Cochlear™ Update

Upgrading and converting Nucleus® 24 implant recipients to a Nucleus CP810 Sound Processor using Cochlear™ Custom Sound™ 3.2

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Contents

Note: *Nucleus 24 implants include all CI24R and CI24M models.*

Upgrading and converting Nucleus® 24 implant recipients to a Nucleus CP810 Sound Processor using Cochlear™ Custom Sound™ 3.2

You can select to **convert** the settings on an existing sound processor when changing to the Nucleus 5 Sound Processor or you can select to **upgrade** the settings for use on the Nucleus 5 Sound Processor.

Convert Option

The **convert** option with Custom Sound™ is designed to copy the compatible settings of the recipient's existing processor onto their new processor. When the setting cannot be copied, the default settings of the new sound processor will be applied.

This option is useful for recipients who want their Nucleus 5 Sound Processor to approximate the sound of their existing processor as much as possible.

The convert option is available for SPrint™, ESPrit™, ESPrit™ 3G and Freedom processors changing to a Nucleus 5 Sound Processor.

Custom Sound 3.2 will alert the clinician if the MAP cannot be converted (e.g. if trying to convert an invalid MAP).

Note: *For processors prior to the Freedom that have a 30dB IIDR, Custom Sound will retain the IIDR at 30dB (T-SPL of 35 and C-SPL of 65). The change to 40dB IIDR (T-SPL of 25 and C-SPL of 65) will only occur using the upgrade option.*

Upgrade Option

The **upgrade** option with Custom Sound uses the MAP settings of the existing processor with the default Nucleus 5 Sound Processor frequency allocation table (the table number used depends on the number of active channels) and IIDR (40dB IIDR).

This option is useful for recipients who want to experiment with different settings and potentially benefit from new settings that have demonstrated improvements for a number of recipients. [1, 2, 3]

The upgrade option is available for Nucleus 24 implant recipients using SPrint, ESPrit and ESPrit 3G processors changing to a Nucleus 5 Sound Processor. There is no upgrade option for Freedom to Nucleus 5 Sound Processor as the Freedom processor uses the same frequency allocation table and IIDR settings as the Nucleus 5 Sound Processor (i.e. If the upgrade option were available for Freedom, it would be the same as the convert option).

What settings are changed with upgrade and convert options?

The following tables show the settings that remain the same or that are changed with the convert and upgrade options in Custom Sound™ 3.2.

Freedom to Nucleus® 5 Sound Processor

Note: *Upgrade option not available due to the same defaults for frequency allocation table and IIDR settings.*

SETTINGS	CONVERT
Strategy	Copied from Freedom™ (Default: ACE™/ACE(RE))
Stimulation mode	Copied from Freedom (Default: MP1+2)
Rate	Copied from Freedom (Default: 900Hz)
Maxima	Copied from Freedom (Default: 8)
Pulse width	Copied from Freedom (Default: 25)
Frequency allocation table	Copied from Freedom (Default: Depends on number of active electrodes for that MAP). Frequency allocation tables for the Freedom and Nucleus 5 Sound Processors are the same.
Volume adjustment (% DR)	Copied from Freedom
Tone Level (% DR)	Copied from Freedom
Tone channel	Copied from Freedom
Low tone channel	Copied from Freedom
IIDR (T-SPL and C-SPL)	Copied from Freedom (Default: T-SPL = 25 and C-SPL = 65; 40dB IIDR)
T and C levels	Copied from Freedom
Active electrodes	Copied from Freedom
Inactive electrodes	Copied from Freedom
Channel gain	Copied from Freedom
NRT markers	Copied from Freedom
Whether a channel/s was interpolated or measured	Copied from Freedom
Whether a channel/s was linked or position changed	Copied from Freedom

