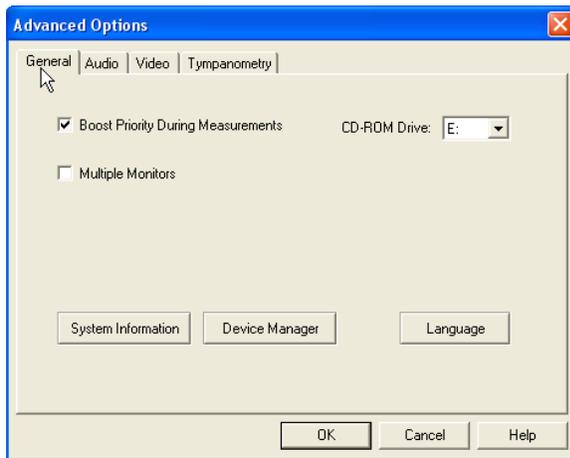
NOTE: Remember, that more information is always available in the Interactive Help System by clicking the Help icon or pressing the F1 key.

Advanced Options

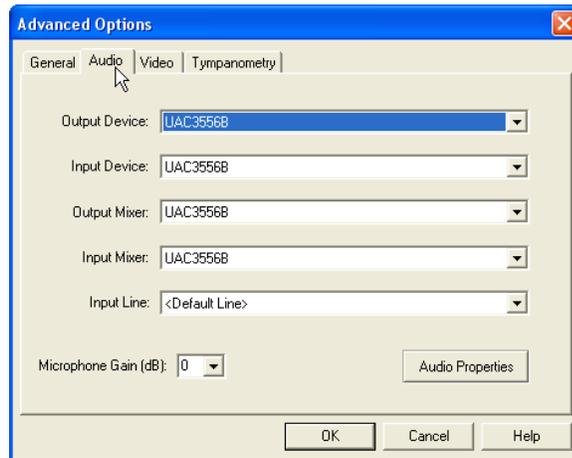
The Advanced Options screen allows you to configure your system to meet your individual clinical needs. It also provides MedRx Technical Support with tools for helping you troubleshoot technical issues. Access this screen from the File Menu on the Avant Main Screen as shown to the right.



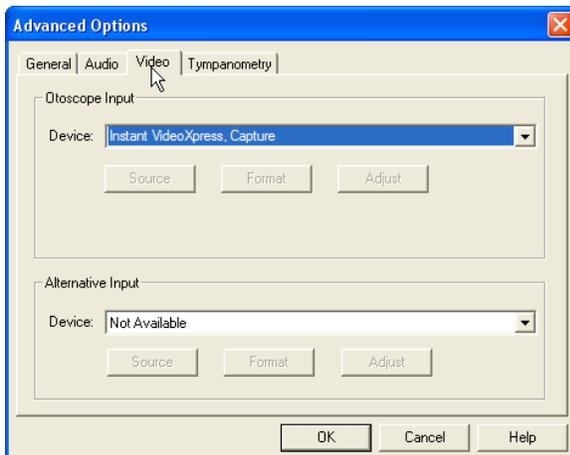
The key features of each tab are described below. For more in-depth information, consult the interactive Help system within the software by pressing the F1 key or clicking the Help icon.



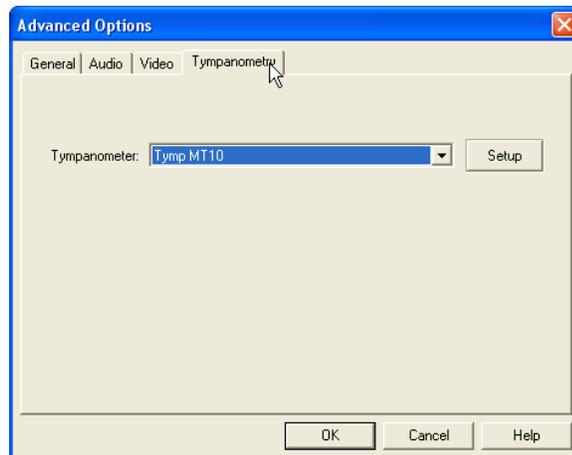
The General Tab configures the overall AVANT Audiometer behavior with respect to other Windows programs, specifically NOAH.



