

Step-by-Step RECD Guide

The RECD task involves 4 steps:

- 1 - Complete Calibration of the Speakers and Probe Tube
- 2 - Measure an Ear Response
- 3 - Perform a Coupler Measurement
- 4 - Apply the RECD Data to your Hearing Aid Fitting

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

STEP 1 Calibration

Speaker Calibration: Go to *Tools* in the top tool bar and select *Calibrate Speakers*. Hold the probe microphone roughly one-half to one meter (19-39") from the speakers. Click *Start* to run the calibration. Increase speaker volume until software no longer states *increase volume*. If using the REM+ system, do this for both the right and left probe microphone.

Probe Tube Calibration: Go back to *Tools* in the top tool bar and select *Calibrate Probe Tube*. Place the tube in the V-notch (which is located on the illuminated portion of the probe microphone). This V-notch will hold the tube in place for calibration. The tip of the tube should be lying directly over the top of the reference microphone in the center (see picture left). Hold the probe microphone roughly one-half to one meter (19-39") from the speakers. Click *Start* to run the calibration. Again, if using the REM+ system, do this for both the right and left probe.



STEP 2 Measure

There are two different methods to measure the Ear Response:

Method A: Using a Hearing Aid

Method B: Using an Insert Headset

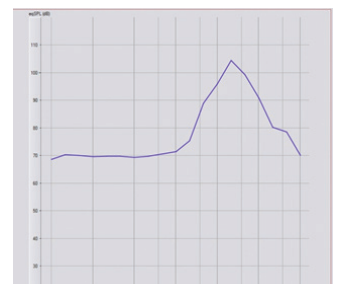
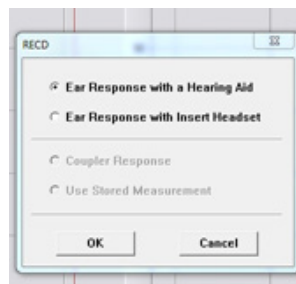
Method A: Ear Response using a Hearing Aid



- Adjust volume of the hearing aid to moderate comfortable listening level. **Turn the compression and noise reduction circuits off.**
- Position the client roughly one-half to one meter (19-39") from the speaker, facing the speaker.
- Place the hearing instrument and the probe microphone tube as for all REM measurements.

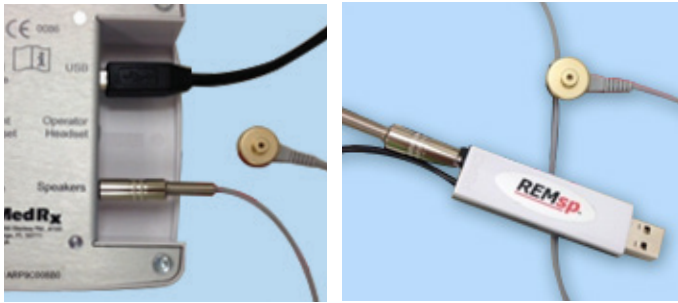


- Select the green *START* button to open the measurement type selection screen.

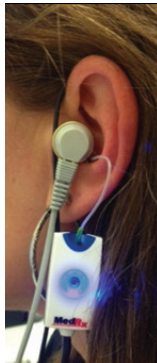


- Choose the Ear Response with a Hearing Aid option.
- Select OK to begin the test and wait until it completes.

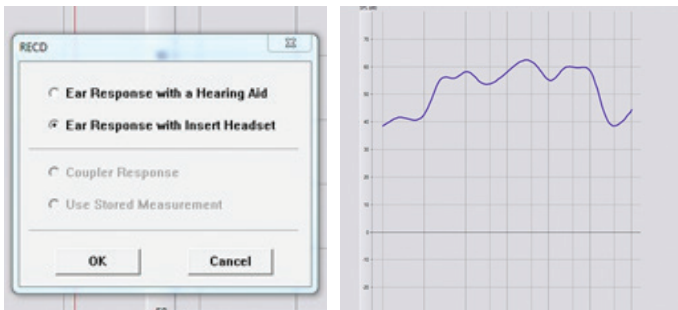
Method B: Ear Response with an Insert Headphone



- Plug the Insert Headphone into the port labeled *Speakers* on the REM+ system. For the REMsp, plug the Insert Headphone into the speaker port located at the base of the hardware.
- Place the probe microphone tube as for all REM measurements and use the insert headphone instead of a hearing instrument. (Add ear tip to Insert Headphone).



