Using DSL in the Affinity System: The Basics

Setting up: Open **Noah 4** software. Create a new client by choosing the <**add new patient**> icon or choose an existing client under **Patient Browser**. Enter client details.

Audiogram: Choose the **Noah Aud** tab at the top left hand corner of the Noah 4 page. Enter the following audiogram for one ear, choose <**Save**> at the top and exit.

Frequency (Hz)								
250	**500**	**750**	**1000**	**1500**	**2000**	**3000**	**4000**	**6000**
	60		65		55		60	

This will bring you back to the Noah 4 page. Press the **Affinity Interacoustics** tab at the top of the page. To bring over your client's audiogram or a previously entered audiogram, choose the drop down menu labeled <**Current Session**> under the section **Protocols and Sessions**. Select the date of your client's audiogram. The audiogram will appear on the graph in the **AUD** tab.

Now that your audiogram is entered, select the **REM** tab on the top right hand corner of the screen.

Fitting Settings: A **Fitting Prescription Settings** window will appear. Enter the settings for your client. For this example, we will use the following settings:

Default prescription:	DSL mi/o
Transducer:	Insert + mold
Hearing instrument style:	BTE
Hearing aid type:	nonlinear
Number of hearing aids:	monaural

Choose OK.

A **Predicted Curve Settings** window will appear. Enter the age and coupler for your client. For this example we will use the following settings:

Age:	8 mos
Coupler:	HA2- Mold

Setting up a Protocol:

There is a preloaded protocol called **<Pediatric Aided Response>**

, which can be found in the drop down menu on the left hand side. If you wish to create your own protocol choose **<Menu>** at the top left hand corner. Select **<Setup>** then **<REM440 setup>**.
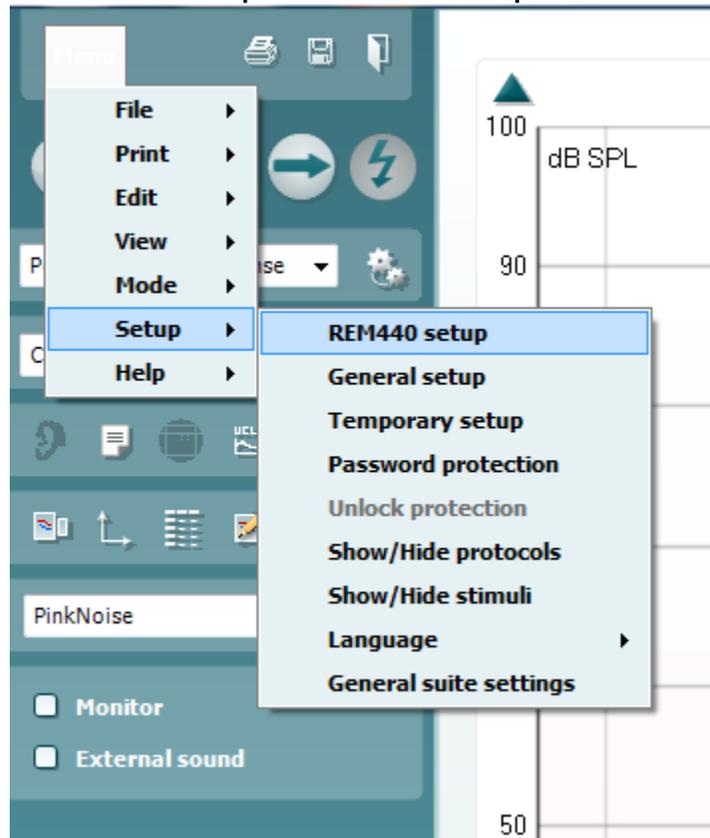
This will bring you to the **Protocol Setup** window. Choose <**New**>. Name your protocol. Choose the options under the **Test Selection** box and **<Add>** the protocol to **Selected Tests**. For this example we will measure RECD, visible speech mapping for soft, average, loud and MPO for a total of 5 tests.
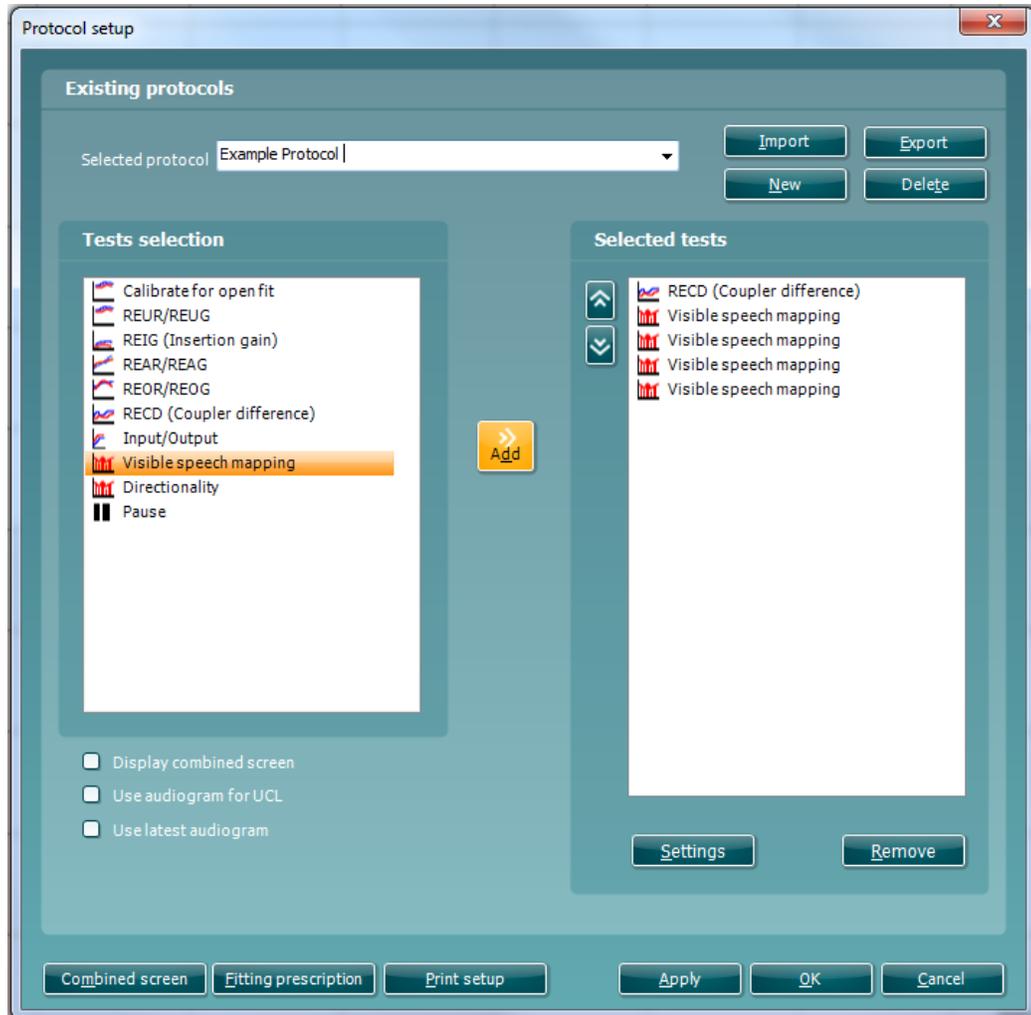
Choose each test and select <**Settings**>. We will choose the following settings for each test (see the table below for the details of each test):

Test	Stimulus Type	Use RECD for both ears	Use Prerecorded coupler curve	Show predicted curve 2cc
RECD	Pure Tone	✓	✓	✓

Test	Stimulus Type	Input Level	Measurement Time	Show SII	Show MPO	Show Target
Visible Speech Mapping for Avg Speech	ISTS	65 dB	15 seconds	✓	—	✓
Visible Speech Mapping for Soft Speech	ISTS	55 dB	15 seconds	✓	—	✓
Visible						

Speech Mapping for Loud Speech	ISTS	75 dB	15 seconds	✓	—		✓
Visible Speech Mapping for MPO	Pure Tone	90 dB		—	—	✓	✓

You can change the color of each test by selecting the <**Left**> or <**Right**> ear tab under **Advanced Settings** and choosing the preferred color for each.