SETTINGS	CONVERT
Volume level	Copied from Freedom then increased by 1 (Default: 10, which is equivalent to 9 on the Freedom)
Sensitivity level	Copied from Freedom (Default: 12)
SmartSound™ Everyday	Copied from Freedom
SmartSound Noise	Copied from Freedom, but with zoom added. (Except if Autosensitivity™ only was used in the Noise environment. In this case, Autosensitivity only will be used in the Noise environment.)
SmartSound Focus	Copied from Freedom
SmartSound Music	Copied from Freedom
Telecoil mixing ratio	Changed to new Freedom/Nucleus 5 default setting (Default: Pediatrics - 1:1; Adults - 3:1)
Accessory mixing ratio	Changed to new Freedom/Nucleus 5 default setting (Default: Pediatrics - 1:1; Adults - 2:1)

SPrint™ to Nucleus 5 Sound Processor

SETTINGS	CONVERT	UPGRADE
Strategy	Copied from SPrint (Default: ACE)	Copied from SPrint (Default: ACE)
Stimulation mode	Copied from SPrint (Default: MP1+2) Note: If SPrint MAP stimulation mode was set to 'Variable', BP+1 mode will be used. Channel stimulation modes will, however, be copied directly to the new MAP.	Copied from SPrint (Default: MP1+2) Note: If SPrint MAP stimulation mode was set to 'Variable,' BP+1 mode will be used. Channel stimulation modes will, however, be copied directly to the new MAP.
Rate	Copied from SPrint (Default: 900Hz)	Copied from SPrint (Default: 900Hz)
Maxima	Copied from SPrint (Default: 8)	Copied from SPrint (Default: 8)
Pulse width	Copied from SPrint (Default: 25)	Copied from SPrint (Default: 25)
Frequency allocation table	Copied from SPrint (Default: Depends on number of enabled electrodes for that MAP.)	Changed to Nucleus 5 (Default: Depends on number of enabled electrodes for that MAP.)
Volume adjustment (% DR)	Copied from SPrint	Copied from SPrint
Tone level (% DR)	Copied from Sprint	Copied from SPrint
Tone channel	Copied from SPrint	Copied from SPrint
Low tone channel	Copied from Sprint	Copied from Sprint
IIDR (T-SPL and C-SPL)	Copied from SPrint (Default: T-SPL = 35 and C-SPL = 65; 30dB IIDR)	Changed to Nucleus 5 default (Default: T-SPL = 25 and C-SPL = 65; 40dB IIDR)

SPrint™ to Nucleus® 5 Sound Processor - CONTINUED

SETTINGS	CONVERT	UPGRADE
T and C levels	Copied from SPrint	Copied from SPrint
Active electrodes	Copied from SPrint	Copied from SPrint
Inactive electrodes	Copied from SPrint	Copied from SPrint
Channel gain	Copied from SPrint	Copied from SPrint
NRT markers	Copied from SPrint	Copied from SPrint
Whether a channel/s was interpolated or measured	Copied from SPrint	Copied from SPrint
Whether a channel/s was linked or position changed	Copied from SPrint	Copied from SPrint
Volume level	Changed to Nucleus 5 setting (Default: 10)	Changed to Nucleus 5 setting (Default: 10)
Sensitivity level	Changed to Nucleus 5 setting (Default: 12)	Changed to Nucleus 5 setting (Default: 12)
SmartSound™ Everyday	Autosensitivity + ADRO®	Autosensitivity + ADRO
SmartSound Noise	Zoom + Autosensitivity + ADRO	Zoom + Autosensitivity + ADRO
SmartSound Focus	Beam™ + Autosensitivity + ADRO	Beam + Autosensitivity + ADRO
SmartSound Music	Whisper™ + ADRO	Whisper + ADRO
Telecoil mixing ratio	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 3:1)	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 3:1)
Accessory mixing ratio	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 2:1)	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 2:1)