- Select the green *START* button to open the measurement type selection screen.



- Choose the *Ear Response with Insert Headset* option.
- Select *OK* to begin the test and wait until it completes.

Once the Ear measurement is complete (whether with a Hearing Instrument or with an Insert Headphone), you are prompted to perform a Coupler Response measurement.

STEP 3 Coupler Measurement

There are two ways to measure a Coupler Response:

Method A: Using a Hearing Aid

Method B: Using an Insert Headset

NOTE:

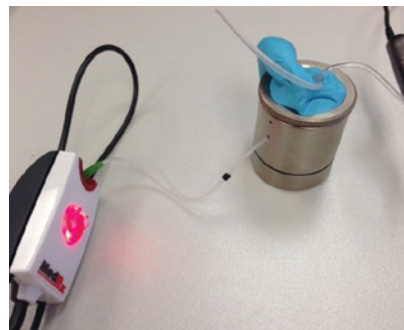
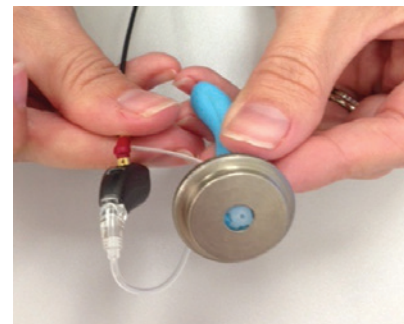
It is important to be consistent with the method used for obtaining the ear response. If the ear response was measured with a hearing instrument, use a hearing instrument for the coupler response. If an insert headphone was used for the ear response, be sure to use the insert headphone for the coupler response as well.

NOTE: If using a Hearing Aid:

- The coupler measurement can be done either in a REM coupler, or in a Test Box (if available)
- Hearing instrument volume control setting and other parameters must remain the same for both Ear Response and Coupler Response measurements. It is recommended to set the hearing aid volume control to moderate (approximately 60dB-70dB in the ear with 65dB input), and **turn the compression and noise reduction circuits off.**
- Not to be used with open fit hearing instruments due to minimum output in the low and mid frequency ranges.

Method A: Coupler Response with a Hearing Aid

- Attach the hearing instrument to the REM coupler. The hearing aid settings must be the same as in the Ear Response test.
- Place the probe tube into the customized opening in the side of the coupler.



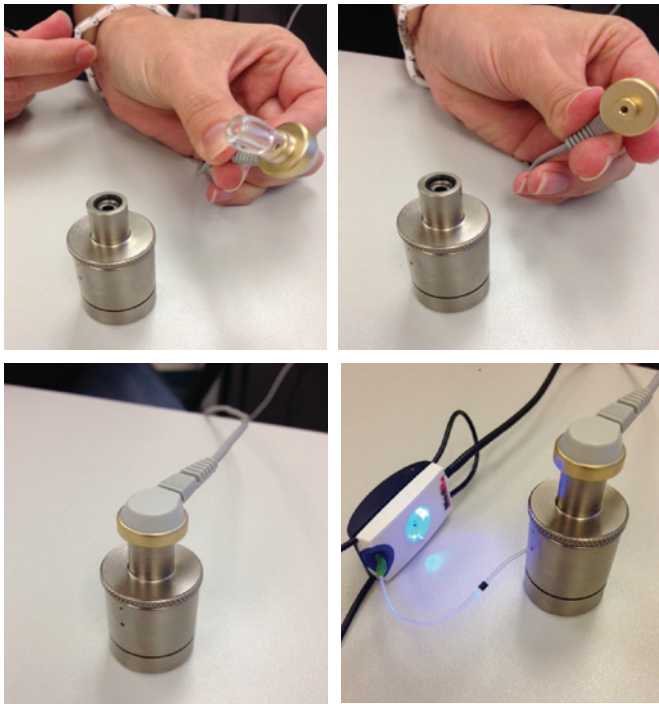
- Select *START* to open the measurement type selection screen.



