

Fitting Guide

SYMFIT 6.1

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I. Introduction

The VIBRANT SOUNDBRIDGE and BONEBRIDGE Systems

Vibrant Soundbridge®

INTRODUCING

- The Vibrogram: Direct Drive threshold measurement
- DSL, NAL-NL1 NAL-NL2 available for the Vibrant Soundbridge fitting



Bonebridge™

INTRODUCING

- Fitting of the bone conduction implant system



II. Setting up Hardware and Software

The following components are necessary for fitting the Amadé audio processors of the Vibrant Soundbridge and the Bonebridge systems.

Hardware

MINIMUM SYSTEM REQUIREMENTS

- Processor (CPU): Pentium III, 800 MHz
- Hard disk space: 300 MB free storage
- RAM: 256 MB
- Graphics Display: 1024 x 768 resolution, 64k colors
- Programming Interface: HI-PRO or NOAHlink
- Programming cable with CS44 interface
- CD-ROM drive
- Windows XP
- USB interface: 1.1

RECOMMENDED SYSTEM REQUIREMENTS

- Processor (CPU): Pentium 4.2 GHz
- Hard disk space: 2 GB free storage
- RAM: 1 GB
- Graphics Display: 1280 x 1024 resolution, 16.7m colors
- Programming Interface: HI-PRO or NOAHlink
- Programming cable with CS44 interface
- DVD drive
- Windows XP Pro, Windows Vista, Windows7
- USB interface: 2.0

Fitting software discussed in this guide

- Siemens Connexx Software v6.4.3 - 6.4.5
- VIBRANT MED-EL SYMFIT Hearing Instrument Database:
 - For the Vibrant Soundbridge: SYMFIT 5.1 or SYMFIT 6.1
 - For the Bonebridge: SYMFIT 6.1

Accessories

- Audio Processor Adapter (to check the function of the Amadé)
- Audio Processor Fitting Kit - Amadé
It contains all the necessary accessories for the Amadé fitting and maintenance

III. Amadé Audio Processor

Characteristics of the Amadé audio processor

The Amadé audio processor (figure 1) contains the digital signal processing for both the Vibrant Soundbridge and the Bonebridge implant system. The state-of-the-art signal processing provides these features:

- Digital signal processing in 16 frequency bands
 - Frequency range 250 Hz - 8000 Hz
- 8 compression channels
- Directional microphone
- Advanced speech in noise management
- 3 storable programs
- Zinc-Air 675 battery
 - battery life 5-7 days depending on amplification level



figure 1

How to wear the Amadé

The Amadé audio processor should be worn by the patient as shown in figure 2.

The battery compartment should be placed pointing downwards, as it is the heaviest part of the processor. In this position, the two microphones form a horizontal line and the effect of the directional microphones (if activated) is optimized.

Be aware that there is a left and a right version of the Amadé. To achieve correct directionality the correct version of the Amadé should be used for the corresponding ear.

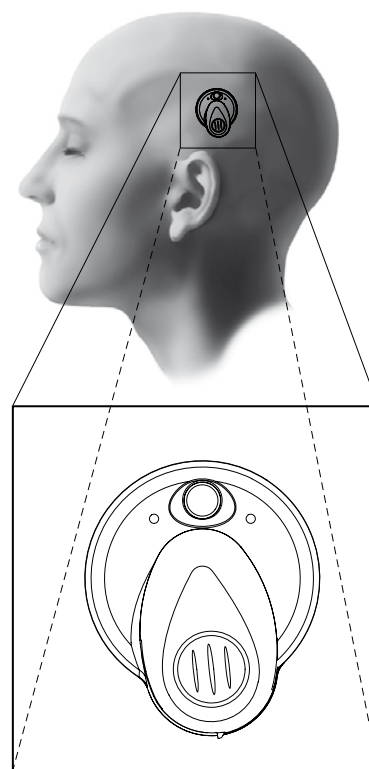


figure 2

Front and back of the Amadé audio processor

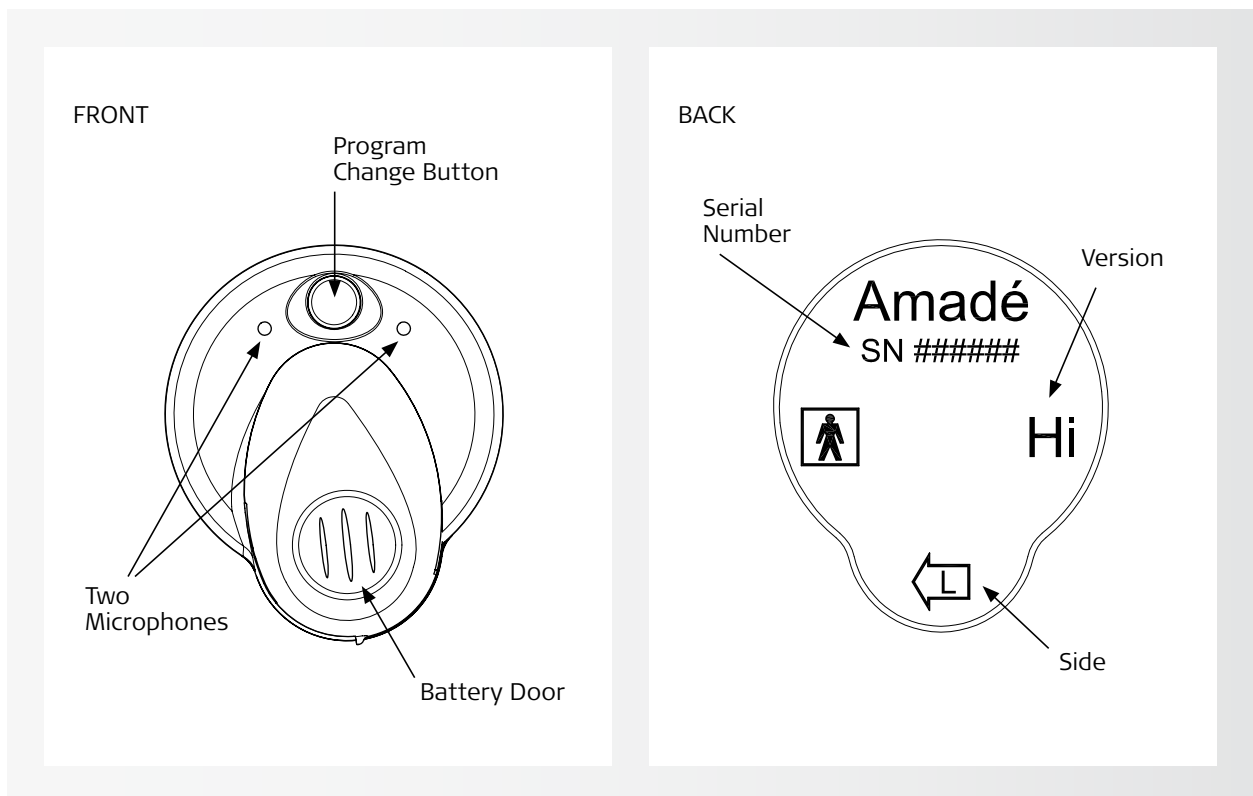


figure 3a

figure 3b

On the front side of the Amadé, the user can choose between three programs by pressing the program change button. The two microphones allowing for a directional microphone option can also be seen in figure 3a.

On the base of the processor (figure 3b), the serial number of the device is printed. On the right hand side there is a mark for the Amadé version:

- **Hi** for a high power Amadé for the Vibrant Soundbridge
- **Lo** for a low power Amadé for the Vibrant Soundbridge
- If there is **no mark**, the device is a standard Amadé for the Vibrant Soundbridge
- **BB** for an Amadé for the Bonebridge

Underneath all these markings there is an indicator showing on which side of the head the Amadé should be worn, (L for the left side, R for the right side).

The holding magnet is located in the center of the Amadé. It can be recognized with one to five dots. The number of dots represents the strength of the magnet. Amade audio processors are automatically shipped with a number 3 magnet. Numbers 1 and 2 are weaker magnets. Numbers 4 and 5 are stronger magnets and used in cases when the skin flap between the implant and the Amade is thicker than usual.

Battery door positions

The position of the battery door defines the status of the Amadé audio processor.

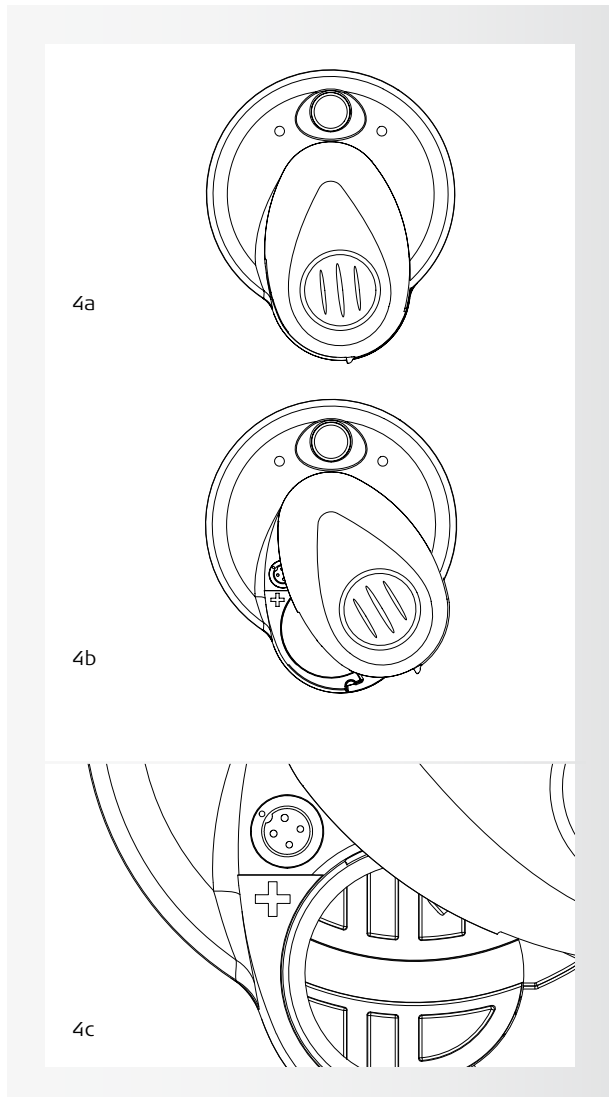


figure 4

When the battery door is closed completely with a working battery inside, as seen in figure 4a, the Amadé is **ON**. To turn **OFF** the Amadé, open the battery door slightly (5mm) anticlockwise (figure 4b).

To program the Amadé with the programming cable, open the battery door to see the programming socket (figure 4c).

