User Manual

for the Nucleus® Freedom™
BTE and Bodyworn
speech processors

Part Number: N31018F Issue 2

Contents

Introduction

Overview

The Nucleus® Freedom™ speech processor is used together with a Nucleus® Freedom™ implant, to transmit sound to the cochlea.

The Freedom speech processor consists of a Processing Unit, coil and a choice of two Controllers.

The smaller BTE Controller allows the speech processor to be worn behind the ear as a BTE speech processor. It is powered by three 675 zinc air batteries.

The larger Bodyworn Controller is worn on the body as a body worn speech processor. It uses either two AAA nickel/metal-hydride (NiMH) batteries, or disposable alkaline batteries.

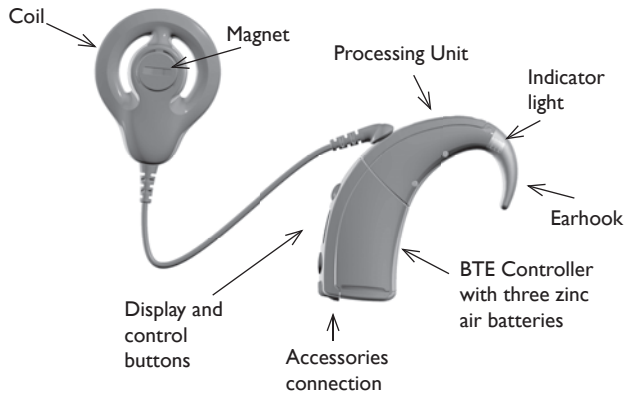
The two Controllers can be used interchangeably with the same Processing Unit.

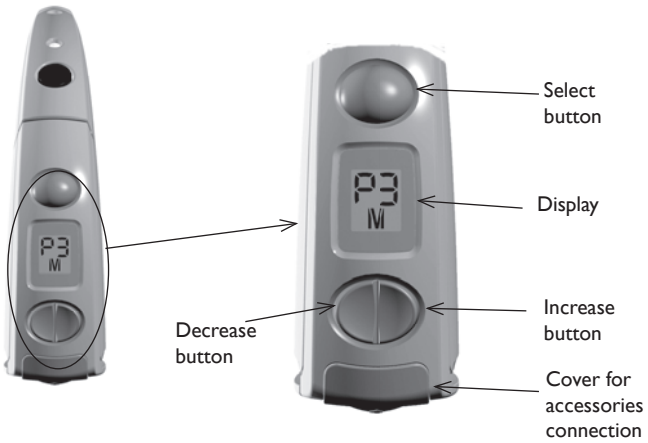
Warning

The Freedom speech processor contains small parts that may be hazardous if swallowed, or may cause choking if ingested or inhaled.

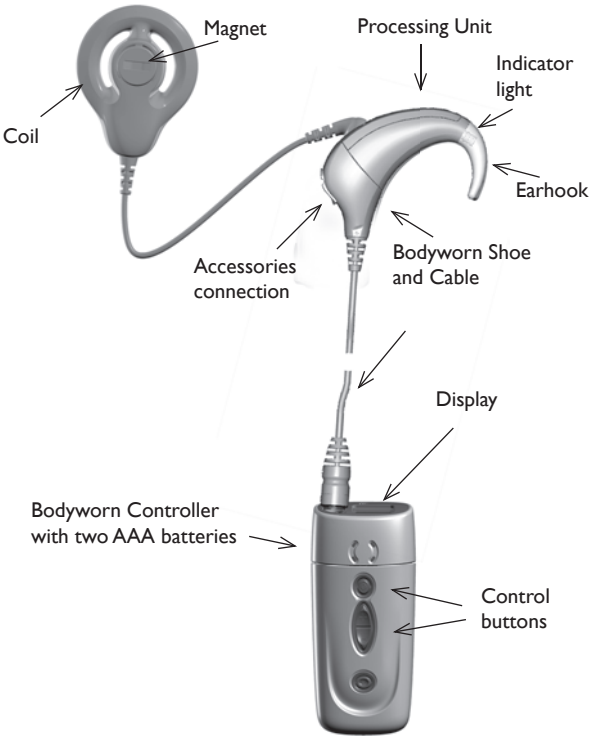
Infants and young children should wear the Bodyworn Controller in a Cochlear-provided, tamper-resistant pouch.