ESPrit™/ESPrit 3G to Nucleus 5 Sound Processor

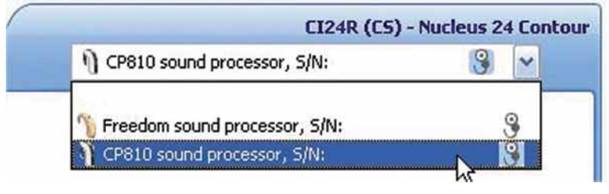
SETTINGS	CONVERT	UPGRADE
Strategy	Copied from ESPrit/ESPrit 3G (Default: ACE™)	Copied from ESPrit/ESPrit 3G (Default: ACE)
Stimulation mode	Copied from ESPrit/ESPrit 3G (Default: MP1+2) Note: If ESPrit/ESPrit 3G MAP stimulation mode was set to 'Variable,' BP+1 mode will be used. Channel stimulation modes will, however, be copied directly to the new MAP.	Copied from ESPrit/ESPrit 3G (Default: MP1+2) Note: If ESPrit/ESPrit 3G MAP stimulation mode was set to 'Variable,' BP+1 mode will be used. Channel stimulation modes will, however, be copied directly to the new MAP.
Rate	Copied from ESPrit/ESPrit 3G (Default: 900Hz)	Copied from ESPrit/ESPrit 3G (Default: 900Hz)
Maxima	Copied from ESPrit/ESPrit 3G (Default: 8)	Copied from ESPrit/ESPrit 3G (Default: 8)
Pulse width	Copied from ESPrit/ESPrit 3G (Default: 25)	Copied from ESPrit/ESPrit 3G (Default: 25)
Frequency allocation table	Copied from ESPrit/ESPrit 3G: (If the upper frequency is greater than 7938Hz, convert will set the boundary to 7938Hz, except for cases where this change results in the highest frequency band being less than 500Hz wide, in which case the Nucleus 5 Sound Processor default table will be used.) (Note: If an ESPrit 3G was programmed on a Freedom implant and is being converted to a Nucleus 5, the frequency allocation tables will be changed to the Nucleus 5 default.)	Changed to Nucleus 5 Sound Processor default table for the number of active channels.
Volume adjustment (% DR)	Changed to Nucleus 5 default (Default: 20)	Changed to Nucleus 5 default (Default: 20)
Tone level (% DR)	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
Tone channel	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
IIDR (T-SPL and C-SPL)	Copied from ESPrit/ESPrit 3G (Default: T-SPL = 35 and C-SPL = 65; 30dB IIDR)	Changed to Nucleus 5 default (Default: T-SPL = 25 and C-SPL = 65; 40dB IIDR)
T and C levels	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
Active electrodes	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
Inactive electrodes	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
Channel gain	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
NRT markers	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
Whether a channel/s was interpolated or measured	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G
Whether a channel/s was linked or position changed	Copied from ESPrit/ESPrit 3G	Copied from ESPrit/ESPrit 3G

ESPrit/ESPrit 3G to Nucleus 5 Sound Processor - CONTINUED

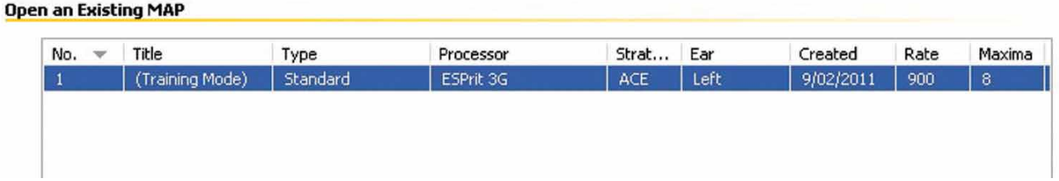
SETTINGS	CONVERT	UPGRADE
Volume level	Changed to Nucleus 5 setting (Default: 10)	Changed to Nucleus 5 setting (Default: 10)
Sensitivity level	Changed to Nucleus 5 setting (Default: 12)	Changed to Nucleus 5 setting (Default: 12)
SmartSound™ Everyday	Autosensitivity™ + ADRO®	Autosensitivity + ADRO
SmartSound Noise	Zoom + Autosensitivity + ADRO	Zoom + Autosensitivity + ADRO
SmartSound Focus	Beam + Autosensitivity + ADRO	Beam + Autosensitivity + ADRO
SmartSound Music	Whisper™ + ADRO	Whisper + ADRO
Telecoil mixing ratio	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 3:1)	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 3:1)
Accessory mixing ratio	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults: 2:1)	Changed to Nucleus 5 setting (Default: Pediatrics - 1:1; Adults - 2:1)