Placing/Removing the battery

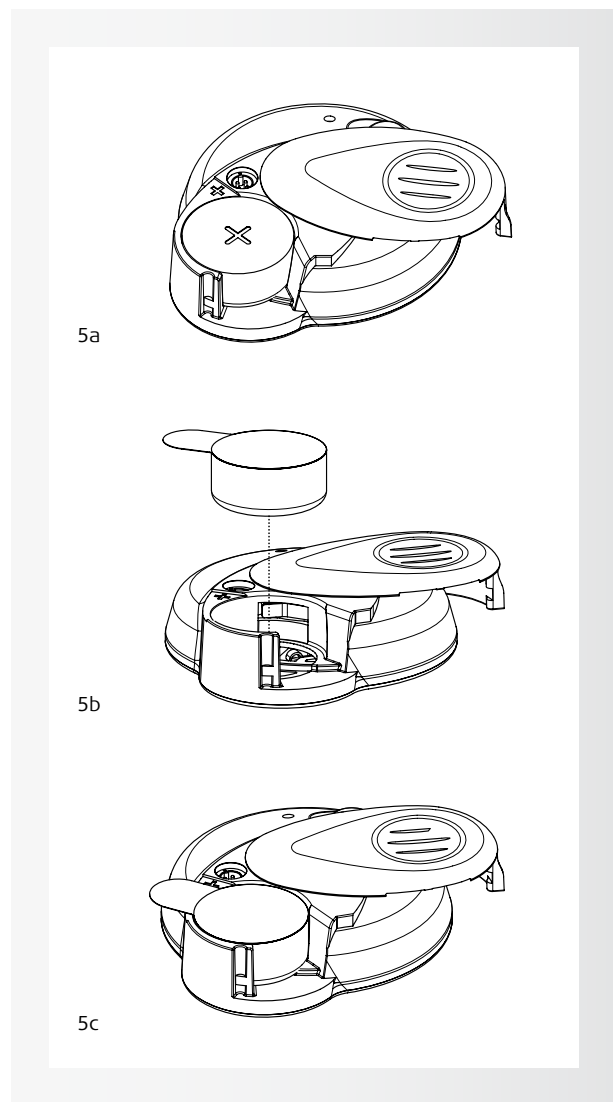


figure 5

The Amadé audio processor uses a single Zinc-Air 675 battery. Figure 5 (a-c) shows how to exchange the battery. When the battery door is open, the battery can be inserted or removed (figure 5a). Use a Zinc-Air 675 battery inserted with the plus pole (+) on top (figure 5b+c). Remove the tab / sticker from the battery. To achieve optimized battery performance it is recommended to wait one minute after removing the tab before closing the battery door.

Changing the magnet

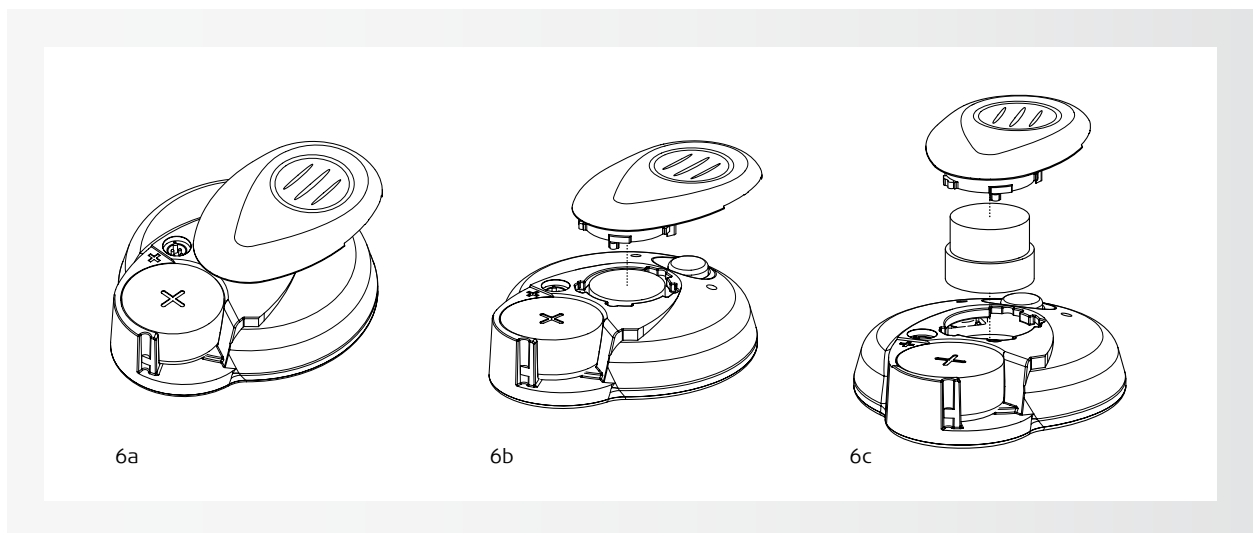


figure 6

The adequate strength of the magnet should be checked during every fitting session.

If the magnet is too weak, the audio processor may not stay on the user's head and if the magnet is too strong, reddening of the skin or pain can occur. If the magnet appears to be too weak or too strong, please change accordingly.

To change the magnet (figure 6, a-c), turn the battery door 180° anticlockwise from the closed position. Once opened 180°, the battery door can be lifted off and the magnet can be replaced. Place the metallic part of the magnet facing down towards the bottom of the Amadé battery compartment; the plastic foam should be facing towards the top.

Replace the battery door by moving it to the same position as it was when it was lifted off. Then turn the battery door clockwise (180°) to the desired position.

Connecting the HI-PRO box and programming cable

To program the Amadé, the HI-PRO box (GN Otometrics) and a programming cable (CS44 interface) are required. NOAHlink can be used as an alternative.

Connect the HI-PRO box to the computer where Connex and SYMFIT are installed, plug the programming cable into the connector of the corresponding side of the HI-PRO box.

Next, the battery door must be placed to the programming position. This position can be found while the cable is plugged into the programming socket and the battery door is closed enough so the AP Adapter shows the processor is turned ON.

After completing the steps above, the Connex software can be started.

Connecting the Programming Cable to the Amadé

To program the Amadé, connect the programming cable. Make sure the Amadé battery is sufficiently charged.

Open the battery door to access the programming socket (figure 7). To connect the audio processor, align the marks on the programming cable and socket, and connect them.

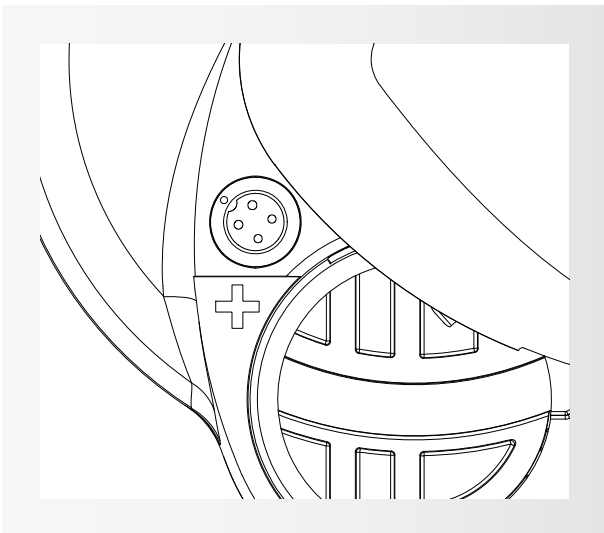


figure 7

IV. Fitting Session

Start fitting session - enter client data

After starting the Connexx software, the Client List and Data screen will appear (figure 8). For new clients, complete the fields on the screen. For existing clients, existing data can be loaded.



figure 8

Create a new client - required and optional data

To create a new client record, click on the "New" button located in the bottom left corner of the "Client List and Data" screen. On the right side you will see the fields to enter the client data.

First Name, Last Name and Date of Birth are required to create a new client record. All other fields are optional.

When the data for the new client is complete, click the "Save" button. The newly added client information should now be transferred and appear in the client list.

The client list

To search for a client in the client list, enter the first or last name into the corresponding field and click "Search Now". To display the complete list of clients, click on "Show all".

To load data for a specific client, double-click on the corresponding dataset. Or click on the client dataset and click on "Load Client".

V. First Fitting for the Soundbridge Amadé

The Vibrogram

The Vibrogram is a pure tone audiogram received by direct stimulation of the inner ear through the Vibrant Soundbridge. It can be performed with all types of the VSB Amadé audio processor.

Pure tones are presented through the Amadé and are adjustable in frequency (from 500Hz to 6000Hz) and loudness (between 15dB and 105dB).

Measuring the "audiogram" through the implant does not only provide information about the hearing loss of the patient in the Vibrogram, but also about the frequency response of the Vibrant Soundbridge and the coupling of the FMT to the inner ear.

THE VIBROGRAM THRESHOLDS ARE RECOMMENDED TO BE USED AS A STARTING POINT FOR THE FITTING OF THE VIBRANT SOUNDBRIDGE SYSTEM

Detecting a connected Amadé Audio Processor

The first step is the detection of the hearing instrument via the detect connected instruments button in the toolbar (figure 9).

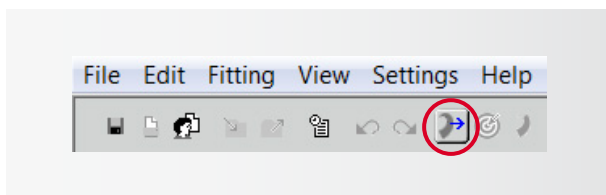


figure 9

It is not necessary to select the processor first, the detection automatically recognizes which audio processor is connected.

NOTE: TROUBLESHOOTING _____
IF THE AMADÉ IS NOT RECOGNIZED CORRECTLY, THE FOLLOWING MAY HAVE OCCURRED:

1. The wrong SYMFIT version is installed
To check which version of the VIBRANT MED-EL

SYMFIT database you have installed, go to "Help", followed by "Info about Database".

Here it can be confirmed that SYMFIT 6.1 is installed to program an Amadé BB, SYMFIT 5.1 or 6.1 is required to program the VSB Amadés.

2. The programming cable is not properly connected to the processor
Please refer to chapter III on page 11 of this guide to learn how to connect the programming cable correctly.
3. The hardware is not installed correctly.
Please refer to the user manual of the HI-PRO box (or NOAHlink) for assistance.
Make sure that the HI-PRO box is set up on a serial port COM1 to COM4.

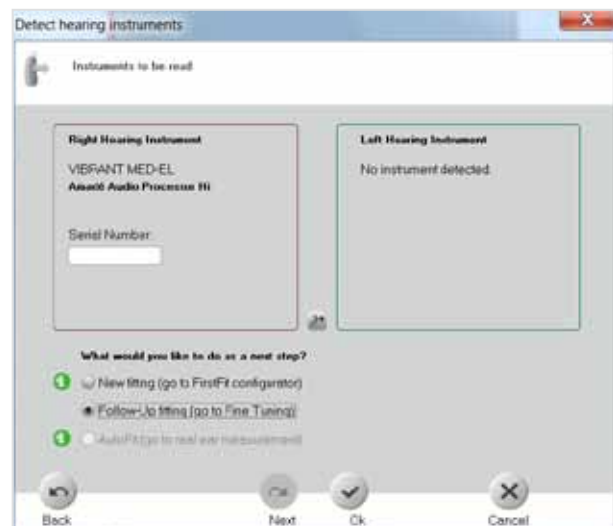


figure 10

Figure 10 shows that Connexx has detected an Amadé (in this example Amadé Hi) on the side where the audio processor is connected to the HI-PRO box.

Now it can be differentiated between a first fit session and a follow up fitting.

Follow-Up fitting (go to Fine Tuning) should be chosen for the Vibrogram measurement.
Press OK to confirm the selection.

Starting the Vibrogram measurement

The necessary calibration settings are stored in the processor via selecting "Fitting", followed by "Test Settings...". The following window (figure 11) will

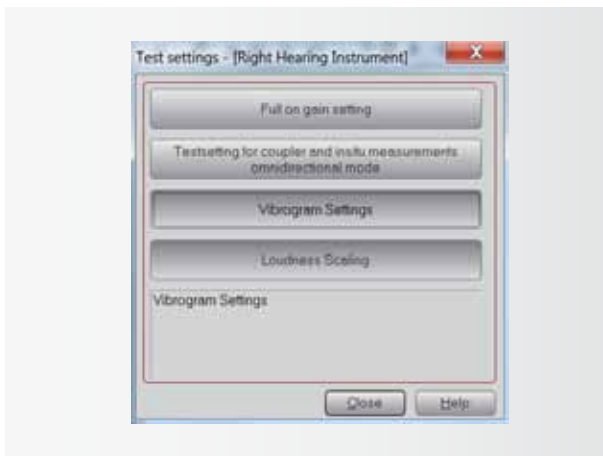


figure 11

appear. Click on **Vibrogram Settings**. The Amadé is programmed and the Vibrogram table (figure 12) is activated.