- Choose the Coupler Response option. If an RECD Measurement curve has already been established from a previous session, select the *Use Stored Measurement* option if you wish to use that data.
- Select *OK* and wait until the test completes.

Method B: Coupler Response with an Insert Headphone

- Verify the Insert Headphone is plugged into the *Speakers* port on the REM+ system or plugged into the speaker port of the REMsp system located at the base of the hardware.



- For the Insert Headphone, remove the ear tip and place on the coupler using the body aid coupler attachment piece.
- For the REM coupler, insert the probe tube via the hole on the side of the coupler (see pictures above).
- Select *START* to open the measurement type selection screen.



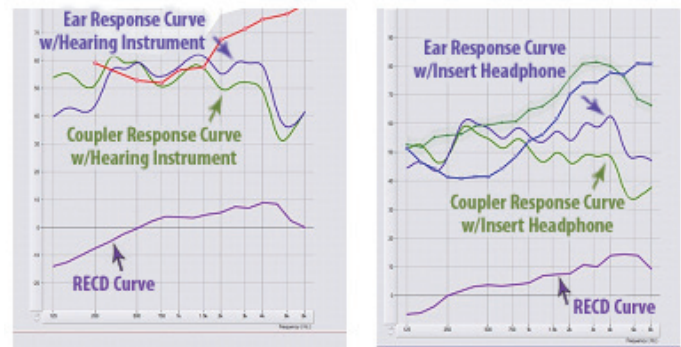
- Choose the Coupler Response option. If an RECD Measurement curve has already been established from a previous session, select the *Use Stored Measurement* option if you wish to use that data.

NOTE:

If the Ear Response 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 Ear Response 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.

- 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 coupler measurement made from the RECD function. The RECD curve is calculated based upon the Ear Response and the Coupler Response. Simply stated, the RECD curve is the difference between the Ear Response and the Coupler Response.



Coupler Response in a Test Box

- Attach the hearing instrument (must be the same as in the Ear Response test) to the box coupler.
- Close the box lid tightly.
- Select the *Box Coupler* button.
- Select *START* to open the measurement type selection screen.
- Choose the Coupler Response option or Use Stored to skip the measurement.
- 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.



How is the RECD used?

The RECD values are used as a correction to coupler measures for a 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 coupler (or 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 on the right side of the screen to choose between Ear or Coupler measurement on all Real Ear screens where measurements in a coupler are appropriate. Again, the coupler measurements can be performed in a REM coupler or in a test box (if available).

What do you do with the RECD data?

Once the RECD data is calculated and a curve is established, the data can then be used in most hearing aid fitting software programs. Many hearing aid manufacturers have an RECD section within their fitting software and is used when calculating *first fit* or *auto fit* programs.

Within the MedRx REM system, the RECD needs to be exported to a data file. This can be accomplished by following the steps below:

- From the RECD screen, go to *File* then select *Export*.
- A *Save As* window will pop up.
- Name your file accordingly and select *Save*.
- Once you save the file, it will show the data in raw numbers.
- Place the numbers for RECD Left Ear or RECD Right Ear in the hearing aid programming software in the appropriate locations.

Once the RECD data is recorded in the hearing instrument fitting software, run the *first fit* or *auto fit* feature. Once the hearing instrument is programmed, the program can then be measured against a target using traditional real ear measurements or speech mapping within your MedRx REM system.

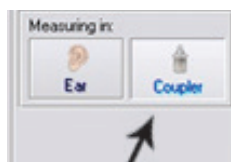
STEP 4 Apply The RECD Data

How do you apply the RECD data to your fitting?

The hearing instrument should be placed in the coupler and positioned within 19-39 inches (one-half to one meter) from the speaker. Place the probe tube inside the coupler (see picture below).