Steps for converting or upgrading to the Nucleus 5 Sound Processor

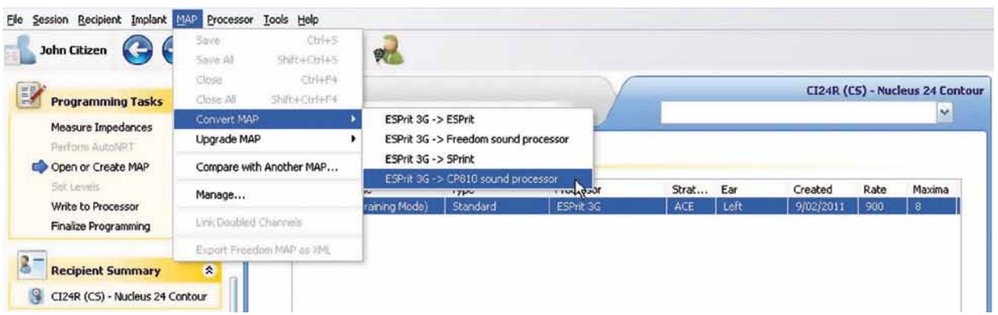
1. Open the recipient file
2. Measure impedances and ensure the proper sound processor has been selected in the drop down menu.



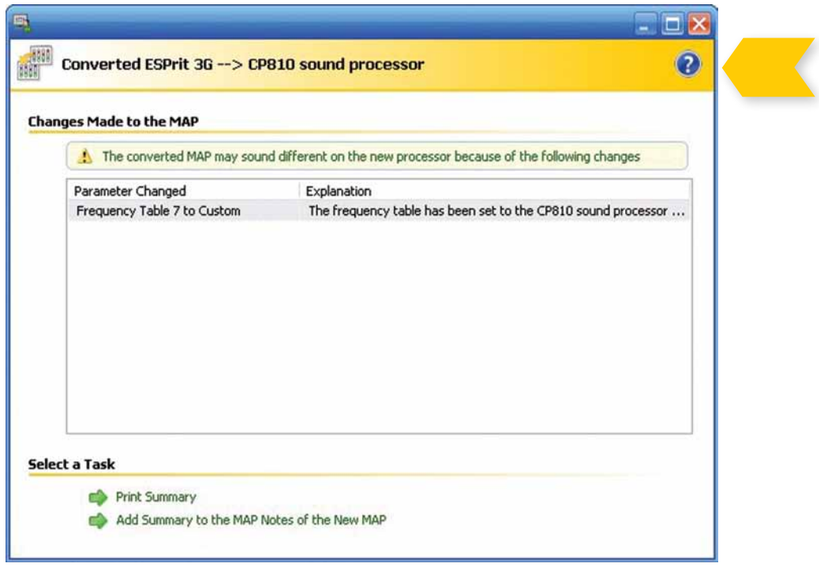
3. Go to the **Open or Create MAP** screen and select the MAP to be used on the CP810 Sound Processor:



4. **Upgrade** or **Convert** the MAP. To do this, right click on the selected MAP or go to MAP in the top menu.



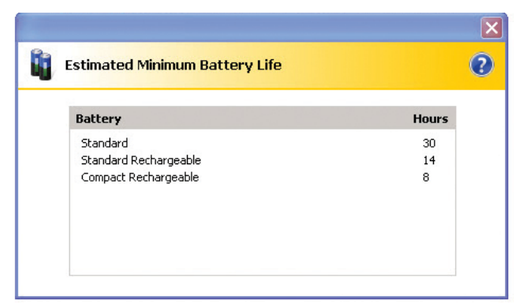
A MAP summary will appear if Custom Sound has made changes to the settings on the MAP (e.g. This will appear when upgrading or if a setting needs to be adjusted with the conversion option).



