

# The DSL Fitting Method

on the FONIX FP40  
Hearing Aid Analyzer



Version 3.40 and higher



The Desired Sensation Level (DSL) method is a hearing aid selection and fitting approach with the goal of making amplified speech audible. The desired sensation levels for amplified speech are determined at each frequency for all degrees of sensorineural hearing loss. The DSL method is not an insertion gain formula approach: i.e. NAL, POGO, etc., but it does use probe microphone instrumentation as well as 2cc coupler measurements in the test box. DSL was originally developed for use with children and later expanded to include adults.

The following is a workbook designed to help you use DSL on the FP40 hearing aid analyzer.

## **Performing Real Ear Measurements using the DSL method**

Before your patient comes into the office:

1. Press F5 – PROBE
2. Press F2 to select SPL
3. Press F4 – TARGET
4. Press F3 – Select DSL LIN or DSL WDRC.
5. Press F1 to select ear.
6. Press F6 to select age.
7. Enter Audiogram with Amplitude and Frequency knobs
8. If desired, press F2 to select UCL and enter UCLs with Amplitude and Frequency knobs.
9. If DSL WDRC is your fitting rule, press F2 again to select CT and use the amplitude knob to adjust the compression threshold of the hearing aid to desired setting.
10. Press F5 to generate Target and UCLs (if not entered)
11. If necessary, press F1 to select other ear and repeat steps 6-10.
12. Press F4 to go back to Probe screen

When your patient is in your office:

1. Put ear hook and reference microphone on patient's ear, and arrange patient at a 45 degree angle to the speaker.
2. Press [LEVEL] and [START/STOP].
3. Insert probe microphone and hearing aid.
4. Press F7 to toggle desired test signal.
5. If desired, use Amplitude knob to change amplitude.
6. Press [START/STOP] to begin first measurement and [START/STOP] again when satisfied.
7. The soft speech curve should be above the patient's thresholds (T's).
8. Press F3 to select AIDED 2.
9. If desired, use Amplitude knob to change amplitude.
10. Press [START/STOP] to begin measurement and [START/STOP] again when satisfied.
11. The medium speech curve should meet the target (A's).

12. Press F3 to select AIDED 3.
13. If desired, use Amplitude knob to change amplitude.
14. Press F7 to select SHORT SWEEP to minimize client exposure to loud signal.
15. Press [START/STOP] to perform short sweep.
16. The loud sweep should be below the UCLs (U's).

## **What is RECD and why would I want to use it?**

RECD is the real-ear-to-coupler difference: the difference between the acoustical resonance of a 2cc coupler and the acoustical resonance of a person's unaided ear canal. So, you take the frequency response of an insert earphone inside a 2cc coupler and subtract it from the frequency response of the same insert earphone placed inside the patient's ear.

Why would you want to take the RECD? Well, DSL was developed for fitting hearing aids on children, and, as anyone who has fitted an aid on a child knows, it is sometimes hard to make the infant or child sit still long enough to perform good real-ear measurements on them. So, if you can just make them sit still long enough to get a real-ear unaided response, you can get the RECD and use it to convert real-ear targets to coupler targets. Then, you can test the aid all you want in the coupler and send the child to stay with his parents in the waiting room while you program and test the hearing aid in the sound chamber. If you have a really hyper patient, you can even just rely on the average RECD for the child's age group and forgo any real-ear measurement entirely. Of course, when the child gets old enough to sit still long enough to get a good real-ear measurement, real-ear measurements are the way to go.