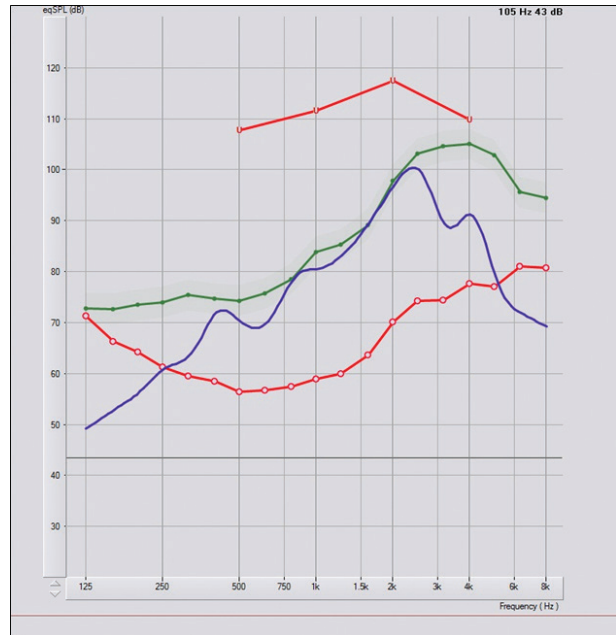
Once the hearing instrument and probe tube are placed in the coupler, a measurement can be taken. In the MedRx REM software, choose the preferred method of measurement, Real Ear Measurement (REM) or Live Speech Mapping (LSM). Select *Measuring In: Coupler* at the bottom right of the measurement screen.



Press the green *Start* button to perform your measurement.

Compare the outcome to target and make adjustments if necessary in the hearing instrument fitting software.

It may be necessary to take multiple measurements if adjustments are made to the hearing instrument. Below are examples of measurements matching target that were taken in the coupler with the hearing instrument.



Real Ear Measurement matching NAL-NL2 Target at 65dB



Live Speech Mapping Measurement Matching Modified Speech Spectrum at 65dB

Manual Input

If already known, RECD data can be entered manually. Click *Manual* button, then click on the plot to enter points.

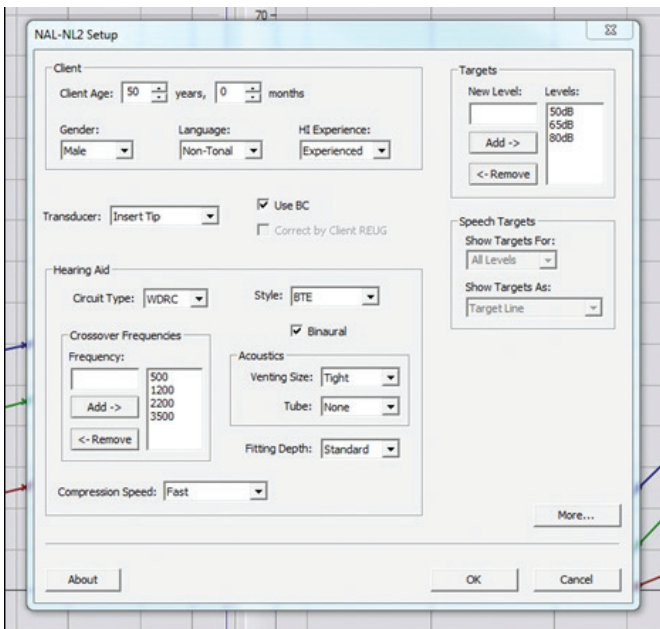
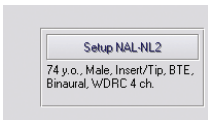
Click *Manual* again to finish entering points.

Predicted RECD

RECD can be calculated by prescription rule formulas. Currently only NAL-NL2 is used to calculate RECD data. Select NAL-NL2.

Warning: Predicted RECD calculation depends on many rule parameters, such as patient's age and gender, HI acoustics, insertion depth and venting size. Make sure these parameters are set correctly in the Rule Setup.

To get to the Rule Setup click on the "Setup NAL-NL2" icon on the right hand side.



Example of rule setup screen options.

When possible, measuring RECD is preferred over using predicted values.