5. Custom Sound™ will now transition to the **Set Levels** screen. 'Go Live' and check the sound. Make adjustments as required and save the new MAP.

Note: *HearingMentor™ is a great resource for suggestions on adjusting MAPs.*

Custom Sound will automatically measure compliance levels for the battery option(s) indicated and provide battery life estimation details for each battery option. The battery life estimation will provide useful information for counseling recipients about when to expect to change batteries with their new Nucleus 5 Sound Processor.



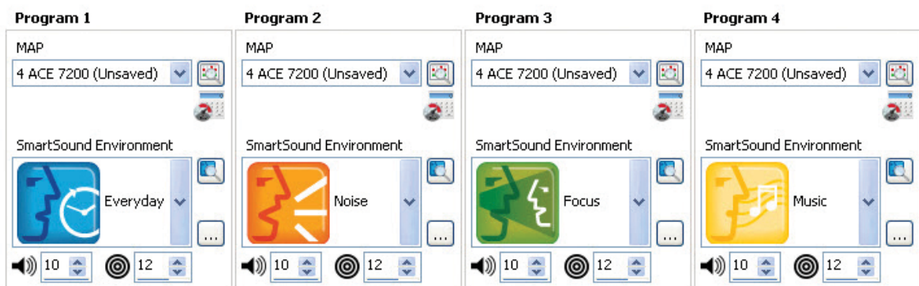
6. Go to the 'Write to Processor' screen. The converted or upgraded MAP will automatically be populated in each of the four program locations. Additionally, the SmartSound™ Environments of Everyday, Noise, Focus and Music will be added to each MAP to form the Program.

   The default SmartSound settings for the Nucleus® 5 Sound Processor are:

   - Everyday — Autosensitivity™ + ADRO®;
   - Noise — Zoom + Autosensitivity + ADRO;
   - Focus — Beam + Autosensitvity + ADRO;
   - Music — Whisper™ + ADRO

   For conversions and upgrades from SPrint™, ESPrit™ and ESPrit 3G sound processors to the Nucleus 5 Sound Processor, the new defaults will be applied. For conversions from the Freedom Sound Processor, the SmartSound Environments from the previous session history will be applied. (See table on pp 4-5 for detail.)

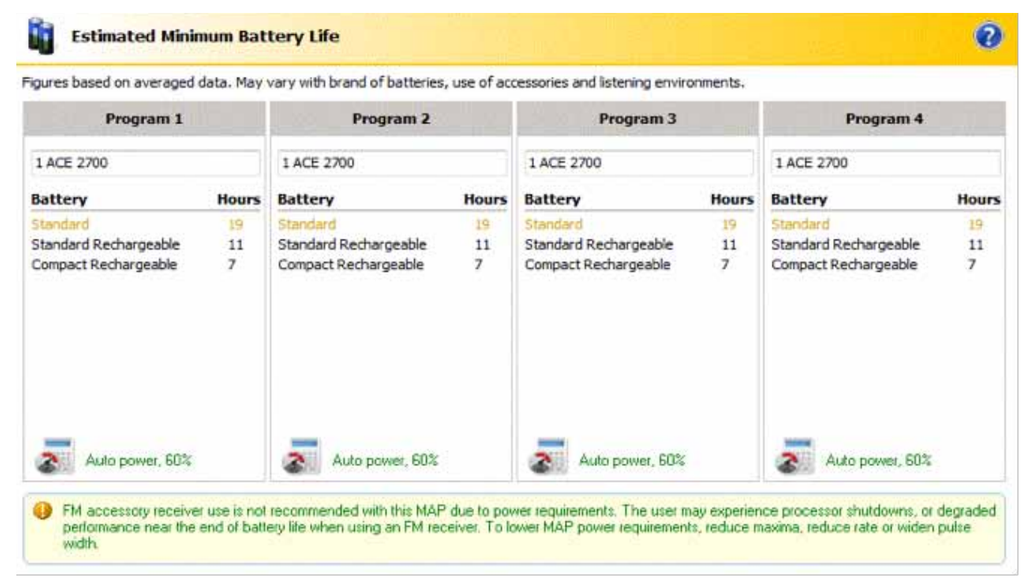
   The SmartSound Environment options can be viewed and modified in the 'Configure Environment' window, which is opened by selecting the ... icon.