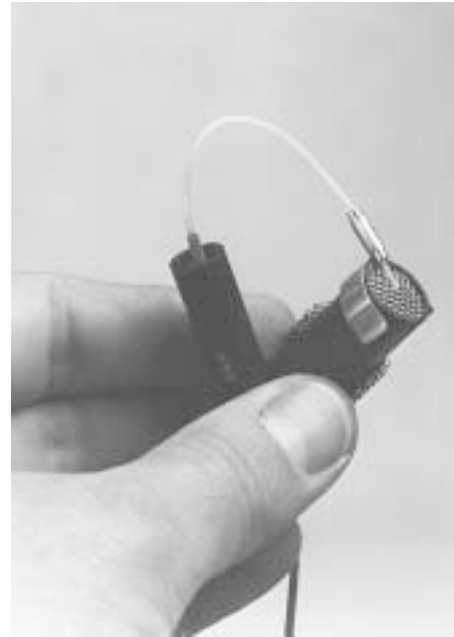
## **How to get the RECD**

### **Coupler Response**

Note: Steps 1-7 are optional but good to do in order to get the most accurate RECD. Also, once you take the coupler response, it is saved into permanent memory until you store another measurement on top of it. From that point on, you can skip this whole section and only take the real ear measurement to get the RECD.

1. From the coupler screen, press F1 – MENU.
2. F4 to CAL MIC(S).
3. Attach the calibration clip to the larger coupler microphone so that the metal tube hangs off the very tip of the microphone.
4. Thread probe tube connected to the probe microphone through tube so that the probe tube sticks out over the grill of the coupler microphone (see picture on next page).
5. Put assembly in sound chamber and close chamber door.
6. Press F6 – COMPEN PROBE.
7. Press F1 – EXIT.

8. Plug insert earphone into the external speaker jack on the back of the FP40. An adapter may be needed.
9. Attach the larger coupler microphone to HA-2 coupler.
10. Attach insert earphone plastic tip to the tubing of the HA-2 coupler.
11. F5 to enter PROBE mode.
12. F1 to enter MENU.
13. F4 to enter calibrate mics.
14. F7 to select HA2 ER3A.
15. Press [START/STOP] to begin measurement.  
A *WAIT* message will appear on your screen. When this message disappears, the measurement has been taken and stored into permanent memory.
16. F1 to exit menu.



*Compensating the FP40 microphones*

### **Real-Ear**

1. Assuming you are in the probe screen and the insert earphone is plugged into the FP40, press F4 to enter target screen.
2. F7 to enter probe-coupler screen.
3. F3 to enter RECD mode.
4. F3 to toggle to MEASURED RECD.
5. Insert probe microphone in client's ear.
6. Insert custom earmold or foam eartip coupled to the insert earphone into client's ear.
7. Press [START/STOP] to perform measurement.
8. Both the curve and the numerical data will appear on the screen.

### **Taking Coupler Responses in the Real-Ear**

1. If you just got done taking the RECD, press F1 – GAIN MODE to enter the target coupler screen. Otherwise, press F5 – PROBE, F4 – TARGET, F7 – COUPLER.

**Note: make sure the insert earphone is unplugged from the FP40. Leaving it plugged in can result in an inaccurate test.**

2. Assuming you have input your audiogram, you should see a target curve on the graph on the screen. Check and make sure that the RESER is set to zero. This is at the bottom of the table in the chart in the middle of the screen.
3. Press F6 to select desired amplitude of test signal.
4. The source type is shown on the screen. The source used is always the last source type you used in the normal probe mode.
5. Press F4 to choose the aid type.

6. Press [START/STOP] to start measurement. If the signal type is composite or digital speech, press [START/STOP] again when satisfied with measurement.
7. If DSL WDRC is your fitting rule, press F6 to adjust the amplitude of the source. Notice that the target changes as the source level changes. Perform the coupler measurements at several different amplitudes to make sure that the AGC circuits of the hearing aid are compressing properly with the measurement meeting the target at different amplitudes.
8. Press F5 to enter SSPL MODE.
9. You should see a series of star symbols on the screen. These symbols stand for the highest comfortable levels predicted for this patient. Again, make sure the RESERVE is set to zero.
10. Press [START/STOP] to take a puretone 90 dB measurement. If the resulting measurement is higher than the target symbols, those sounds will be uncomfortable for the patient. Try to adjust the aid so the measurement only reaches at or below those symbols.

## **Setting DSL as your default fitting rule**

1. Go to the TARGET screen by pressing F7 from the Target Coupler Gain screen or F4 from the Main Probe Screen.
2. Press F3 to select the DSL WDRC or DSL LIN.
3. Press [START/STOP]. You will see a *WAIT* message appear on the screen momentarily. When this message disappears, the selected fitting rule is stored as the default.