Use the Audio Tab to select the proper audio device for your AVANT Audiometer. 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 the driver and software that control it are correctly installed.

Preparing for Testing

Connecting the Peripherals



After you install the drivers for your AVANT Audiometer (See AVANT Audiometer Installation Manual) you need to AVANT Audiometer 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

If you are installing the AVANT Audiometer outside a sound booth, connect the Patient Response, Talkback Mic, Bone Conductor, Speakers and Earphone cables to the inside of the patch panel and then connect your patch cables from the outside of the patch panel to the AVANT Audiometer as shown. If your booth did not include patch cables these are readily available from electronics or stereo stores, or from MedRx.

To install the AVANT Audiometer inside the booth, simply reverse the above, connecting the operator side cables (USB, Operator Mic, and Monitor) to the patch panel. In most booths, the USB cable will need to pass through the booth and be packed with foam and caulking. Consult your booth installer for specific instructions.



Insert Earphones



TDH-39 Earphones



Bone Conductor



Talkback Microphone



Patient Response Switch



Operator Mic & Monitor



USB Cable



Optional HDA 200 High Frequency

Placing the Earphones on the Patient

The AVANT Audiometer 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.

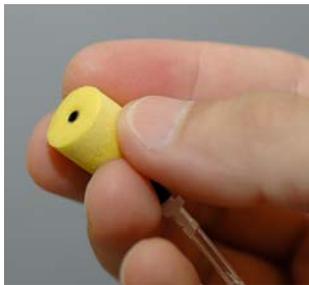
Eartone 3A Insert Earphones

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. These tips are designed for single patient use and should not be washed and reused.

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

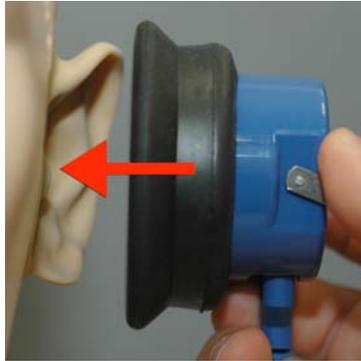


2. Carefully compress the tip between your fingers to allow it to fit into the patient's ear canal as shown. Do not roll the tip between your fingers.



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.

Optional Extended High Frequency Earphones (HDA200)

Note: The HDA200 Earphones are part of an upgrade option for the AVANT Audiometer. If you need to test frequencies beyond 8000 Hz, you must notify MedRx at the time of order. This option carries a price differential which will be detailed at the time of order.



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.