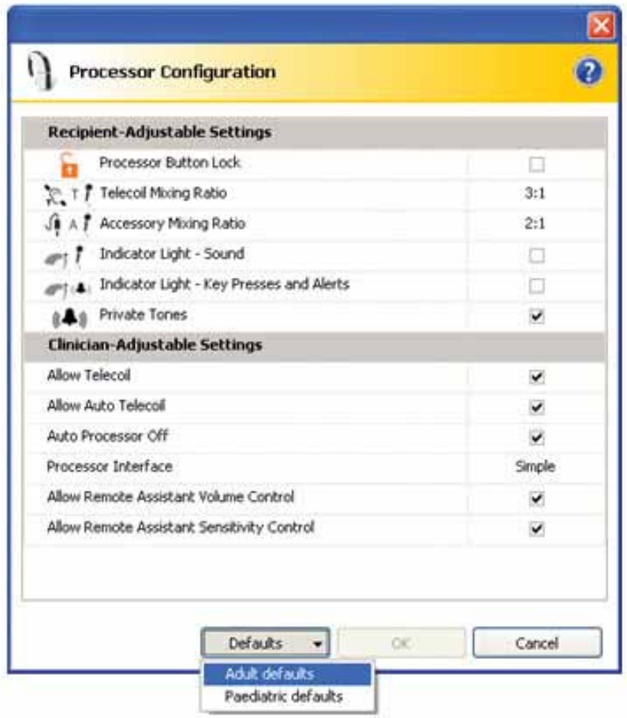
Note: *If progressive MAPs are used, the Everyday environment is applied to each MAP.*

The option to 'Go Live' in each program can be used to check the sound of each SmartSound environment with the recipient. It is recommended to use the default SmartSound settings with recipients to gain the documented benefits with hearing performance, particularly in noisy environments. If the recipient has not used SmartSound before some acclimatization to the sound is usually needed.

Custom Sound 3.2 provides additional guidance for the use of an FM device with the Nucleus 5 Sound Processor. Ear level FM receivers are active devices and they draw additional power from the sound processor. When using 2 Zinc Air batteries, an automatic warning regarding FM accessory use is generated when the estimated battery life is 19 hours or less.



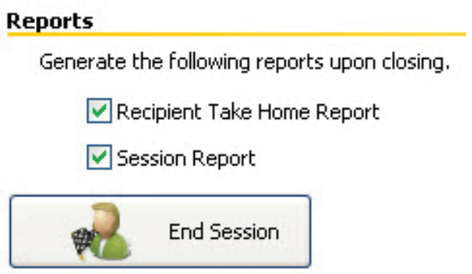
7. Click on the Nucleus® 5 Sound Processor icon in the 'Write to Processor' screen to configure the processor settings for the recipient. Custom Sound will automatically default to the 'Adult' settings on the processor. To change this, click on the **Defaults** button and select **Pediatric defaults** or customize by ticking the options:



Note: *If you uncheck the Allow Telecoil box, this will automatically rule out the option for Auto Telecoil.*

8. Click **Write** to download the programs onto the Nucleus 5 Sound Processor.

9. Go to **Finalize Programming** screen to generate the recipient take home or session receipt. Click on the **End Session** button.