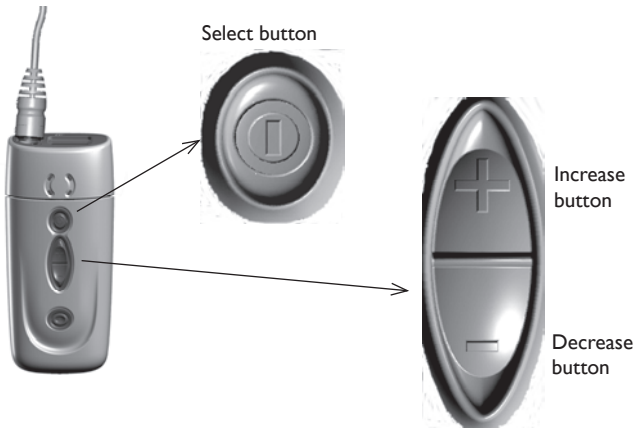
Freedom speech processor
with BTE Controller





Freedom speech processor
with Bodyworn Controller





Sound received by either the microphone, in-built telecoil, an accessory, or a mix of microphone sound and sound from the in-built telecoil or an accessory, is coded by the Processing Unit and transmitted through the coil to the cochlear implant.

The implant's electrodes stimulate the cochlea's hearing nerve fibres, which relay the signals to the brain to produce hearing sensations.

Your speech processor has been programmed for use with your implant only. It is important to only use your own speech processor, to never swap yours with another person, and if you have two implants, to correctly match the speech processor to the correct implant.

Warranty, registration and patient identification card

Your warranty is enclosed.

Please complete the registration card and return it to Cochlear within 30 days of receiving your product.

You should also complete the supplied patient identification card and carry it with you at all times.

Serial number

The serial number is 101005 plus the number found on the spine of the Processing Unit, under the microphone protector, for example, 1010051234579

We suggest you make a note of the full serial number for future reference.

For more information on how to remove the microphone protector, see *Care and Troubleshooting*.

Other Information

For future reference, keep this manual in a safe place.

For information about the 'H' or Help messages, see *Care and Troubleshooting* or a Freedom speech processor Quick Reference Guide.

Your Freedom speech processor stores your first name, last name, implant family, MAP identifier and recipient identifier.

This allows you to

- attend another clinic for programming, when you wish
- identify a speech processor as your own.

Access to this information occurs when the clinician opens the program. That is, it is only able to be accessed in a programming session.

Program options available

Up to four speech processing programs (P1 to P4) are available for your use.

The program components are selected at the programming session, when your clinician includes the features you want.

By including different features, the programs can be varied to help you hear better in different listening situations:

- Programs can include ways to improve your hearing, using Nucleus® SmartSound™ and autosensitivity.
- While you are normally able to vary settings for microphone sensitivity or volume, programs can also have them set at a fixed level.

- Either the microphone sensitivity or volume function may be disabled, that is, turned off.
- The indicator light and private tones can be activated or turned on at the programming session. In addition, users of Bodyworn Controllers can have public tones and backlighting to the display activated, or turned on.

For more information on:

- Nucleus SmartSound, see the next section
- autosensitivity, microphone sensitivity and volume, see *Controllers*
- how to change between and vary programs, see *Controllers*, *Accessories* and *Care and Troubleshooting*
- the indicator light, private and public tones, see *Processing Unit* and *Care and Troubleshooting*

Nucleus® SmartSound™

The following functions may be included as options, within a program:

- Beam™ allows you to focus on the sounds coming from the direction in which you are looking. It can be used, for example when you are talking with someone in a crowd, where there is a lot of distracting noise behind or beside you.
- Whisper™ is better able to detect soft sounds in quiet situations. It can be used, for example when you are in a lecture or meeting where it is diff cult to hear from a distance.
- ADRO™ makes automatic adjustments where there are large changes in sound between loud and soft. It can be used, for example where there is a lot of noise:

soft sounds are better detected, loud sounds are more comfortable and speech is clearer.