Press <**Apply**> then <**OK**>. Your protocol will now be saved. You can access your protocol by choosing it from the drop down menu at the top left corner.

RECD: Measure RECD:
Choose the **RECD** tab on the lower left side of the screen and select the <**Start**> button. The coupler measurement portion of the RECD is measured yearly and is stored in the system, therefore a coupler measurement does not need to be done. Follow the picture instructions that appear, for measuring the RECD on ear.

Mark the probe tube insertion depth by sliding the black ring along the tube to the following depths:

a. 3-5 mm past the end of the earmold (if you have one)
b. The following distance from the end of the tube (the probe mic can be used as a guide, as shown on the right):

- ✓ Adult males: 31 mm
- ✓ Adult females: 28 mm
- ✓ Children: 15-25 mm

Attach the probes to the hooks on the Affinity®. Place the real-ear module on the client's ear. Carefully insert the probe tube into the client's ear, until the black marker is at the intertragal notch. Use otoscopy (when the marker is still a little further out than the intertragal notch) to make sure that the ear drum is not touched. Place the tube along the bottom of the ear canal. Use lubricant to gently adhere it if necessary.

Place the foam ear tip or mold on the end of the transducer, compress it, and insert it over the probe tube, into the ear. Watch the black mark to make sure it stays in the notch – otherwise you are pushing it in further.

Press <**Continue**> and this will measure the RECD on the client's ear.

Use Predicted RECD:
Choose the **RECD** tab on the left and press the **<Start>** button. When the picture instructions pop up to measure on ear, choose **<Cancel>**. This will use a predicted RECD based on the client's age and audiogram.

Enter RECD:
To manually enter the RECD, choose the **RECD** tab on the left and choose the icon (insert picture) called **<Insert/edit Target>**. This will bring you to a screen called **Edit RECD**. You can manually enter the client's RECD values in the spaces and press **<OK>**.

For this example, we will enter the following RECD values:

				Frequency (Hz)				
250	**500**	**750**	**1000**	**1500**	**2000**	**3000**	**4000**	**6000**
8	9	11	15	16	14	17	19	18

Verifying the hearing aid:
Once you have the RECD values, you can proceed to verify the hearing aid(s) in the coupler. Place the hearing aid on the HA-2 coupler and connect it to the coupler microphone on the Affinity. Align the HA microphone in the centre of the + at the bottom of the test box.

You can toggle between the left and right ear by using the ear icon:

Choose the **Visible Speech Mapping** tab for average speech (65 dB). Select **<Start>**. On the graph, you will see a measurement of the hearing aid response to 65 dB input in the colour you chose. The recording will automatically stop after it has run for 15 seconds. The grey line on the graph indicates the target for 65 dB speech (see below). Adjust the hearing aid gain with the programming software as needed to match the response curve

to the targets. After you make any changes to the hearing aid, ensure that you re-measure the curve.

Repeat these steps for MPO, soft (55 dB), and loud (75 dB) inputs as seen in the screen shot below.

On the top left corner of the screen you can find an icon that looks like this: This icon will allow you to toggle between a single and combined display of curves. You can compare the curves by pressing combined view which looks like this:

Table Values: After you have completed each measurement, you can access the table of values by choosing the <**Table Mode**> icon:
The grey numbers in the table represent the target values and the coloured numbers correspond to the colours chosen for each measured curve.