General Counseling Tips

When converting or upgrading MAPs, a change in sound quality is expected in most recipients. This may take some adjustment time on the part of the recipient. Some of the key differences in sound when starting to use a new processor may include:

	CHANGES TO EXPECT AND COUNSEL ABOUT	COUNSELING TIP
SPrint™ /ESPrit™/ESPrit 3G to Nucleus 5 Sound Processor	A higher default sensitivity level is used on the Nucleus 5 Sound Processor so recipients may find they are hearing more sound than previously.	Encourage recipients to use the default sensitivity level of 12 on the Nucleus 5 Sound Processor. If the recipient reports hearing more sound as a concern, match sensitivity level initially to their previous processor (we recommend not going below a sensitivity level of 8) and increase sensitivity level within tolerance levels over time. Another option is to use the default sensitivity of 12, but to reduce the volume to 7-8. The recipient can increase volume when necessary.
	If using the upgrade option, there will be an increased IIDR for a wider window of sound (typically from 30dB to 40dB IIDR)	After trying sensitivity and volume adjustments and after sufficient take-home experience, if recipient is still reporting hearing too much sound, decrease the IIDR (by increasing the T-SPL level in increments of 1 until recipient is comfortable).
	A new frequency allocation table may have been used – this will likely change the sound quality for the recipient.	Most recipients will adjust to the new frequency allocation table with time. If required, the frequency boundaries of the channels can be adjusted to better match the previous MAP. Consult HearingMentor and the Clinical Guidance document for further information.
Freedom™ to Nucleus 5 Sound Processor	Use of the phone with the telecoil is different for the Freedom and Nucleus 5 Sound Processor (as a result of the orientation of the telecoil inside the processing units).	Demonstrate to the recipient the correct way to hold the telephone when using a Nucleus 5 Sound Processor with telecoil enabled. Encourage the recipient to try different positions with the phone and telecoil.
In general: Sound	• The Nucleus 5 Sound Processor has a different microphone frequency response compared to microphones used in previous generations of processors. The recipient should be counseled to expect some difference in sound quality. • This difference will generally be more significant for ESPrit/ESPrit 3G and SPrint recipients changing to the Nucleus 5 Sound Processor due to differences in frequency allocation tables, the use of dual microphone technology, SmartSound™, microphone sensitivity levels and the IIDR increasing from 30 to 40dB. • Adjusting the C-levels may be appropriate for recipients who might find it very difficult to adjust to a new sound quality after long term use of their previous processor. The volume control can be used by recipients to control loudness. • In order to help recipients get used to differences in sound quality, encourage them to use their new sound processor and not revert to using their previous processor. • Consult HearingMentor for guidance based on the sound description from the recipient.	
In general: Usability	It may take recipients time to adjust to using the different controls on the new processor as well as using the sound processor and remote assistant in different listening situations. Nucleus 5 is a very different system with more features than our previous systems. Each recipient is different and adaptation may vary. We recommend that recipients start with the Simple Mode on the CR110 Remote Assistant while becoming familiar with the device.	
In general: Battery life	Battery life is dependent on a number of variables. Clinicians should follow the battery suitability guidance and battery life estimations provided by Custom Sound™ 3.2 for counseling recipients. Generally speaking, recipients using the Nucleus 5 Sound Processor with the standard battery module (i.e. 2 Zinc Air batteries) should receive approximately two thirds of the battery life if they used a Freedom processor with the standard battery controller (i.e. 3 Zinc Air batteries). The reason that the battery life of the CP810 Sound Processor is about two-thirds of the Freedom is because the CP810 Sound Processor uses one less battery.	

Implant ID Troubleshooting Tips

If issues with the Implant ID are experienced when going live (e.g. this may happen if the coil is placed on the head after the 'Go Live' button is pressed or when first measuring impedances for a recipient programmed with a Freedom™ or SPrint™ processor who is upgrading or converting to the Nucleus® 5 Sound Processor), use one or all of the following troubleshooting steps.

A. It is advisable to confirm that the correct implant and sound processor combination has been selected in the tabs at the top of your screen.