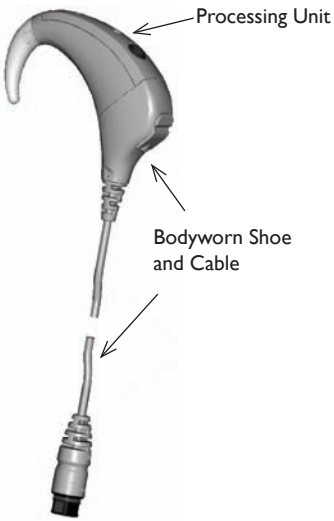
Discuss with your clinician how you want these options applied to your programs. To use them, select a program where they have been included.

Speech Processor Components

This section of the manual describes the component parts of your Nucleus® Freedom™ speech processor.

Processing Unit

The Processing Unit, incorporating Nucleus® SmartSound™ technology, is the brain of the speech processor, where sound signals are encoded for transmission via the coil to the implant.



It is worn on the ear, with either the BTE Controller or with the shoe that connects it to the Bodyworn Controller.

Both the coil cable and Bodyworn Shoe cable are available in a variety of lengths.

To attach the Bodyworn Shoe and Cable to the Controller, line up the dot mark on the plug with the dot mark at the top of the Controller and push the plug into the socket.

Note: Never poke anything into the microphone ports on the spine of the Processing Unit.

Earhook

Two earhooks are available, to f t differently sized ears. One is designed for use by adults, the other by children. That is, one is for use on larger ears, the other on smaller ears.

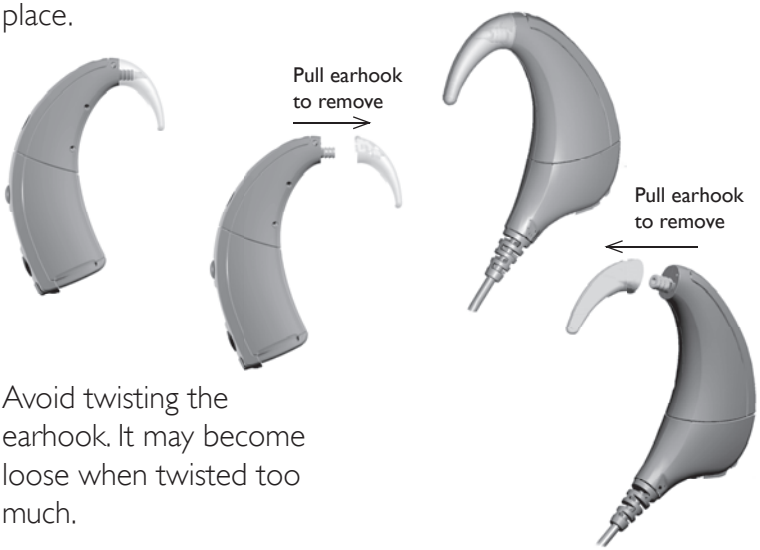
Smaller earhook for use by an adult

Larger earhook for use by a child

In addition, the earhook can be shaped to better f t, or be more comfortable on your ear.

To shape the earhook, remove it from the Processing Unit, place it in hot water for a few minutes and then bend it to the shape you want.

To change or remove the earhook, pull it away from the Processing Unit. Replace the earhook by pushing it back into place.



Avoid twisting the earhook. It may become loose when twisted too much.

Microphone protector

Always use the microphone protector that covers the microphone ports. It is designed to protect your speech processor from dirt and moisture.

The microphone protector should be replaced when it becomes dirty or the sound quality deteriorates.

For more information on how to change the covers, see *Care and Troubleshooting*.

Indicator light

The red indicator light on the Processing Unit can be used as a visual indication of normal function or to indicate situations which require attention, such as help messages.