CAUTION: Do NOT close the **Test settings** window.

Select the Vibrogram tab from the 6 tabs in Fine Tuning. The Vibrogram table will appear (figure 12). The Vibrogram process is similar to an audiogram. In order to prevent external sounds from being picked up by the microphones, mute the Amadé. Refer to figure 42 on page 34 on how to mute the Amadé.

THE PRE-PROGRAMMED AMADÉ IS NOW GIVEN TO THE PATIENT AND PLACED OVER THE IMPLANT.

Begin taking measurements at 1kHz, 30dB above the bone conduction threshold. Click on the corresponding symbol to activate the tone and start the measurement. The tone will remain active until either another test tone is activated or the measurement is complete. The active tone will be displayed on the top and bottom of the Vibrogram screen (figure 12).

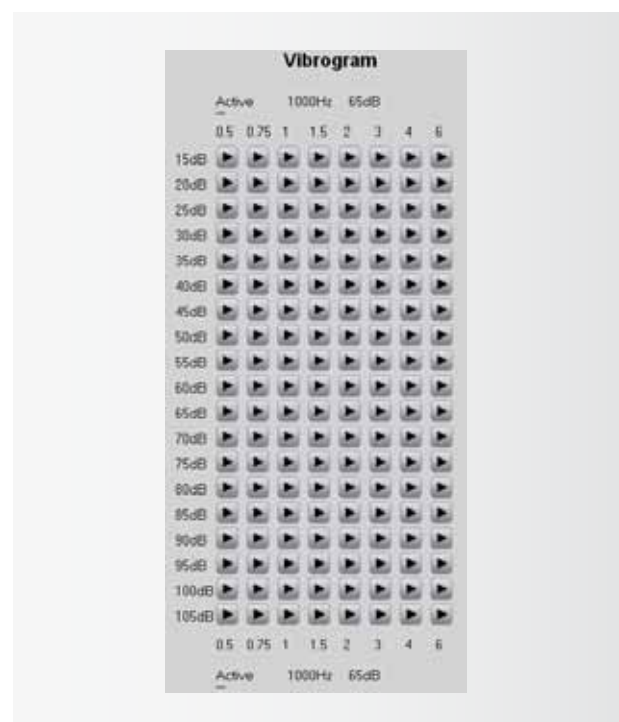


figure 12

NOTE: Test tones can be adjusted from 500Hz to 6000Hz in frequency and from 15dB to 105dB in volume.

REMARK: _____
If the patient is having difficulty finding satisfying fitting levels, consider collecting the uncomfortable loudness levels (UCL) during the Vibrogram process so there is a full range of responses.

Vibrogram Measurement completion

When the measurement is finished, click on Vibrogram Settings and Close the Test Settings window. The following window will appear (figure 13), select Yes. It is not intended to leave the test settings in the Amadé.

As the Vibrogram thresholds have been received as a basis for the first fitting it can now be continued with entering the thresholds (and UCL values) in the Audiogram tab.

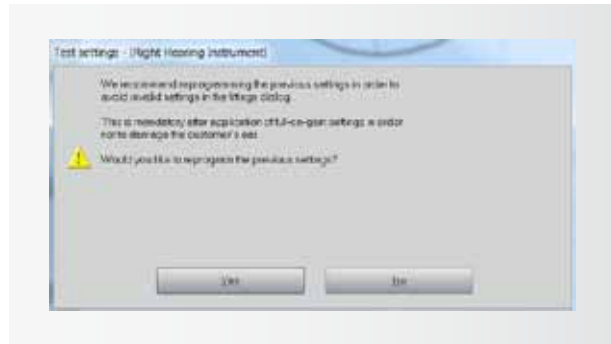


figure 13

The Audiogram Tab

Select the Audiogram; this is the first tab in the Connex software and it will appear after creating a new client. The data entered in this screen will be used by the Connex software to calculate the target gains for the

Amadé. For the first fitting the thresholds of the patient have to be entered at least on the side which is to be fitted (figure 14).

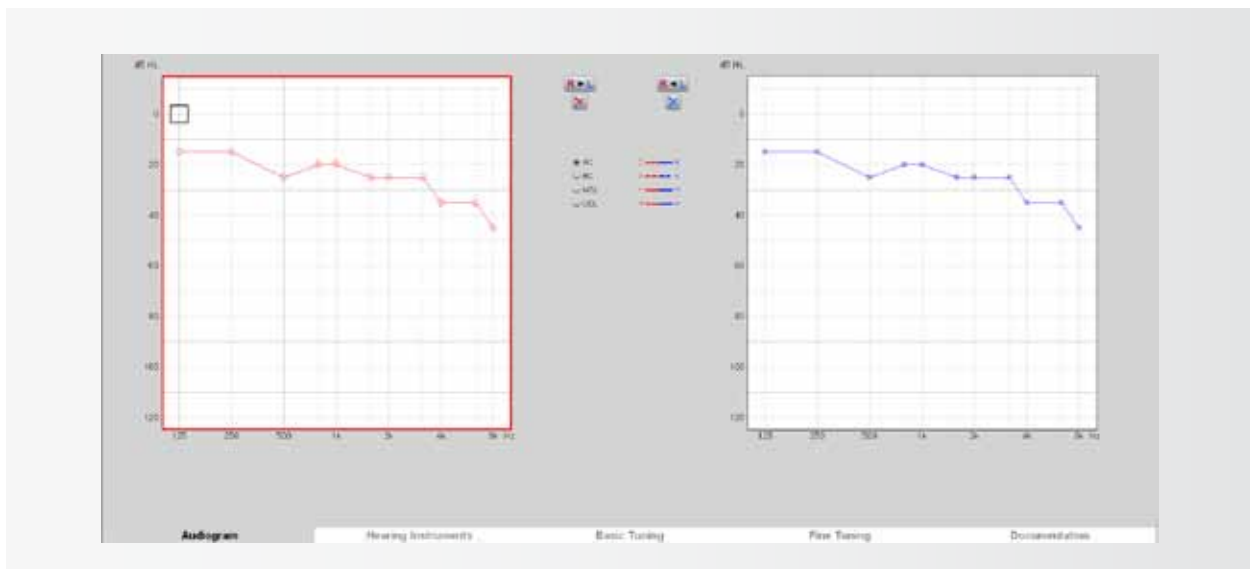


figure 14

When fitting the Amadé audio processor of the Vibrant Soundbridge the thresholds and the dynamic range of the patient (UCL) are defined by the Vibrogram. It is therefore suggested to use the Vibrogram as a basis for the fitting as it includes the hearing thresholds of the

patient as well as the efficiency of energy transfer from the FMT to the inner ear.

Air Conduction symbols are used to enter the Vibrogram thresholds, if UCL values have been measured, UCL symbols are used to enter them here.

The First Fit Configurator

After entering the Vibrogram as a basis for the first fit, the first fit configurator can be started.

This is done via selecting "Fitting" and then "First Fit..." from the menu or using the highlighted icon in figure 15.

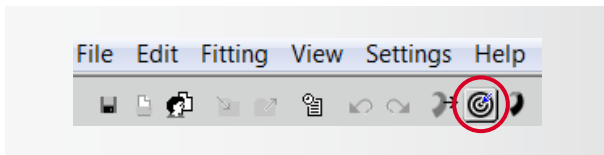


figure 15

First fit approach

First select whether the first fit should be done for the left, the right or for both connected hearing instruments, in the case of a bilateral fitting. In the following example (figure 16) an Amadé is connected on the right side. Therefore the other two options cannot be selected here. Click on **Next** to continue.

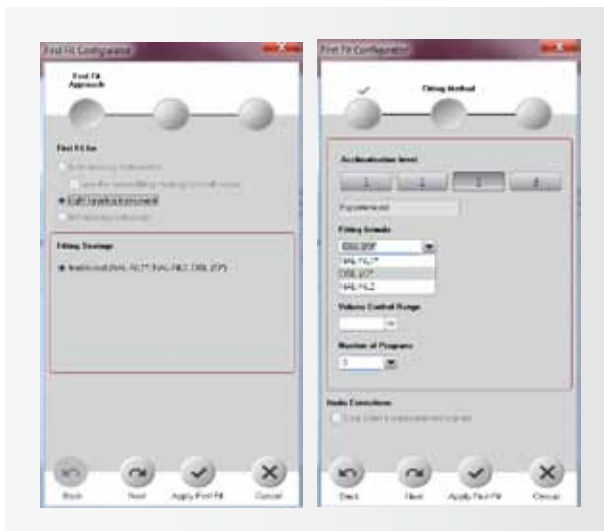


figure 16

figure 17

Fitting formula and acclimatization level

A modified version of the DSL I/O, NAL-NL2 or NAL-NL1, as the **Fitting Formula** in the **Fitting Method** window, is recommended (figure 17). All three fitting formulas are optimized to the output characteristics of the Vibrant Soundbridge system. Setting the **Acclimatization Level** reflects the client's experience with amplification from conventional hearing systems. Level 1 should be selected for inexperienced hearing aid users. Level 1 has the lowest starting volume and cautious high frequency gain so sounds are not uncomfortably loud. Level 2 is for "beginners" with some amplification experience and level 3 for experienced hearing aid users. Acclimatization level 4 can be used as the setting for patients who are the most experienced with amplification. Level 4 provides the highest volume for all settings.

Next, the **Number of Programs** will be selected. Up to 3 programs can be stored in the Amadé. One or more programs can be created during the first fitting. Additional (up to 3 total) programs can be added, at any time, after the first fitting. There are 3 default programs: "Universal", "Noisy Environment", "TV/Music". After selecting the number of programs, click "**Apply First Fit**". This will complete the first fit configuration, target gains will be calculated and stored in the Amadé audio processor.

The programming is now complete; place the audio processor on the implant site.

VI. First Fitting for the Amadé BB

Audiogram

Select the Audiogram; this is the first tab in the Connex software and will appear after creating a new client. The data entered in this screen will be used by the Connex software to calculate the target gains for the Amadé BB.

For the first fitting, the hearing thresholds of the user need to be entered. Depending on the type of hearing loss, the bone conduction (BC) threshold of either the implanted side or the contralateral side (for single-sided deafness) should be entered as described below. Values are entered by double-clicking on the corresponding level-frequency point in the audiogram field.

Considerations for the Audiogram

1. Conductive and Mixed Hearing Loss

When fitting the Amadé audio processor for the Bonebridge, consider that the inner ear is stimulated by bone conduction directly. Meaning, the hearing loss that needs to be compensated is defined by the inner ear component of the hearing loss; measure and enter

the bone conduction (BC) thresholds of the implanted side.

The Connex software mainly uses air conduction thresholds for the target gain calculation however, when fitting the Amadé BB with conductive or mixed hearing loss, the respective BC thresholds should be entered with air conduction (AC) symbols and will be used as a basis for the first fit.

2. Bilateral conductive and Mixed Hearing Loss

For bilateral fittings, follow the steps listed above. Enter the bone conduction values of the left and right ear in the respective audiogram field with AC symbols (figure 18).