SII: For each measurement of **Visible Speech Mapping** (for soft, avg, loud), the SII percentage value can be found at the top of the graph after each measurement.
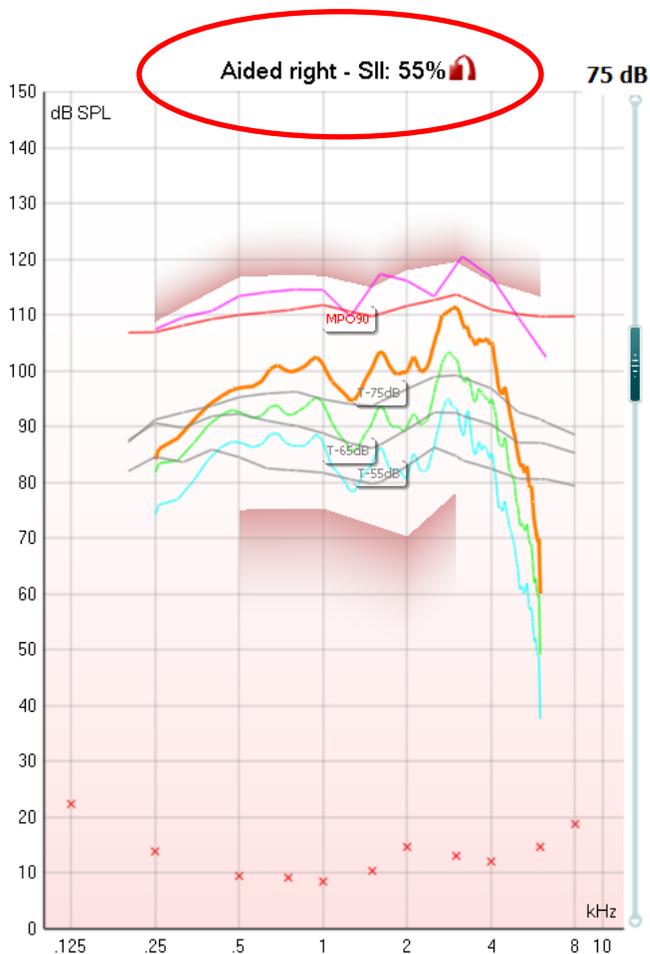
Saving: You can save the session by choosing the **<Save>** icon ▢ at the top left hand corner. There are options to either save and proceed to a new session or there is the door icon ▢, which will allow you to save and exit. Your session will save as a time and date.

The DSL Protocol for Prescribing and fitting hearing aids for infants and children:

1) Measure Thresholds with insert earphones. If you will fit a BTE, connect the insert phones to the ear using the child's own earmold.
2) Measure the Real Ear to Coupler Difference (RECD), also using the earmold for BTE fittings.
3) Use the data from 1 & 2 to calculate DSL targets, setting the hearing aid style and circuit type in the DSL software or electroacoustic test system. Print out a set of targets for the 2cc coupler, including user gain, full on gain, and maximum output.
4) Using manufacturer's specifications, choose a new hearing aid that has enough power and flexibility to meet targets and provide compatibility with FM systems, telephones, and/or whatever other listening devices will be used.
5) Order the hearing aid.
6) When the aid is received, measure it, and adjust it to meet targets using fitting protocols that are appropriate for your measurement system. Coupler-based verification is recommended for children, especially if the RECD has been measured. Speech-like test signals are best for the 55-75 dB range of input level. For MPO, only narrow-band high-level signals should be used.
7) FM systems are often used, for home and/or school. Coupling the FM to the hearing aid (via DAI or Telecoil) lets the combined FM/HA system use the hearing aid's frequency response shaping. The AAA 2011 FM protocol is helpful in verifying that this has been done correctly.
8) Document your final settings and verification data. Provide the recommended Volume Control setting to the parents if necessary. The use of volume control locks/covers and battery locks/covers are often considered to protect against excessive listening levels and ingestion of batteries.
9) Tools for functional evaluation of the hearing aid are available to determine the impact of the hearing aid fitting (e.g., UWO PedAMP)
10) Follow children regularly. Retesting of thresholds and RECD is recommended at least as often as earmold changes are made. When the RECD is remeasured, the aid should be readjusted to new targets. Remember that the RECD is affected by middle ear status: perforations or PE tubes will have a large effect on the RECD, and therefore on the fitting as well.

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