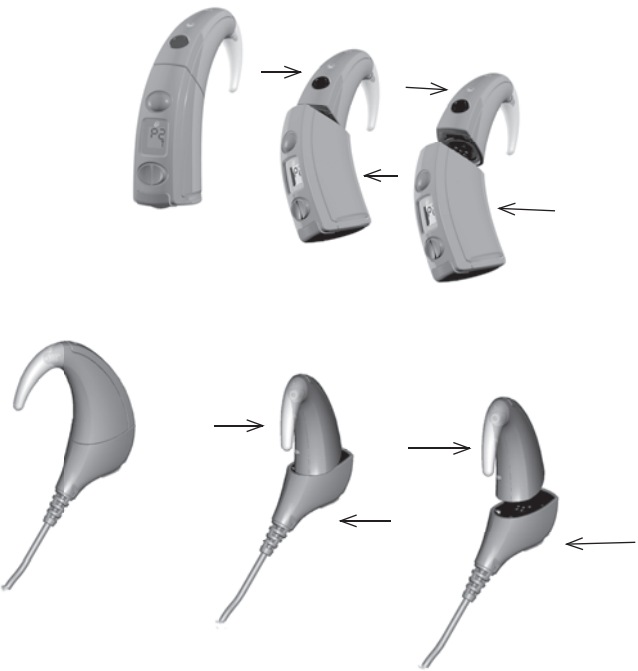
It can be turned on or off in any program when the clinician establishes each program.

Indicator light indications:

- f ickering when responding to incoming sounds
- low f ash rate when warning the battery is low
- high f ash rate when all other warning indications for example, when the coil is not in position over the implant

Changing the Controllers

To remove the Processing Unit from either the BTE Controller or the Bodyworn Shoe and Cable, twist the BTE Controller or shoe side facing you to the left and the Processing Unit to the right, until the parts separate.



To attach the BTE Controller or Bodyworn Shoe and Cable to the Processing Unit:

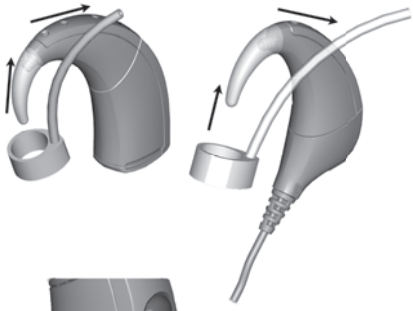
1. Hold the BTE Controller or shoe and the Processing Unit so they touch, with the Controller or shoe side facing you to the left and the Processing Unit to the right of the f nal position.
2. Twist the Controller or shoe, and the Processing Unit until the two parts click into place.

Mic Lock™

A Mic Lock™ can be used to hold the Processing Unit in place behind the ear. The tube version can be used on both the BTE Controller and Bodyworn Shoe. The stirrup is for use with the Bodyworn Shoe and Cable.

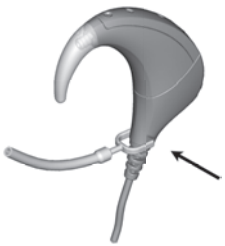
To f t the Mic Lock:

1. For the tube Mic Lock, thread the earhook and Processing Unit through the Mic Lock tube and move it down the unit until it f ts f rmly.



For the BTE Controller, position the Mic Lock between the buttons, so the transparent band covers the display.

Alternatively, clip the stirrup Mic Lock into the two holes towards the base of the Bodyworn Controller shoe.



2. Put the processor on your ear.
3. Bring the tubing around to the front of your ear and up to the earhook. Either sized earhook can be worn with the Mic Lock.

   If the tube Mic Lock does not feel comfortable, for a better f t, rotate the band around the base of your speech processor.

4. Hold your speech processor f rmly in place, and determine where the tubing should be cut.
5. Mark the tubing, allowing for an additional few millimetres, so it can attach to the earhook.
6. Cut the tubing ONLY when you are certain the length will allow a secure and comfortable f t.
7. Feed it on to your earhook.

To wear the Processing Unit with the Mic Lock in place, fold your ear down and gently pass your ear lobe through the Processing Unit and Mic Lock until it is in position on your ear.

Alternatively, bring the tubing to the front of your ear and feed it on to your earhook.

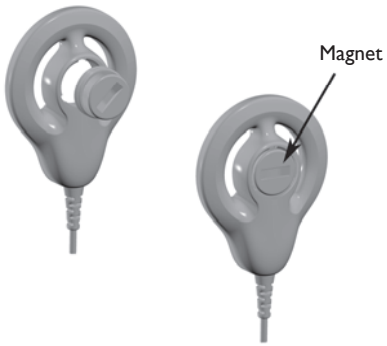
Your speech processor, with the Mic Lock in place, should f t securely.

To remove the Processing Unit with the Mic Lock attached, fold down your ear lobe and reverse the process. Alternatively, ease the tubing off the earhook.