3. Single-sided sensorineural deafness (SSD)

Bonebridge can be used for patients with profound unilateral sensorineural deafness or single-sided deafness (SSD). In this case, the Bonebridge is implanted on the deaf side. Sounds are picked up by the audio processor on the deaf side and the

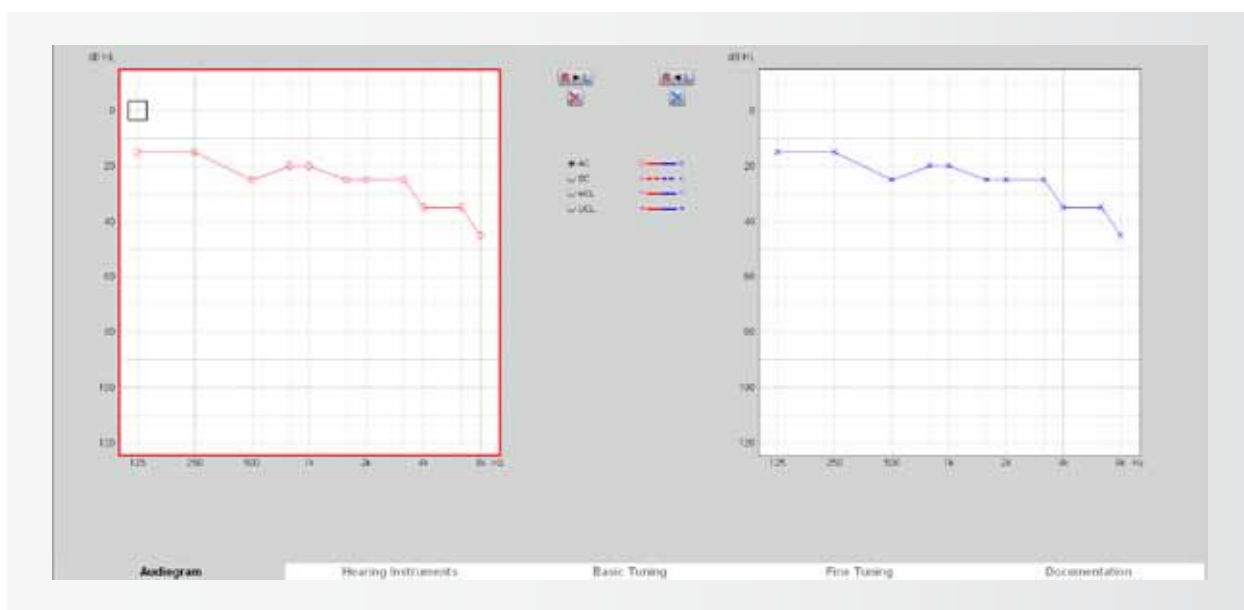


figure 18

vibrations travel across the skull, via bone conduction, stimulating the normal hearing inner ear on the contralateral side.

To include the attenuation of bone conduction from the deaf side to the normal hearing side, measure the unmasked bone conduction measured on the (implanted) deaf side. Use these values as a basis for the first fit; enter in the audiogram tab on the implanted side with AC symbols.

REMARK: Typically, bone conduction thresholds are only measured from 500 Hz to 4 kHz. Values at 250 Hz, 6 kHz and 8 kHz should be entered by extrapolating from the given bone conduction thresholds. Where no values are entered, no gain will be calculated.

Detection of the Amadé and First Fit

Next, to detect the Amadé BB audio processor, click the detect connected instruments button on the toolbar (figure 19).

It is not necessary to select the processor first; detection will automatically recognize the connected audio processor.

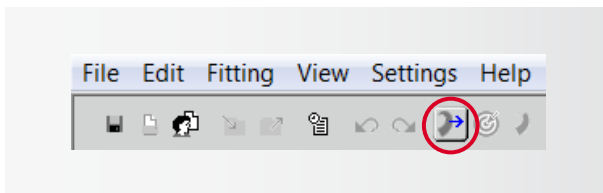


figure 19

REMARK: TROUBLESHOOTING IF THE AMADÉ BB IS NOT RECOGNIZED CORRECTLY, THE FOLLOWING MAY HAVE OCCURRED:

1. The wrong SYMFIT version is installed
To check which version of the VIBRANT MED-EL SYMFIT database you have installed, go to: "Help", followed by "Info about Database". Here it can be confirmed that SYMFIT 6.1 is installed to program an Amadé BB.

Please refer to section II on page 6 to check which version of the SYMFIT database is required for the Amadé to be programmed correctly.

2. The programming cable is not properly connected to the processor.
Please refer to chapter III on page 11 of this guide to learn how to connect the programming cable correctly.
3. The hardware is not connected correctly.
Please refer to the user manual of the HI-PRO box (or NOAHLink) for assistance.
Make sure that the HI-PRO box is set up on a serial port COM1 to COM4.



figure 20

Unilateral fitting

Figure 20 shows that Connexx has detected an Amadé BB on the side where the audio processor is connected to the HI-PRO box.

Now it can be differentiated between a first fit session and a follow-up fitting.

New Fitting (go to First Fit Configurator) should be chosen in this context. The software will start to

calculate target gains according to the audiogram that has been entered.

Follow-up fitting (go to Fine Tuning) for follow-up fitting sessions. It will read out the connected Amadé and it can be proceeded based on these settings.

Press OK to confirm the selection.

Bilateral Fitting

The software also allows simultaneous fitting for bilateral Bonebridge users. When two Amadé are connected, detect connected instruments shows the window in figure 21.

Select New fitting (go to First Fit Configurator) in case of a first fit based on the entered audiograms.

Select Follow-up fitting (go to Fine Tuning) in case of a fitting based on the values stored in the connected processors.



figure 21

The First Fit Configurator

First Fit Approach

Select the side: left, right or both for bilateral fitting (figure 22).

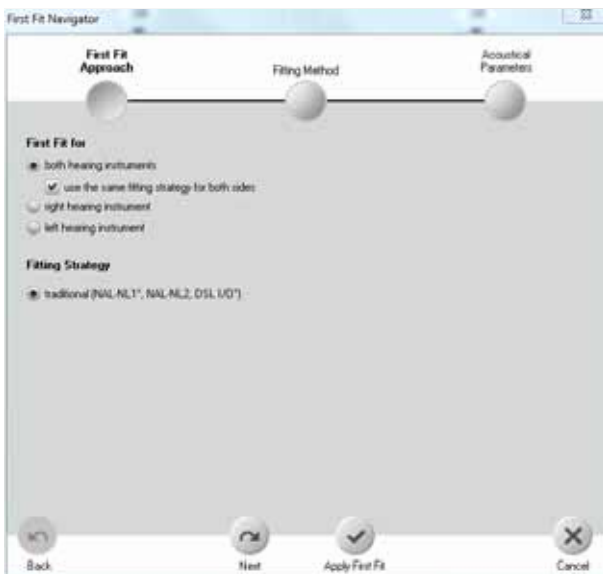


figure 22

For bilateral first fittings, there is the option to use the same fitting strategy for both audio processors or a different fitting strategy for each audio processor. Usually, the same strategy for both audio processors is used, as seen in figure 22. Each audio processor should be programmed, one at a time on the patient's head. After both processors are programmed, place them on the patient and turn them on. Adjust the volume with the gain setting until both sides have an equal level of sound. Finally, make sure sounds are not too loud for the patient. If they are too loud, turn the volume to an acceptable level for the patient.

This fitting guide will now continue with a case of unilateral fitting.

For a unilateral fitting, the following example (figure 23) is for an Amadé BB connected on the right side. After selecting the correct side, click "Next" to continue. For the the Amadé BB, it is strongly recommended to use

the modified formula DSL I/O (please refer to the next section). Use the tickboxes as seen in figure 24.

Fitting formula and Acclimatization level

Use the DSL I/O as Fitting formula in the Fitting method window (figure 24), it has been optimized to the output characteristics for Bonebridge. NAL-NL1 should NOT be used for fitting the Bonebridge system.

Setting the Acclimatization Level reflects the client's experience with amplification from conventional hearing systems. Level 1 should be selected for inexperienced hearing aid users. Level 1 has the lowest starting volume and cautious high frequency gain so sounds are not uncomfortably loud. Level 2 is for "beginners" with some amplification experience and level 3 for experienced hearing aid users. Acclimatization level 4 can be used as the setting for patients who are the most experienced with amplification. Level 4 provides the highest volume for all settings.

Next, the Number of Programs will be selected. Up to 3 programs can be stored in the Amadé BB. One or more programs can be created during the first fitting. Additional (up to 3 total) programs can be added, at

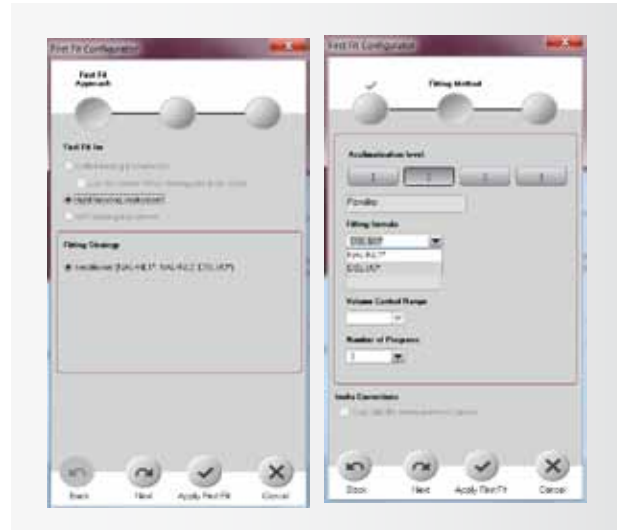


figure 23

figure 24

any time, after the first fitting. There are 3 default programs: "Universal", "Noisy Environment", "TV/Music". After selecting the number of programs, click "Apply First Fit". This will complete the first fit configuration, target gains will be calculated and stored in the Amadé BB audio processor.

The programming is now complete; place the audio processor on the implant site.

NOTE: The remaining chapters in this guide are applicable to both Soundbridge Amadé and Amadé BB audio processors. All settings can be used for both audio processor families unless stated otherwise.

VII. Basic Tuning

Next, in the third tab, you will see the **Basic Tuning** tab.

Curve Display

In figure 25 (a. VSB, b. BB) the input/output (gain) **Curve Display** of the Connexx software can be seen.

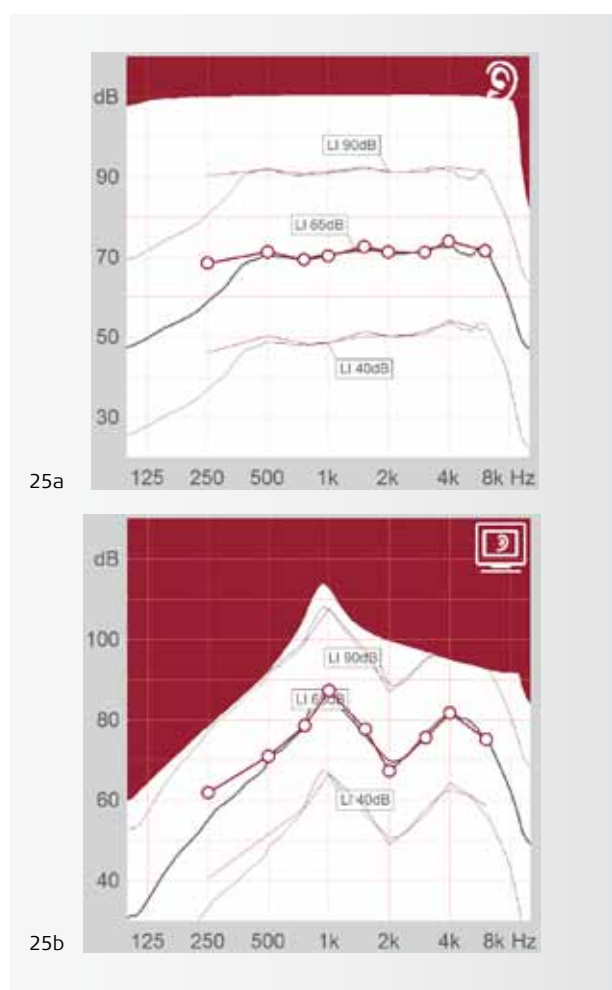


figure 25

In the Curve Display the relation between the following axes can be seen:

- x-axis: Frequencies from 125 Hz to 8000 Hz
- y-axis: Gain / Output (depending on what was set on the Curve Display settings).

