# Audiological Bulletin no. 10

Using the fine tuning tools in Sound Explorer
to fine tune gain in Inteo fittings

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This bulletin describes the general fine tuning tools available in Compass when you are fitting and fine tuning Inteo with Compass V4. The descriptions refer to the gain fine tuning options in the Fine tuning window in Sound Explorer in Compass. Please refer to Compass in order to see the details of the screen. Remember that Compass offers several help functions to explain the different options in the program: Tooltips, Using this window panels and the help manual.
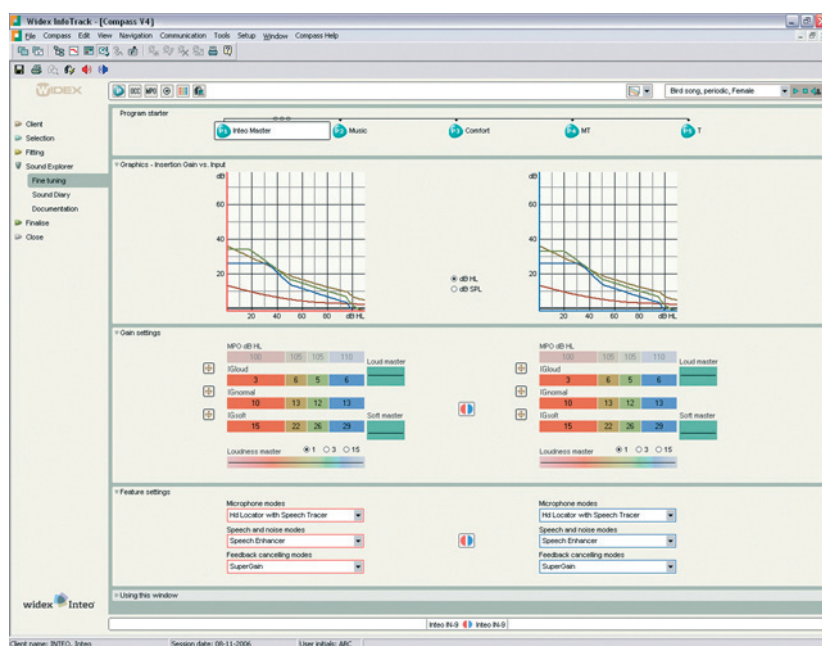
Fine tuning tools

In the Fine tuning window you can fine tune gain and adjust features for each of the selected listening programs. In addition, the Toptool bar gives you access to overall tools that allow you to change program combination (Program manager), fine tune for occlusion (Occlusion manager), adjust the MPO setting (MPO manager), define and fine tune the direct audio input options (DAI manager), view compression data (Compression view), and recalculate program settings (Recalculate).

Fine tuning the Master program

The default Fine tuning window shows the settings for the Master program. The Master program is the primary Inteo listening program, and unless you have added extra listening programs, this is the only program in the hearing aid. The Master program is designed to provide the best possible overall performance in all environments. All adaptive features work together through the actions of the Dynamic Integrator to optimise audibility, intelligibility and comfort.

When fine tuning the Master program, the basic Sound Explorer tools can be used to recreate and analyse problematic sound environments and to demonstrate the effect of any adjustments.

In the Gain settings panel you can use the composite handles to make overall adjustments of groups of parameters (compression and gain), or you can use the insertion gain matrix to make individual insertion gain adjustments at specific input levels and frequencies. Note that any changes in the gain

settings for the Master program will automatically affect any other listening programs, unless you choose to unlink the individual listening programs.

How to fine tune a parameter?

When you want to fine tune a parameter, place the cursor in the field for the parameter you want to change, click once and use the arrows to increase or decrease the level. You can also select several parameter fields and change their settings simultaneously. To select parameters that are next to each other, hold down the Shift key on your keyboard and highlight the desired parameters. Or simply place the cursor on the first parameter, click the mouse button and drag it across all the parameters you wish to adjust.

The composite handles

The Fine tuning window offers three composite fine tuning handles:

- **Loudness master**
  This handle allows you to adjust gain for all input levels simultaneously, very much like a volume control. You may use this handle as one broadband handle for all frequencies, as three handles for the low, mid or high frequencies, or as a frequency specific handle for one or more of the 15 channels individually.

- **Loud master**
  This handle allows you to alter the gain and compression for high level inputs across all frequency channels simultaneously.