Coil

The coil transmits the encoded information to your cochlear implant.

A magnet holds the coil in place, over the implant.



Turn the magnet in either direction, to adjust how tightly it is held to your head

The closer the magnet is to the head, the more f rmly it is held in place, and vice versa.

If the magnet strength is too weak the coil may fall off. If it is too strong, it may cause discomfort or skin irritation.

Warnings:

Consult your clinician if you wish to change your magnet strength.

Store spare magnets safely. Store them away from credit and other cards that have a magnetic strip.

Small parts may be hazardous if swallowed or may cause choking if ingested or inhaled.

Coil connection

The coil plugs into the Processing Unit as shown.

Always hold the plug securely with two f ngers when removing the plug from the Processing Unit. You may damage the plug, cable or processing unit if you either pull the cable or twist the plug.

Note: If you plug the coil cable into the Processing Unit when the speech processor is turned on, the speech processor may turn off. If this occurs, hold down the Select button to turn the speech processor back on, that is, until you either hear sound or the display shows.

Alternatively, the display may not show anything, while the speech processor continues to operate. If this occurs, stop the power to the Processing Unit, and then restart it. To stop the power, you can either:

- Hold down the Select button until the speech processor is off.
- Twist the Processing Unit and BTE Controller or Bodyworn Shoe and Cable until they no longer connect, then twist them back into place again.
- Slide the battery holder out, then in again.

After you have done one of the above, hold down the Select button to turn the speech processor back on, that is, until you either hear sound or the display shows.

Freedom Controllers

In addition to the batteries, both the BTE Controller and Bodyworn Controller have

- a display, that indicates the operations occurring, and
- buttons, that operate your Freedom speech processor.

The Bodyworn Controller can be worn in a pouch on a harness or attached to a belt, or held in a pocket or secured to your clothing.

Caution:

Although very unlikely, the Bodyworn Controller may malfunction and overheat. To prevent discomfort and/or irritation to the skin, infants and young children should always wear the Bodyworn Controller in a Cochlear provided pouch.

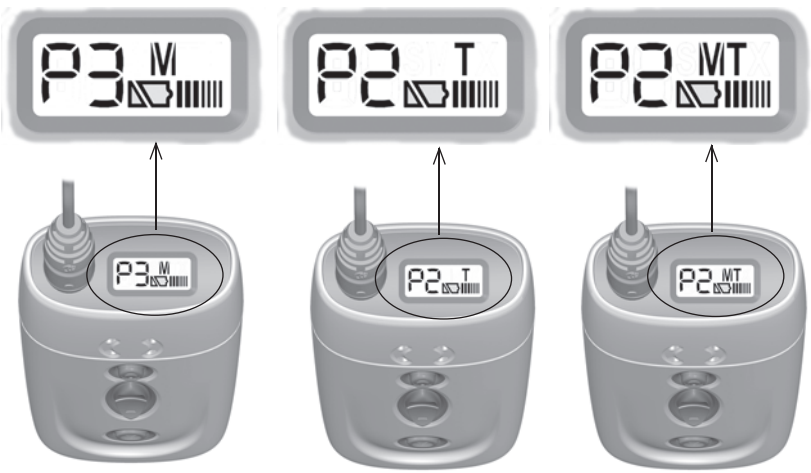
If an infant or young child cries without reason or exhibits other behaviors consistent with discomfort, parents and caretakers should check the Bodyworn Controller and verify that it has not overheated.

Display

The display generally shows the program in use, for example, P1 and whether the microphone, in-built telecoil or both are operating, varies according to the program in use and the functions being used.

Program 3 in use
Microphone only

Program 2 in use
Telecoil only



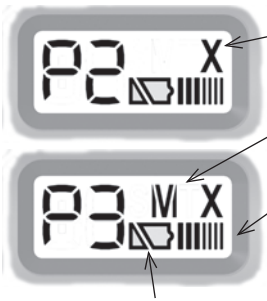
Program 3 in use
Microphone only

Program 2 in use
Telecoil only

Program 2 in use
Microphone and telecoil
together

When the lapel microphone is used with the BTE Controller, no 'M' or 'T' shows on the display.