Three black lines and three cherry red/teal lines (depending on which side is to be fitted, teal for the left side, cherry red for the right side) can be seen in the curve display.

The cherry red/teal lines represent the target gain/output that Connexx calculated in the first fit according to the audiogram for inputs of 40 dB (soft sounds), 65 dB (conversational level), and 90 dB (loud input sounds).

The black lines represent the current settings that are stored in the Amadé and therefore the actual gain/output of the system for the same input levels.

REMARK: ADJUSTING THE CURVE DISPLAY _____ TO DISPLAY THE CORRECT VALUES FOR THE VIBRANT SOUNDBRIDGE AND BONEBRIDGE SYSTEMS THE DEFAULT SETTINGS FROM THE CONNEXX SOFTWARE HAVE TO BE CHANGED FOR THE CURVE DISPLAY.

This can be done by selecting **Settings → Preferences** in the menu. There the first tab is the Curve Display tab where the following settings have to be selected.

1. **Gain (G) or Output (O):** This defines whether the gain or the output of the system is displayed. Both settings are equivalent via the calculation $\text{Output Level} = \text{Input Level} + \text{Gain}$. The output level for the Vibrant Soundbridge is given in dB SPL (sound pressure level). The output level for the Bonebridge is given in dB FL (force level).
2. **Coupler Type = Ear Simulator**
3. **Stimulus = Pure Tone**

Note: These changes only have to be done once. The changes will be saved and become default settings for future sessions.

Settings in the Basic Tuning

Basic adaptation of the programming is done in the Basic Tuning window (figure 26). Simple questions about hearing impression with the Amadé can be directly responded to in this window.

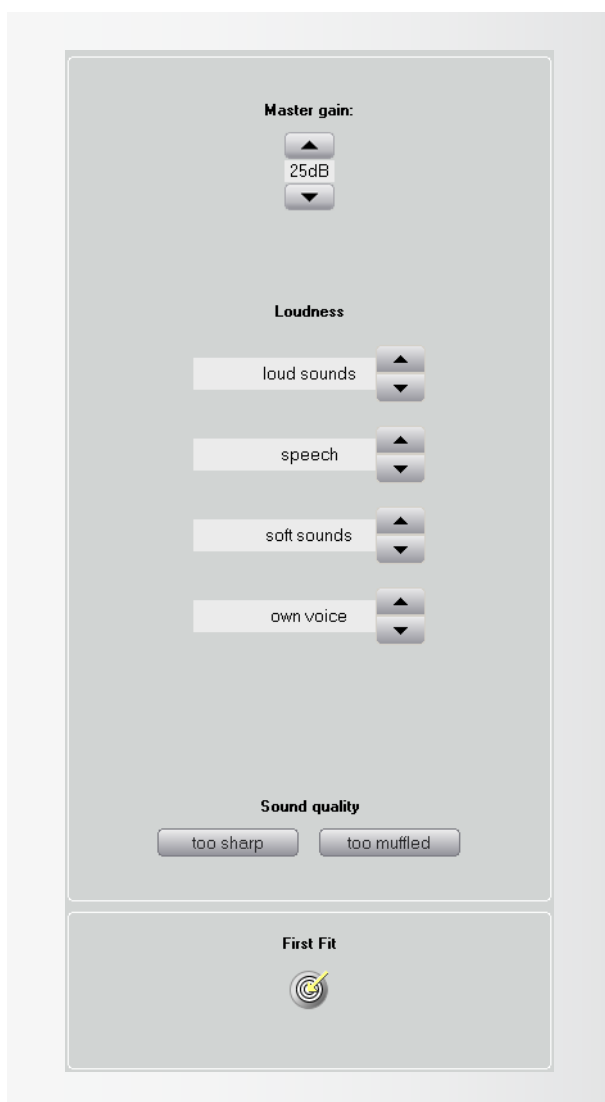


figure 26

REMARK: Every setting in the software that is adjusted will be per default immediately sent to the processor and will therefore be perceived by the user.

Master Gain

If the user experiences the overall volume of the system as too loud or too soft, it can be set with the Master gain in the Basic Tuning and also in the Fine Tuning window.

With this control, the volume of the system can be increased or decreased by incremental steps of 3 dB.

REMARK: The number displayed at the Master gain field represents the maximum amplification of the 65 dB input curve in the curve display for the respective view mode. For detailed information about the amplification pattern of the system please refer to the curve display.

Volume of specific sounds

To further improve the basic fitting, it is also possible to respond to more specific questions in this tab. For example, the volume of the user's own voice, convenience of loud sounds (e.g. clapping hands) or soft sounds.

REMARK: Be aware that changing the settings in the Basic Tuning window influences the amplification and compression profile of the system. It is therefore recommended to refer also to the Fine Tuning tab.

Changing the sound quality

The Vibrant Soundbridge and Bonebridge systems provide excellent high frequency amplification that may or may not be used by the user. For users who have not heard high pitch sounds for a long period of time, these may sound metallic or sharp. Because of this, users may not be comfortable with these sounds. The sound quality in the Basic Tuning window can be adjusted by clicking on too sharp. This reduces the gain in the high

frequencies and increases the gain in the low frequencies, making the sound more muffled.

New First Fit

Begin by pressing the button on the bottom of the basic tuning window to start a new first fit.

REMARK: _____

High frequency sounds are essential for speech understanding. Considering this, the user should get used to these kinds of sounds over time. It is suggested to slowly increase the high frequency sounds from fitting session to fitting session.

VIII. Fine Tuning

The Fine Tuning settings allow frequency specific gain and compression as well as advanced speech in noise adjustments to be made.

Frequency Shaping

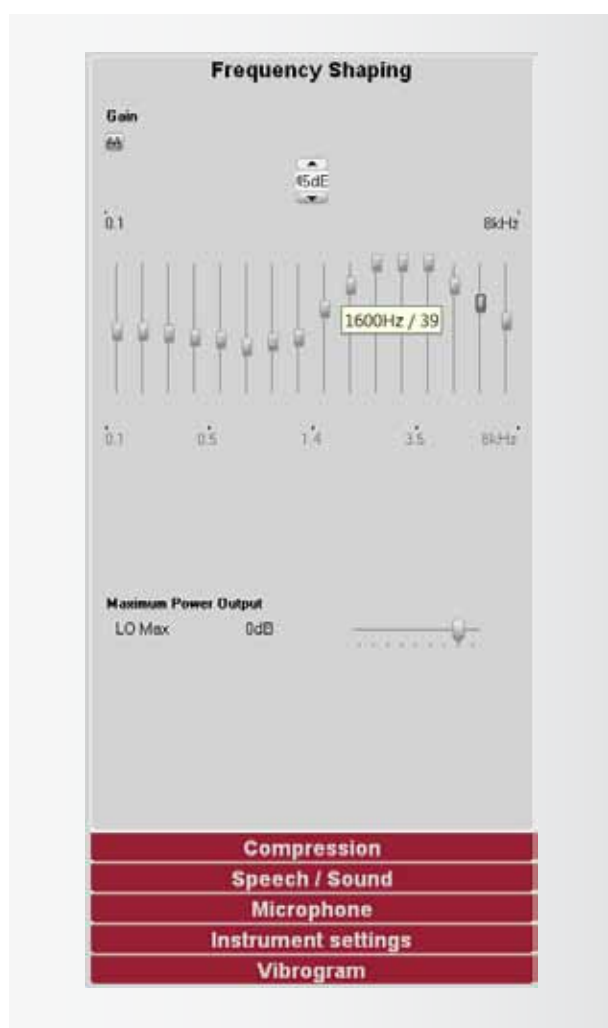


figure 27

The first tab in Fine Tuning allows the gain for each of the 16 individual frequency bands to be adjusted separately in incremental steps of 1 dB using a drag and drop method (see figure 27).

If the mouse is moved over one of the controls, the central frequency of the frequency band appears as well

as the current gain applied.

By marking several frequency bands with the mouse, the gain in user-defined frequency areas can be changed easily and quickly.

REMARK: _____

The number between 0 and 60 is interpreted in the way that 60 is equivalent to the maximum amplification on the specific frequency band and every 1 dB lower means -1 dB below the maximum amplification. The information value of this number is limited.

The exact values of the amplification applied depending on frequency and input level can be taken from the curve display.

REMARK:

Figure 27 shows that an increase of the overall gain with the handle is not possible, as the control is shown as non-active. This is interpreted in a way that channels 11-13 are already set at maximum amplification. To increase that overall volume of the system the gain in the channels 11-13 has to be reduced first, then the Master gain can be increased again. Of course, this changes the frequency shaping slightly.

The Maximum Power Output (MPO)

By setting this control, the maximum output of the system can be limited. The MPO is a very fast compression of signals represented in the last 2 dB of output of the Amadé. This can be useful if the user complains that very loud sounds are uncomfortable. The MPO can be set in increments of 3 dB from 0 dB (no reduced output limit) to -21 dB (output limit reduced by -21 dB).

Setting the MPO represents a reduction of the dynamic range of the system and it is therefore suggested to do this with caution.

Setting the MPO control to the utmost right position sets the system into the Peak Clipping (PC) mode, the MPO is deactivated. This means that the system uses

2 dB more of output, however, this causes strong distortions if sounds reach the output limit of the system. It is not recommended to use this setting.

Compression

Frequency dependent amplification for loud and soft input sounds

It is possible to separately adjust the gain for loud (90 dB) and soft (40 dB) input sounds in up to 8 channels. With the help of the eyeglass control these 8 channels can be combined into 1, 2 or 4 groups and then be adjusted accordingly. This is very useful as it allows the clinician to directly respond to comments of the user concerning specific listening situations.

As already mentioned in the section Basic Tuning changes in the input related amplification are equivalent to changes in the compression settings (compression kneepoint and ratio) in the specific frequency band which should therefore be observed (figure 28).

Setting the Compression Kneepoint and Ratio

Of course Connexx also allows to manually set Compression Kneepoints and Compression Ratios. The frequency range can be also split here with the eyeglass control.

By double-clicking on the respective field a dropdown menu opens which allows to set the compression kneepoint between 35 dB and 75 dB, the compression ratio between 1.00 (no compression) and a maximum of 4.00.