B. Stop the 'Go Live' function and take the coil off the head. Place the coil back on the head and press 'Go Live'.

C. If the coil is removed and replaced quickly during programming from a Nucleus 24 recipient with a Nucleus 5 or Freedom Sound Processor that contains no programs, Custom Sound may indicate that the coil is on the wrong implant or that the coil is still not connected. *To resolve this situation it is recommended that you remove the coil again and replace it after waiting at least five seconds.*

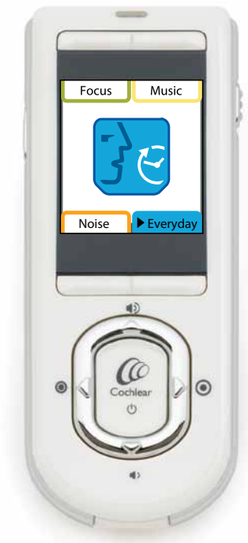
Cochlear™ Nucleus® CR110 Remote Assistant

The Cochlear Nucleus CR110 Remote Assistant can be used to simplify and support the counseling process. For the recipient, the remote assistant is an easy-to-use tool to monitor, control and manage their hearing environment. Bilateral recipients need only one Remote Assistant to adjust and manage two sound processors simultaneously.

The icons used on the Remote Assistant user interface are also used within Custom Sound™ 3.2. While programming, refer to these icons and introduce the recipient to the icons and functionality of their remote assistant. This mainly includes the SmartSound™ environments and recipient-adjustable settings.

Upgrades for the Remote Assistant are automatically downloaded to the remote assistant whenever the Custom Sound software includes a remote assistant software upgrade. The remote assistant must be connected by USB cable to the computer to allow the upgrade to occur. The software will automatically ask if the update should proceed. Upgrading the software of the Remote Assistant through Custom Sound will take approximately two minutes to complete. (Note: The Remote Assistant is not supported by Windows 2000.)

Cochlear recommends counseling recipients to bring their Remote Assistant to every clinical session – for the purposes of assisting counseling and for possible software upgrades.



SMARTSOUND EVERYDAY

ACCESSORY MIXING RATIOS

CP800 Series Programming Shoe and Cable

The CP800 Series Programming Shoe and Cable is designed to be used with the existing Cochlear Programming Pod (the same one as used with the Freedom™ Sound Processor) and the Cochlear™ Nucleus® 5 Sound Processor. The Programming Shoe and Cable is not compatible with Freedom or older Cochlear sound processors.

To attach the cable to the Programming Pod:

1. Ensure that the Programming Pod is connected to the computer on which Custom Sound Suite is installed.
2. Connect the Programming Cable to the Programming Pod.
3. Connect the Programming Shoe on the cable to the sound processor via the battery bayonet connection point.

Tips

- The Quick Reference Guide is a great way to introduce the functions of the Nucleus 5 Sound Processor and CR110 Remote Assistant in programming sessions.
- The Processor Configuration window for the CP810 Sound Processor enables personalization of recipient-adjustable and clinician-adjustable settings.
- Only one Remote Assistant is needed for both unilateral and bilateral Nucleus 5 Sound Processor recipients.
- The use of SmartSound icons in Custom Sound™ Suite 3.2 and the CR110 Remote Assistant can assist in the counseling of recipients.
- Remember to ask recipients to bring the CR110 Remote Assistant to all sessions.

References

1. Nucleus Freedom Clinical Outcomes, June 2006. Freedom For Nucleus 3, 12-14 (N31896F ISS1 JUN06)
2. Davidson, L., et al. (2007). The Effect of Instantaneous Input Dynamic Range Setting on the Speech Perception of Children with the Nucleus 24 Implant. Ear &Hearing, 30, pp340-349.
3. Dawson, P., et al. (2007). Clinical Evaluation of Expanded Input Dynamic Range in Nucleus Cochlear Implants. Ear & Hearing, 28, pp163-176.

Notes

Hear now. And always

This is the Cochlear promise to you. As the global leader in hearing solutions, Cochlear is dedicated to bringing the gift of sound to people all over the world. With our hearing solutions, Cochlear has reconnected over 230,000 cochlear implant and Baha® users to their families, friends and communities in more than 100 countries.

Along with the industry's largest investment in research and development, we continue to partner with leading international researchers and hearing professionals, ensuring that we are at the forefront in the science of hearing.

For the person with hearing loss receiving any one of the Cochlear hearing solutions, our commitment is that for the rest of your life we will be here to support you **Hear now. And always**

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