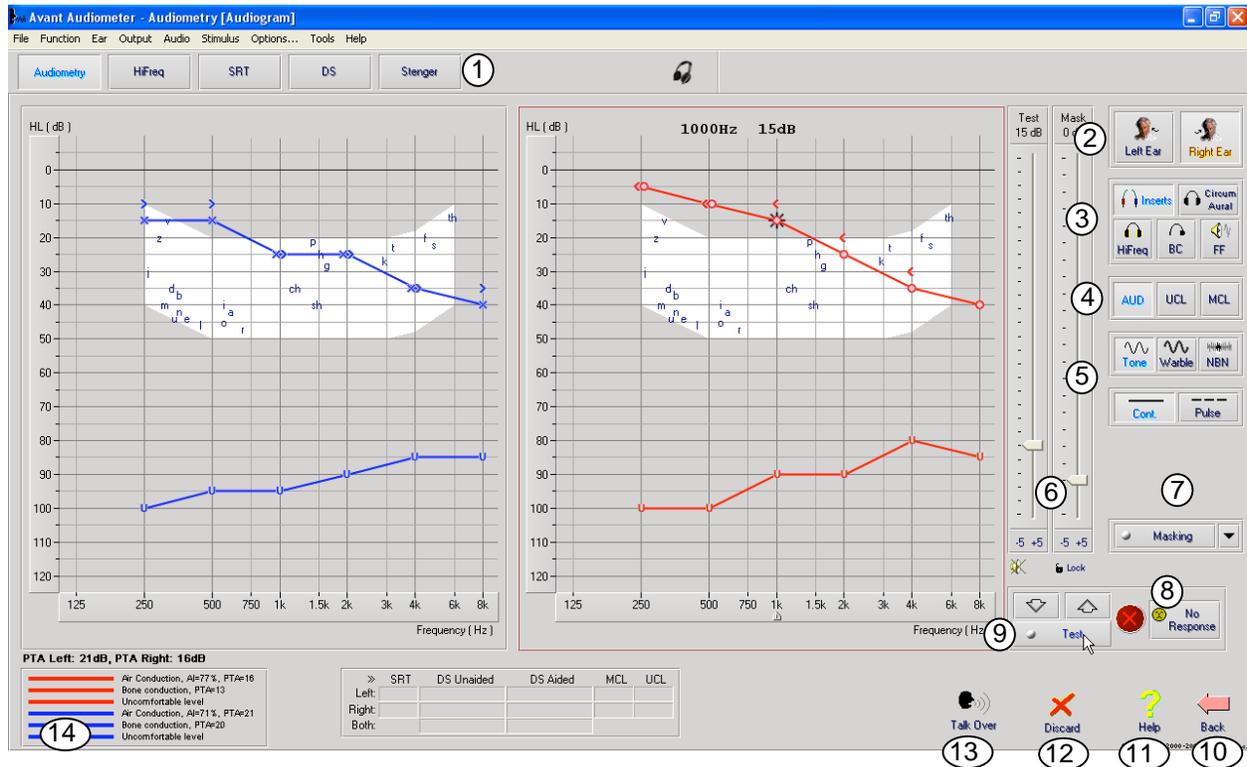
Placing the Bone Conductor



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 Audiometer main window. The sections of the manual that follow explain how to use these tools to perform hearing evaluations using your AVANT Audiometer.



- | | |
|---|-----------------------|
| 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 Audiometer 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 page 8.

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

1. From the main A²D 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 above and inside the legend as follows:

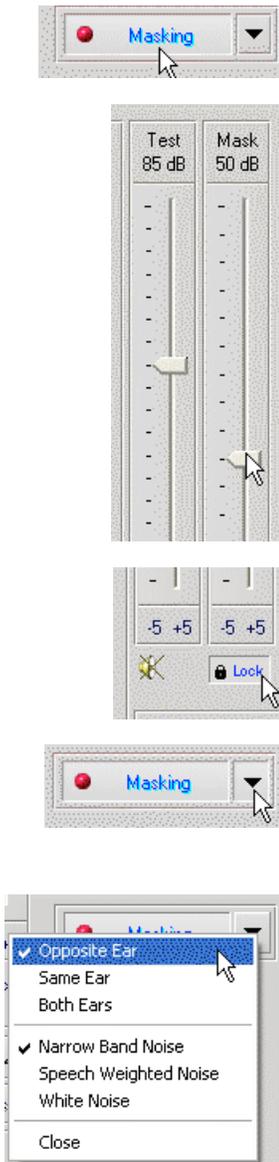


Pure Tone Audiometry via the Bone Conductor

1. Following the instructions on page 9, 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 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 Audiometer, 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 for pure tone 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.

Optional High Frequency Audiometry

The AVANT Audiometer is available with the option to perform extended high frequency pure tone audiometry. This is used clinically to evaluate noise induced hearing loss, ototoxicity and tinnitus. High frequency testing uses the same procedure as described on page 12 for pure tone audiometry with the following exceptions:



1. Select the **HiFreq** button from the test selection toolbar before you begin. This will automatically switch the output transducer selection to the HDA200 High Frequency Headset
2. Conduct the Pure Tone testing as described above. The screen will adjust to display the extended high frequency range from 8,000 Hz to 16,000 Hz.