Dual and Syllabic compression

DUAL (double temporal component compression)
Dual compression operates with both a fast and a slow level meter. The fast level meter provides an immediate reduction in gain for higher-level impact sounds. The

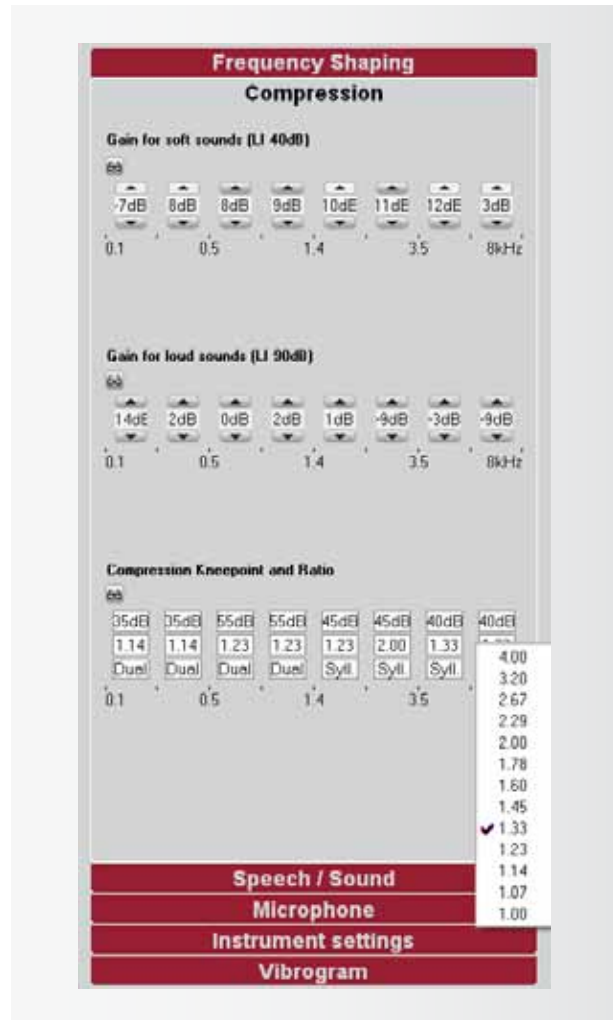


figure 28

fast attack time is 5 ms. The second level meter with 900 ms attack and 1400 ms release time provides gain adjustments based upon the average level of the incoming signal.

In this way, the Amadé operates with a quasi-automatic gain control, while at the same time preserving speech dynamics essential to understanding, without allowing uncomfortably loud peak levels.

Dual compression follows the overall speech level and limits distortion. For users who suffer from mild recruitment (mild to moderate hearing loss), dual compression protects the temporal contrast of their own voice.

SYLLABIC (or fast compression)

Syllabic compression adjusts the gain for instantaneous fluctuations that occur within speech. It operates with a fast level meter using an attack time of 10 ms and a release time of 100 ms.

It should be used in frequency bands where a user has a strongly reduced dynamic range (moderate to severe hearing loss) which is more common in the high frequencies. In this case it is preferable to select syllabic compression for the compression areas five to eight. The attack and release time of syllabic compression are fixed.

Speech/Sound

With the tools in this tab, the Speech and Noise Management, Sound Smoothing, Wind-Noise reduction, and Feedback Cancellation can be set. These settings can support the user's hearing experience in different environmental situations (figure 29).

Speech and Noise Management

This feature is an adaptive algorithm following the currently detected noise that maximizes both the hearing comfort and the speech intelligibility for each acoustical situation. This means that speech signals are emphasized while interfering noises such as traffic noise or air conditioning are suppressed. If the checkbox is enabled you can select between med (noise attenuation of 8 – 15 dB) and max (noise attenuation of 12 – 24 dB) noise attenuation.

Sound Smoothing

This feature guarantees high listening comfort. The algorithm detects loud sounds with a sudden onset (like clattering dishes, rustling paper, or slamming doors) which are annoying for hearing impaired people. Sound Smoothing eliminates only these sounds

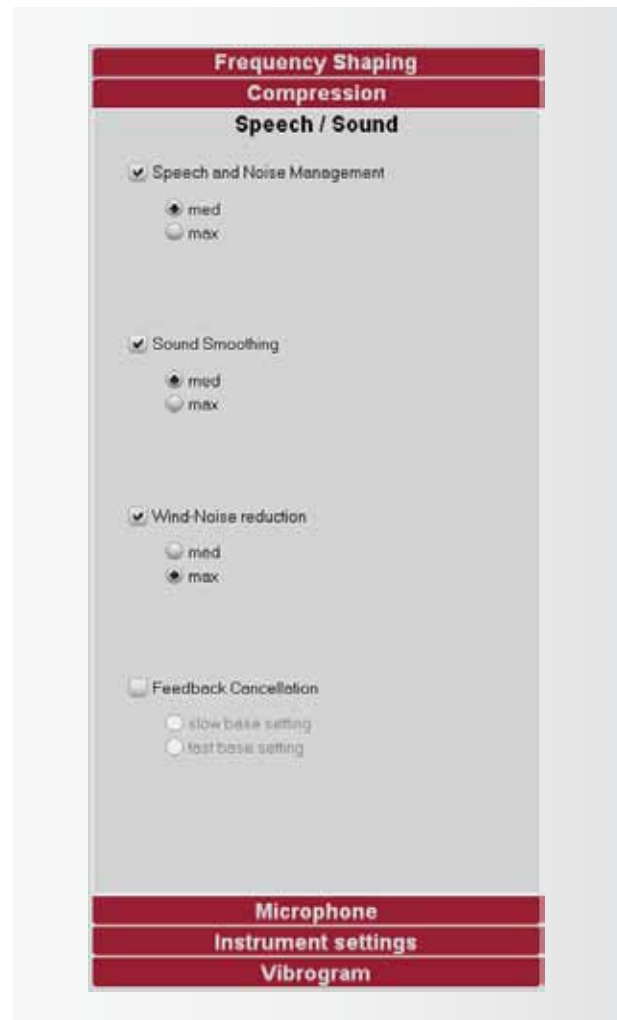


figure 29

without affecting speech or soft impulsive sounds and therefore maintains the naturalness of sound. A choice can be made between med (medium Sound Smoothing) and max (maximum Sound Smoothing). The two settings differ with respect to the amount of attenuation of loud impulsive sounds.

Wind-Noise reduction

This feature is useful in special listening situations where wind generates unwanted noises in the Amadé. The reason for this fact is that the openings for the microphone ports can generate interference.

The Wind-Noise Reduction algorithm evaluates the amount of wind noise at the housing openings of the microphones. In case of strong and therefore annoying wind noise the gain in the low frequencies is reduced proportionally to the wind speed and the microphone system is switched to omnidirectional. You can select between med (medium Wind-Noise reduction) and max (maximum Wind-Noise reduction).

Feedback Cancellation

This feature enables a feedback reduction system. This system continuously analyzes the feedback path of the Amadé and subtracts the unwanted feedback, if necessary. If Feedback Cancellation is enabled, the selection can be made between slow and fast base setting: Slow base setting is optimized for maximum sound quality, fast base setting is optimized for maximum effective gain.

Microphone: Directional and Omnidirectional Option

The Amadé audio processor has a dual microphone system which can be set to Omnidirectional or Directional (figure 30). In omnidirectional mode sounds from all directions are processed equally.

In directional mode, sounds coming from the front of the Amadé user are amplified over sounds coming from behind.

REMARK: _____

In the directional mode sounds being picked up by the rear microphone are amplified less than the sounds being picked up by the front microphone. Therefore, the overall volume is slightly lower in the directional mode than in the omnidirectional mode. This can be compensated by increasing the master gain.

Instrument settings

Two alert tone types can be enabled (figure 31) to inform the user of the audio processor about an adjustment that needs to be made. The alert tones can be activated to indicate the following situations:



figure 30

Information about program change

The number of beeps depends on the selected program, e.g. one beep indicates program 1. The frequency of the alert tones can be adjusted for optimal audibility and set to 250, 500, 750, 1000, 1500, 2000, 3000, 4000, or 6000 Hz (figure 31).

Low battery beep

Indicates that the battery has to be replaced. The low battery beeps are longer than the program change beeps and their frequency is 250 Hz below the program change beeps. The beep occurs 20 seconds after the battery supply voltage falls below a defined threshold, subsequently every five minutes. The loudness of both alert tones can be set in 5 dB steps from 15 dB to 105 dB. To demonstrate the program change beeps press the Play alert tone button.



figure 31

REMARK: _____

If the alert tone is enabled in one program, all activated listening programs are affected. The beep frequency and loudness of the alert tones can be changed independently for each program.

REMARK:

In case that the battery supply voltage falls below a defined threshold, the Amadé switches into a power management state with a reduced output of 18 dB. The Amadé can still be detected via HIPRO in this case but Connexx will ask the user to replace the battery before the fitting is continued.

IX. Programs in the Amadé

For different listening situations, up to three programs can be activated. All Amadé parameters can be modified and individually adjusted in every listening program. The programs can be seen sorted 1 to 3 from top to bottom either on the right or the left margin of the Connexx programming screen (figure 32).

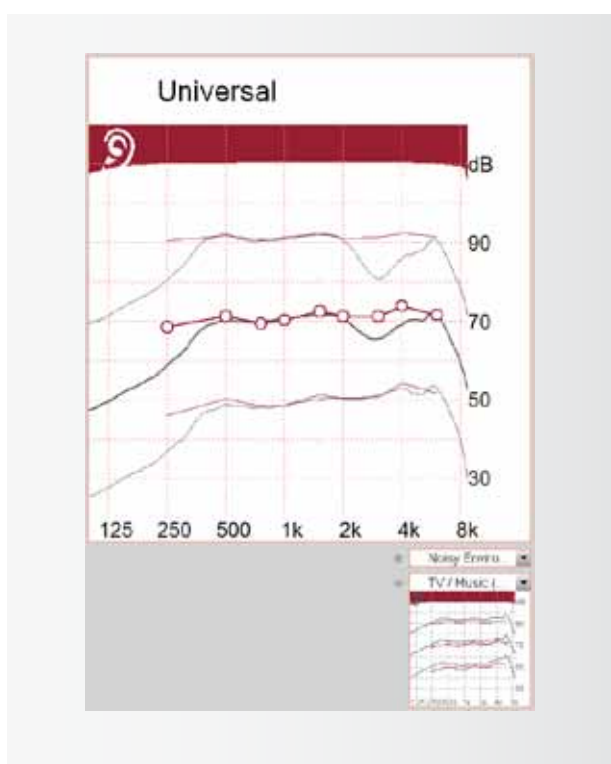


figure 32

Presets available in the Amadé

The following presets are available: Universal, Noisy Environment, TV/Music, Telephone acoustically, Outdoor/Sports, and Privacy.

Universal

The "Universal" program, which is stored under slot 1, is automatically active after switching on the Amadé. The microphone system is set to omnidirectional.

Speech and Noise Management as well as Sound Smoothing are set to medium, and the Wind-Noise Reduction is set to maximum.

(Please find more information about these features on pages 26 and 27 of this guide).

In slot 1 the program Universal is always active. Nevertheless you can change any setting within the program.

Noisy Environment

The program "Noisy Environment" is predefined in slot 2 and designed for noisy situations such as traffic, conversation in a large group, restaurants, or similar noisy situations.

To provide speech intelligibility and comfort within these situations the Amadé parameters are modified as follows: the microphone system is set to directional. Additionally Speech and Noise Management is set to maximum attenuation, Sound Smoothing is set to medium, and the Wind-Noise Reduction is set to maximum. Furthermore the channel gains are reduced in the lower frequency range as well as the gain for loud sounds for the whole frequency range.

TV/Music

The "TV/Music" program, which is the predefined program for slot 3, is primarily intended for listening to music but also for TV applications. It aims to provide a natural, wide band sound for the Amadé user. To achieve this goal, Wind-Noise reduction is turned off and for this particular acoustical environment, the Sound Smoothing feature is also turned off. The overall gain is also increased, especially in the low and high frequency ranges, to provide more bandwidth and sound quality. The time constants of the compression are set to high values (dual) and the microphone system is set to omnidirectional mode. Speech and Noise Management is set to medium attenuation.

Telephone Acoustically

The program "Telephone acoustically" is intended for telephone applications. It is aimed to provide speech intelligibility for the narrow band telephone signal.

Hence the amplification in the middle frequency range is increased and decreased in the very low and very high frequencies. The Microphone System is set to omni-directional, Wind-Noise Reduction is turned off and medium is set for Speech and Noise Management as well as for Sound Smoothing.

