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2. Hardware setup

CONNECTING THE DIB II

The DIB II provides a connection between the CI system and the personal computer with the MAESTRO software. This interface allows implant checks, objective measurements and programming. Make sure that you are using a DIB II. You will find the version of your DIB at the right front side.

- Connect the DIB II to your personal computer via the supplied cable. Connect the power supply and switch on the DIB II (Fig. 1).

![DIB II back](image1)

![Serial data cable](image2)

![Connecting the DIB II to the computer](image3)
2. Hardware setup

- Launch the MAESTRO software and log in as administrator.
- Click on Settings in the toolbar and select the field Hardware.
- Choose the COM port used for the DIB II. Just try various options one after the other in the MAESTRO software. To do this, select a COM port from the list and click on Apply Settings (Fig. 2). If the status of the DIB II connections appears after a short time, you will have found the correct COM port.

![Settings window](image)

Fig. 2 Selecting the COM ports for the DIB II

- Close the Settings window. Information about communication between DIB II and personal computer is indicated in the status line (Fig. 3).

![Status line](image)

Fig. 3 The DIB II recognized by the MAESTRO software is shown in the status line
2. Hardware setup

**CONNECTING THE HI-PRO BOX**

The MAESTRO software supports acoustic unit fitting via the HI-PRO box.

Select the corresponding comport in the Hardware setup editor. Make sure the **Mute Acoustic Unit at Connection time** checkbox is enabled and press **Reconnect**.

![Selecting the COM port for the HI-PRO box](image)

*Fig. 4 Selecting the COM port for the HI-PRO box*
2. Hardware setup

**COCHLEAR IMPLANT**

The DUET 2 Audio Processor is an accessory to the OPUS 2. The cochlear implant component of the DUET 2 is programmed in a similar way to the OPUS 2.

**Step 1**
Press the **Add processor** button and select OPUS 2 from the dropdown list. Activate the **DUET 2 battery pack** checkbox. When pressing **OK** the EAS checkbox is automatically enabled.

![Processor setup in the patient data dialogue](image)
Step 2
The crossover frequency between acoustic and cochlear implant stimulation is based on the user's post-operative unaided audiogram. Open the Audiogram task to enter air conduction thresholds.

The crossover frequency can be found where the hearing loss crosses the 65 dBHL line.

Fig. 6 Audiogram
2. Hardware setup

**Step 3**
Open a new fitting task and change to the *Frequency Bands* tab. Activate the *Display Cross-over Frequency* checkbox. The frequency range covered by the acoustic unit is indicated by the grey area.

Click the *Use Crossover as Minimum* button to adjust to the crossover frequency determined in step 2.

![Fig. 7 Setting the Cross-over Frequency in the Frequency Bands tab](image_url)
2. Hardware setup

**Step 4**
Go back to the **Levels** tab and define all stimulation parameters. Activate the map and make sure it creates sufficient loudness sensation. Press **Save and Close** to finish the cochlear implant fitting.

![Fig. 8 CI stimulation parameters](image-url)
2. Hardware setup

Open a new configuration task. A map can be assigned to a program position by selecting it from the drop-down list, which appears after clicking on the arrow symbol in the field in the upper area of the applicable program position or by drag and drop from the database view. After assigning a map to a program position, a preview of the map appears in the dialog of the applicable program position. Each map is downloaded with the assigned default volume (see Levels) and default sensitivity (see ASM). Changing the default volume in the Configuration task is not possible for OPUS 2 processors.

Press Program Processor to transfer the configuration the processor.

Fig. 9 Processor configuration task
2. Hardware setup

**Step 5**
Reassemble the DUET 2 processor and put 675 zinc-air batteries into the battery pack. Make sure the DUET 2 is turned on.

To connect the DUET 2 acoustic unit to the MAESTRO software the HI-PRO box is required. Plug the DUET 2 programming cable into the CS44 plug and make sure it is connected with the corresponding HI-PRO box socket for the left or right side.
2. Hardware setup

ACOUSTIC UNIT

The acoustic amplification of the DUET 2 is adjusted via the Acoustic Fitting task in the MAESTRO software or using four trimmers. The MAESTRO software indicates if the DUET 2 acoustic unit is adjusted via trimmers or the HI-PRO box interface.

Follow the recommendation in the Appendix section when using the trimmers to adjust the acoustic part of the DUET 2.

Starting from this basic fitting, the parameters can be fine-tuned according to the user's individual needs.
2. Hardware setup

**Step 6**

Press the **Switch to Software Fitting** button to change to software fitting.

![Figure 11 MAESTRO Acoustic Fitting task](image)

The software indicates that the acoustic amplification is adjusted using software and HI-PRO, the trimmers are disabled.
2. Hardware setup

Press **First Fit** to get an automatic gain and Low Frequency Slope setup.

Follow the recommendation in the Appendix section when using the trimmers to adjust the acoustic part of the DUET 2.

Starting from this basic fitting, the parameters can be fine-tuned according to the user’s individual needs.
2. Hardware setup

Press the *Program* button to transfer the acoustic unit settings to the DUET 2 processor.

![MAESTRO Acoustic Fitting task](image)

*Fig. 13 MAESTRO Acoustic Fitting task*

The internal memory which stores the acoustic unit fitting parameters does not include Acoustic Fitting task names. When the *Read* button is pressed only the acoustic amplification parameters are uploaded.
3. Appendix

**GAIN**

Based on the user's audiogram at 500Hz, determine the half-rule gain as follows:

\[
\text{Gain: } \frac{\text{THR}_{500\text{Hz}}}{2} = \text{dB}
\]

In this example the threshold for 500Hz is at 60 dB. So the gain is: \( \frac{60 \text{ dB}}{2} = 30 \text{ dB} \).

![Audiogram threshold at 500Hz](image-url)
3. Appendix

Based on your gain calculation, set the gain using trimmer ②. If the user’s gain exceeds the maximum of 42 dB, it should be set to the maximum level.

**Fig. 15 Gain Trimmer positions**
LOW FREQUENCY SLOPE

Determine the difference between the audiogram findings at 250Hz and 500Hz. Divide this difference by 2. This will give you the setting for the low frequency slope.

\[
\text{Low frequency slope: } \frac{\text{THR}_{500\text{Hz}} - \text{THR}_{250\text{Hz}}}{2} = \text{dB/octave}
\]

In this example the threshold for 500Hz is at 60dB and for 250Hz at 40dB. So the low frequency slope is: \( \frac{60\text{dB} - 40\text{dB}}{2} = 10\text{dB/octave} \).

Fig. 16 Audiogram thresholds at 250Hz and 500Hz
Use trimmer ❶ to set and adjust the low frequency slope as needed.

Fig. 17 Low frequency slope trimmer positions
AGC RATIO

Using trimmer ③, set the AGC ratio to a comfortable level for the user. Most users prefer the position: 1.33:1

---

**Fig. 18 AGC ratio trimmer positions**
Fine tune using the Volume (VOL) trimmer. Gradually increase the volume from the minimum setting. The aim is to have the loudness balanced between acoustic amplification and CI stimulation.

**Fig. 19 Volume trimmer positions**
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