Note: Extended High Frequency Audiometry is an upgrade option for the AVANT Audiometer. If you need to test frequencies beyond 8000 Hz, you must notify MedRx at the time of order. This option carries a price differential which will be detailed at the time of order.

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.

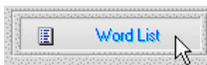
The sections below detail how to perform these tests on the AVANT Audiometer.

Speech Reception Threshold (SRT)

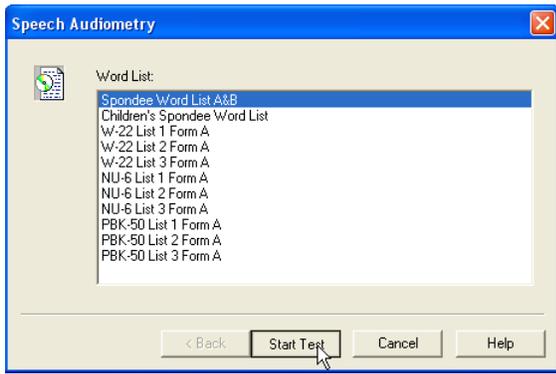
The Speech Reception Threshold (SRT) is defined as the lowest level at which the patient can repeat Spondee words with 50% accuracy. Spondee words are two syllable words with equal vocal emphasis on each syllable such as “baseball” or “hotdog.”

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.

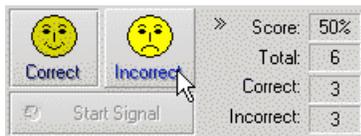


4. Select Spondee Word Lists A&B from the list.

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.

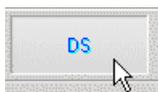
Speech Discrimination (DS)

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.

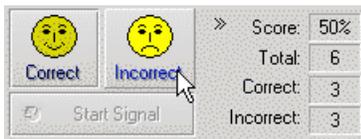
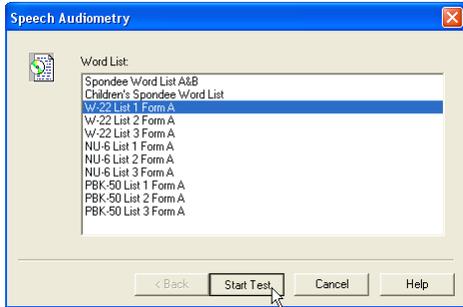
Before beginning the test, instruct the patient that they will hear a series of one-syllable words. They are to repeat the words the best they can. If they are not sure of a word, they should take a guess.



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



10. Click the SRT 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.

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:

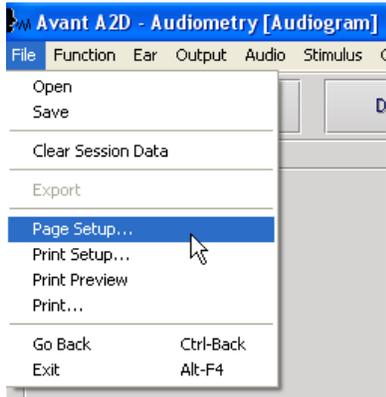
1. Select the *Master Hearing Aid (MHA)* icon from the main screen.
2. Enter the Audiogram values manually if the data is not automatically imported to this screen.
3. Select the input signal type: *File, CD, Mic, or Record*.
4. Select *Monaural* or *Binaural*
5. Select the *Normal* icon, which will 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.

Printing

Printing within the AVANT Audiometer 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 the AVANT™ Audiometer 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. 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

MedRx will repair or replace any defective parts, fully test the system and/or components and ship the system promptly back to the owner. There is no cost for this warranty service, 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 components 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 the AVANT Audiometer 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 with the AVANT A²D Audiometer functions, MedRx will service the problem for a fee to be determined at the time of service.

Consult your MedRx Technical support member for other alternatives for back up.



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