Outdoor/Sports

The program "Outdoor/Sports" is predominately intended for outdoor activities, such as cycling, and eliminates disturbing wind noise.

To achieve this goal a maximum Wind-Noise Reduction is used and the microphone system is set to omnidirectional characteristics. Additionally the amplification in the lower frequency range is reduced, with the Speech and Noise Management and Sound Smoothing being deactivated.

Privacy

The program "Privacy" is intended for all applications where the Amadé user does not wish to be disturbed by environmental sounds. Hence the amplification is decreased by 9 dB for the whole frequency range. The microphone system is set to omnidirectional and the Speech and Noise Management and Wind-Noise Reduction are deactivated. The Sound Smoothing algorithm is set to its maximum impact in this program.

Selecting and changing a program

In figure 32 the first program is magnified meaning that the Amadé is currently in this program. The user is hearing with program 1 at this time and all the setting

changes will be done in program 1.

To switch to program number 2 or 3 a simple click on the respective preview window is sufficient.

Changing presets, activating or deactivating a program

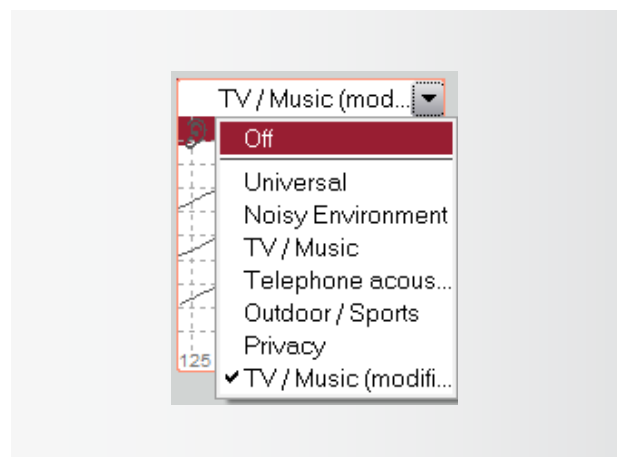


figure 33

If three programs have been selected for the first fitting, by default, the "Noisy Environment" program is stored in slot number 2 and the "TV/Music" program in slot number 3.

In the dropdown menu displayed in figure 33 one of the other presets can be chosen for the corresponding program slot.

In the same way programs can also be switched off if they are not needed by selecting Off in the dropdown menu.

REMARK: _____

Please note that you cannot switch off program number 2 as long as program number 3 is active.

A modified program will appear with the extension "(modified)" in the dropdown menu. Predefined programs are not changed.

Copying and switching programs between slots

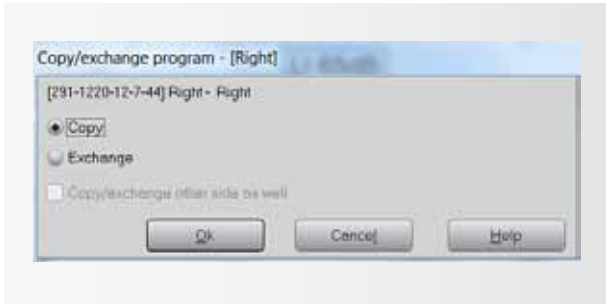


figure 34

By clicking on the activated preview window and drag and drop it over another one the window in figure 34 opens.

There are 2 options to choose between:

- **Copy** the activated program into another slot. This can be useful to create another program with only slight changes (e.g. increased/decreased volume)
- **Exchange** the activated with the targeted program

Confirm the selection by pressing on **OK**.

X. Documentation

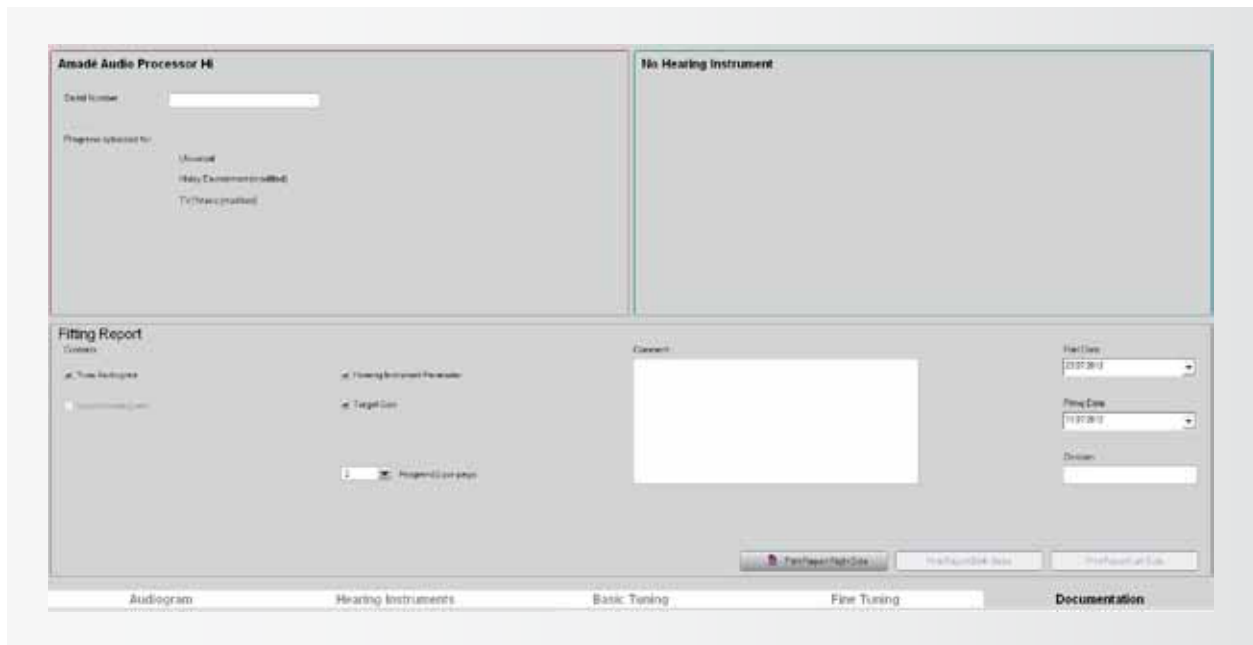


figure 35

In the last tab a report about the fitting session can be created (figure 35).

All parameters like the date and the name of the clinician, audiogram of the user, hearing system parameters and target gain can be stored or printed.

XI. Useful Connexx Tools

Store and recall hearing instrument settings

To store Amadé settings for quick access for later use press the highlighted button in the toolbar (figure 36). The following dialog box appears:

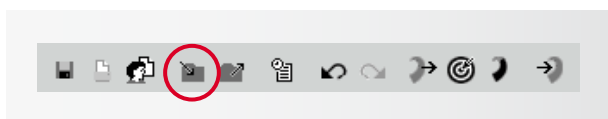


figure 36

The following dialog box (figure 37) appears:

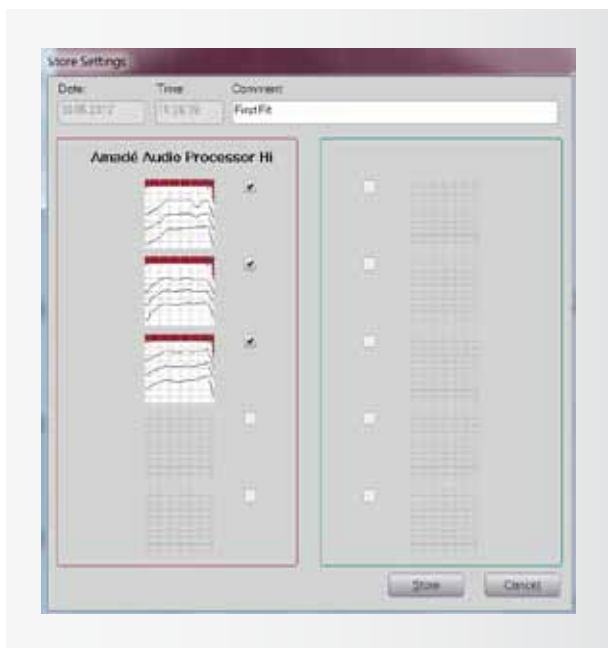


figure 37

The hearing instrument type and date/time are automatically entered and cannot be altered.

Activate the checkboxes for the program settings to be stored for the displayed Amadé.

A Comment relating to this setting in the text field can also be added at the top of the menu of Amadé settings. Press the Store button to acknowledge storage of the hearing instrument setting. The hearing instrument setting shown on the screen is stored permanently in

the client's data form.

If the setting is not to be stored, press the Cancel button to return to the main Connexx window.

For evaluation purposes, it may sometimes be useful to compare the currently used Amadé settings with a previously made fitting. To recall previously stored Amadé settings select Recall Settings... in the Edit menu or press the highlighted button in the toolbar (figure 38).

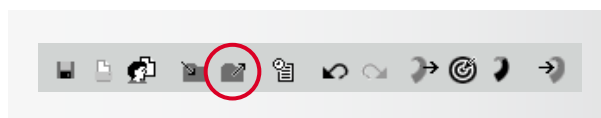


figure 38

The following dialog box (figure 39) appears:

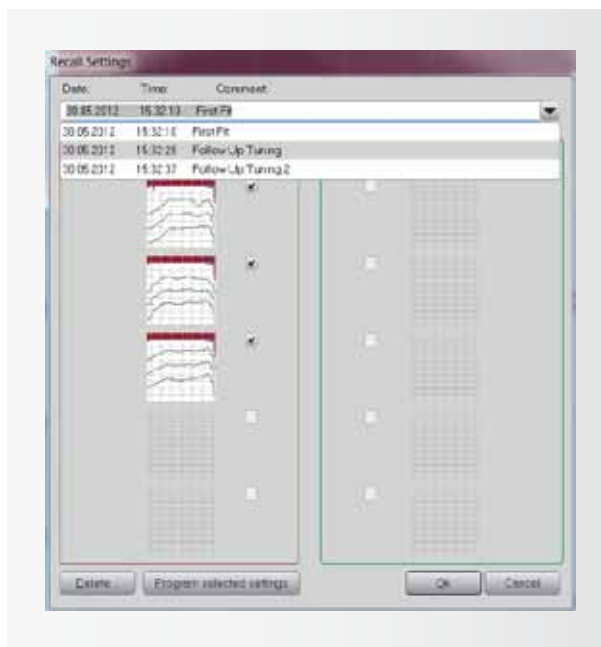


figure 39

To select a hearing instrument setting from the menu, click on the desired setting.

Click the Delete button to delete the hearing instrument setting selected (only programs with marked checkbox will be deleted) in the dialog box. The setting cannot

be recovered later.

With the Program selected settings button, the hearing instrument settings (only programs with marked checkbox) are immediately programmed into the connected Amadé.

Press the Ok button to update the selected Amadé setting onto the screen.

Pressing the Cancel button closes the dialog box, and the working area remains unchanged.

REMARK:

Please note that everything stored here is not stored in the user database. It is only stored on your local Connexx installation and these settings cannot be exported.

Save a session

To save a completed hearing instrument fitting and all associated data, select Save Session... in the File menu, or click the highlighted button in the toolbar (figure 40).