- **Soft master**
  This handle allows you to change the mode in which soft level inputs are handled in Inteo across all frequency channels. The Soft master handle offers four settings for the amplification of soft input levels:

Mode (i) **Maximum audibility**: In this position the compression ratio (CR) for the low level compression is set to its maximum 3:1. Gain is not limited by the fitting formula. Gain is only limited if the hearing aid is close to saturation or if instability (feedback) cannot otherwise be prevented. In this position the hearing aid will provide maximum gain at soft input levels.

Mode (ii) **Very low compression threshold**: In this position the CR for the low level compression is set according to the hearing loss. The CR will typically be < 3:1. In this position you will have very high gain suitable for this loss at low input levels. This is the strategy similar to the low level compression in Senso Diva.

Mode (iii) **SII based compression threshold (default)** : In this position the compression threshold is set just below the input level where audibility is needed for optimal speech perception. The CR for the low level compression is set according to the hearing loss like in strategy 2. This position is the default setting. It gives a comfortable sound and optimal working conditions for the Dynamic Integrator.

Mode (iv) **High compression threshold**: In this position the low level amplification is set to linear operation, i.e CR=1:1. In this position you will limit gain at low input levels to a degree that is considered just acceptable for maintaining good speech perception.

Be aware that each step in the Soft Master handle is relatively large and that changes via this handle affect both gain and compression kneepoint for soft input levels. This results in a definite change in the audibility of soft level inputs, such as distant traffic noise or the ticking of a clock. If you only need to make small gain adjustments for soft level inputs, we recommend that you use the IGsoft handles in the insertion gain matrix.

Using the composite handles in fine tuning

The composite handles are useful when you wish to adjust the overall level, binaural balance, frequency balance/clarity, or the level of soft or loud sounds. It is often useful to start fine tuning with the composite handles before moving to the very specific insertion gain matrix, as the composite handles have a more general effect. We suggest you follow a specific sequence of questions relating to the user´s perception of sound, for example:

- Is the overall level ok? If not, use the Loudness master in the "1" setting. This will adjust overall gain for all channels in unison.

- Is the binaural balance ok? If not, again use the Loudness master in the "1" setting to make adjustments for the left and/or the right ear respectively.

- Is the frequency balance/clarity ok? If not, use the Loudness master in the "3" setting to adjust overall gain for groups of channels: the low (0-800 Hz), the mid (800-2500 Hz), or the high (2500-8000 Hz) channels.

- Are there problems with loud sounds? Use the Loud master to adjust gain/compression for loud input levels in all channels.

- Are there problems with soft sounds? Use the Soft master to change the IGsoft mode in the Inteo.

As adjustments via the composite handles affect several frequencies and/or input levels, no single value can reflect the setting of such a handle. The adjustments are therefore displayed as offset (black line) relative to a starting point (white line). When no adjustments have been made, the two lines lie on top of each other (only the black line is visible). The effects of the composite handle adjustments are also reflected in the values in the insertion gain matrix and in the performance graphics.

Note that the adjustment range of the composite handles may vary depending on the individual fitting and whether the insertion gain matrix has already been fine tuned.

The insertion gain matrix

The insertion gain matrix allows you to fine tune insertion gain for three input levels (loud, normal and soft) in the four basic channels (500, 1000, 2000 and 4000 Hz). Fine tuning a basic channel will also – though to a lesser extent – affect the neighbouring channels. This is to ensure a smooth frequency response without sudden gain peaks across the frequencies.

The adjustment of insertion gain for specific input levels and frequencies is a classic Widex approach, so that one can use similar strategies for analysis and adjustment as with, for example, Senso Diva.

If you wish to adjust amplification for a very specific frequency range, you can use the Loudness master handle in the "15" setting to adjust overall gain in each of the 15 channels separately.

Targets for the insertion gain matrix can be viewed by pressing the target icon to the left of the Loud, Normal and Soft line respectively. This will display insertion gain targets for the individual fitting and can serve as a point of reference throughout the fine tuning process. You may also view detailed information about compression ratios and compression thresholds for each of the basic channels by opening the Compression view from the Toptool bar.

The insertion gain matrix also displays the MPO setting. These values are set based on the Sensogram for the individual user to ensure that very loud sounds do not cause discomfort. If needed, these values can be adjusted using the MPO manager.