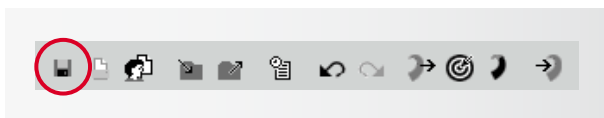


figure 40

The dialog box for saving a session will appear (figure 41):

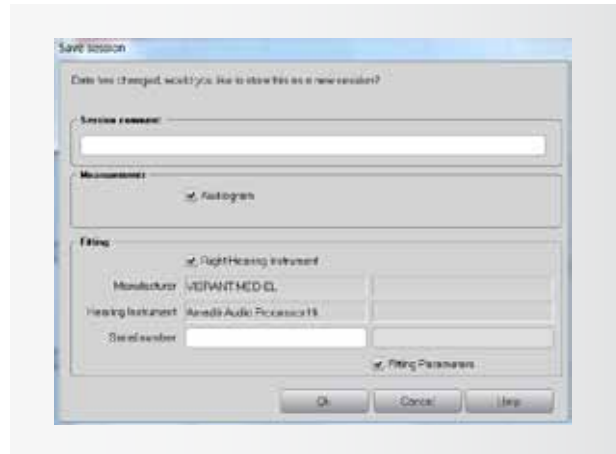


figure 41

be pressed if no data have been selected.

By pressing Cancel: The dialog box is closed and data are not saved.

Mute button

Click on the loudspeaker symbol (figure 42) in the lower toolbar to mute the Amadé. Press the button a second time to unmute the Amadé.



figure 42

Session Comment: Enter a comment for this fitting. This comment will appear later in the session list. Completion of this field is optional.

Measurements / Fitting: Select the data you wish to store for this fitting by checking Audiogram, right hearing instrument and/or left hearing instrument. The input fields **Manufacturer** and **Hearing Instrument** are automatically filled in and cannot be changed. Enter the serial numbers of the hearing instruments in the input field **Serial number**, if desired.

By pressing **Ok**, the selected fitting data are stored and are available for later use. The **Ok** button cannot

Program link

To apply a change in one program to all active programs click on the marked button (figure 43).



figure 43

Binaural link

For bilateral Amadé users a setting for both audio processors can be changed simultaneously. Click on the marked button (figure 44) to apply a change in one program to the respective program on the contralateral ear at the same time.



figure 44

Critical Gain Measurement

If feedback occurs after activation the **Feedback Cancellation** system can be activated within the Speech/Sound settings. Furthermore programming adjustments can be made to eliminate the feedback.

A suggested adjustment strategy follows: start by increasing the knee point a few steps in compression band no. 8. If the feedback level stays the same, bring it back to the initial position and try the same strategy with the next compression band, no. 7. Continue until you have identified which band creates the feedback.

Note that this is the recommended manual procedure. Additionally, an automated Anti-Feedback analyzer is available by selecting **Critical Gain Measurement** in the **Fitting** menu (figure 45).

When selecting **Start Measurement** the hearing implant generates an impulse sound across the whole frequency range for the programs that have been selected. This impulse sound is ciphered and analyzed by the microphones. Select **Optimise** to apply the recommended settings.

Import and export of client data

With the help of this tool client data can be imported and exported. Start the tool by selecting **Client DB Import/Export** from the File menu.

EXPORTING CLIENT DATA

The saved client data can be exported by choosing between one, several or all entries (figure 46). With the **Show all** button you can display the whole list of clients saved on the current workstation. Entries can be selected from this list.

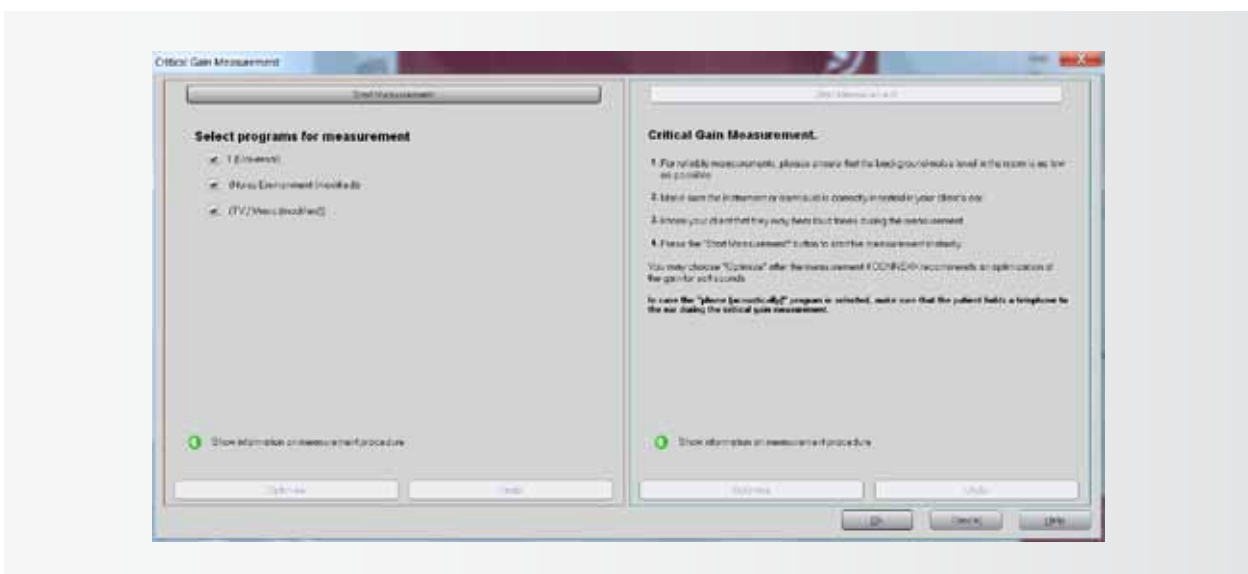


figure 45

To define the location to save the exported data, insert the corresponding file path and file name in the field Export client data to file.

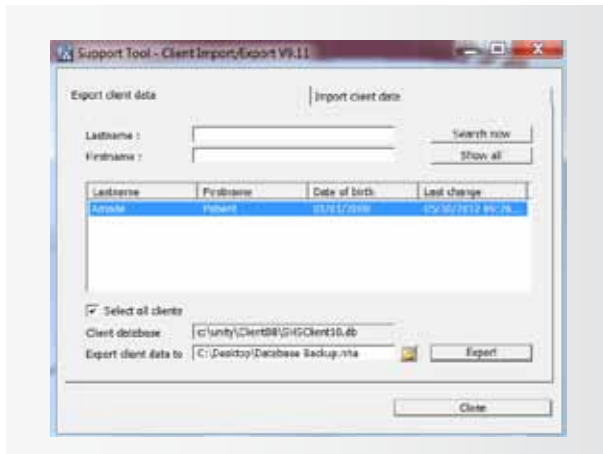


figure 46

After you have selected at least one entry the export process can be started by pressing the Export button. In a subsequent step, the type of export has to be defined:

Export data for standalone use: SHS compatible data will be exported. NOAH import is not possible with this format.

Export data for use in NOAH: NOAH compatible data will be exported. Your NOAH user ID has to be entered.

IMPORTING CLIENT DATA

Client data can be added to the database via the import function (figure 47) by clicking on **Import client data from file**, navigating to the file's location, and selecting the appropriate file. The **Client database** location displays the database to which the new data will be added.

If an NHA file is selected the whole list of clients, which will be added by the import process, is shown in the list field. Click the Import button to start the import process.

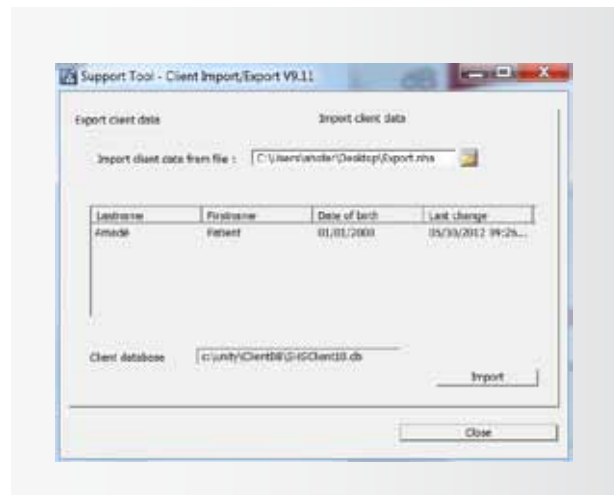


figure 47

REMARK: Please be aware that importing client data is only possible with the identical version of the Import/Export tool that you used for exporting the client data. The client database is not backwards compatible to earlier versions of Connexx.

Fitting Assistant

In addition to the information found in this Programming Guide, the Fitting Assistant available in the SYMFIT software (figure 48) provides fitting and troubleshooting suggestions. Start the assistant by selecting Fitting Assistant from the Fitting menu.

Test settings

Besides the Vibrogram settings, two other test settings can be useful for the fitting session.

They can be selected via **Fitting → Test Settings** in the menu.

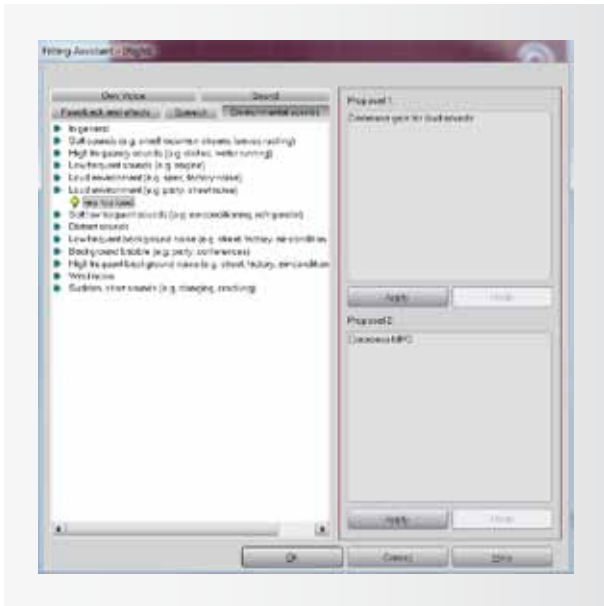


figure 48

LOUDNESS SCALING

(available for the Soundbridge Amadé)

This test setting can be used in order to assess if the fitting is appropriate in a way that e.g. 65 dB input sounds have equal loudness over the whole frequency range. Activating the test setting Loudness Scaling (figure 49) activates the table in the Vibrogram tab

however the fitting in the Amadé remains unchanged. Tones can now be presented to the user to do a loudness scaling.

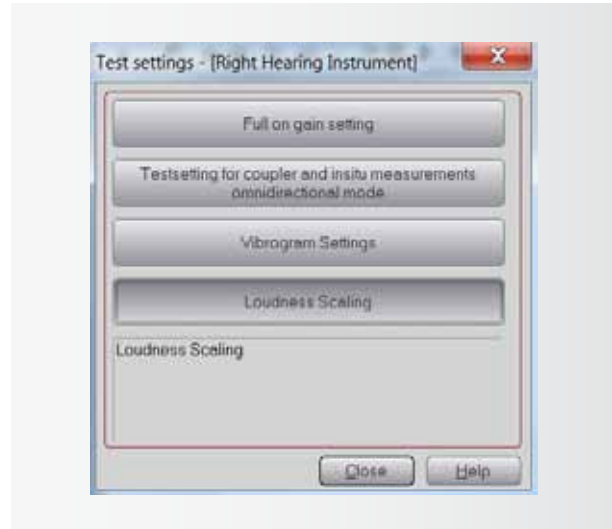


figure 49

FULL ON GAIN SETTING

This test setting sets the gain in the Amadé to the maximum value.

XII. Further Information

If you need assistance regarding the Connexx Software, please refer to the Connexx Help via **Help → Connexx Help** or simply by pressing **F1** on your keyboard.

If you need any further information regarding the fitting of the Amadé, please refer to the Instructions for Use (IFU).

For further information on our products, please visit the MED-EL website:

www.medel.com

or contact us via email:

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