The Bodyworn Controller display has some indications additional to those on the BTE Controller:



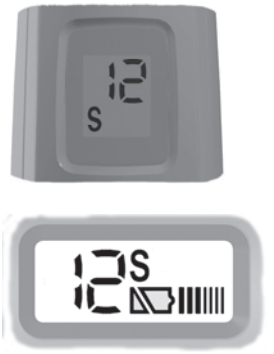
- 'X', showing that an accessory has been activated. This may occur in combination with the microphone.
- a sound level indicator, that responds to sounds picked up by the microphone, telecoil or accessory
- battery level indicator
  - both battery segments are lit, when the battery is full
  - one battery segment is lit, when the battery is low.

The Bodyworn Controller display will light up (backlight) for a few seconds when a button is pressed, or a Help message first shows on the display.

In addition help messages may show, either as a warning or sign that action needs to be taken, for example H2 for low batteries, or H3 if the coil is not in place or is not working. For more information on help messages, see *Care and Troubleshooting*.

When the microphone sensitivity or volume is changed, the symbol, S or V will show on the display. This lets you know which function you are changing. The sound level will show as a number, while the change is occurring.

Microphone sensitivity setting



Volume setting

The display will return to the normal P status when no further changes to the level occur.

On and off

To turn on, push the Select button for a few seconds, until you either hear sounds if the speech processor is in place on your head, or the active program (P1, P2, P3 or P4) shows on the display.

Note: the number of programs available is set by the clinician during programming, up to a maximum of 4.

To turn off, push the Select button for a few seconds, until the sound stops, or the display is off.

Program selection

To change to another program, push the Select button brief y to move to the next program.

If you have the private tone operating, or with the Bodyworn Controller either the private or public tone, when you change to another program, the number of tones heard relates to the program you are moving to. For example, if you are on P2 and press Select, three sounds will be heard as you move to P3. If you wish to move to P4 or P1 you need to wait until the sounds f nish before brief y pushing the Select button again. Repeat to move to P1.

If the private tone or public tone is not operating, no tone will be heard when the Select button is pressed. However there will be a slight gap in sound between the programs. If you wish to continue to move on to another program, wait until you hear the sound from the new program before you press the button again.

That is, pressing the Select button when the sound gap is occurring will not move the speech processor on to the next program. You need to wait for the sound f rst before you again press the Select button.

Continue further brief pushes until you reach the program you want. It will skip the setting where there is no program. For example, if you only have two programs it will only move through two settings.

The program selected operates until you press the Select button again. When you switch your speech processor off and on again, it will remember the last 'active' program, including the microphone sensitivity and volume settings you were using.

Listening controls

You can use the microphone sensitivity and volume controls to change the level of the sounds you hear.

You can adjust both the microphone sensitivity and the volume levels for any program, unless they have been set at a fixed level by your clinician, when the programs were established. Generally, you are most likely to vary the microphone sensitivity, as you adjust to environmental sounds.

The microphone sensitivity and volume settings are saved with the particular program. If you change to a new program, the level will be the same as previously used with that program, that is, the last saved value for that program.

Once you find the level you want and you stop making changes, the display will go back to the normal display after a few seconds.

Whenever you wish to again change the level, repeat the process.

To change between adjusting the microphone sensitivity and volume, when both are available, press either the Increase or Decrease buttons for at least a few seconds.

If your clinician has chosen to disable the microphone sensitivity in a program, it will not operate and you will go immediately to the volume setting when you press either side of the Increase/Decrease buttons.

Similarly if your clinician has chosen to disable the volume control, it will not be available.

Microphone sensitivity

The microphone sensitivity controls the softest level of sound picked up by the microphone.

In noisy situations decrease the sensitivity to reduce background noise.

In quiet situations increase the sensitivity to hear very soft sounds.

To change the microphone sensitivity level:

1. Push either the Increase/ Decrease button. The display will show the current microphone sensitivity level.
2. Continue pushing the Increase/Decrease button until you reach the microphone sensitivity level you want.

The microphone sensitivity is shown as a number between 0 and 20. The recommended level is 12.

If you f nd you often set the sensitivity higher or lower than this level, consult your clinician.

Autosensitivity

Autosensitivity automatically adjusts the microphone sensitivity and prevents the background noise from becoming too loud. It may be included as an option, within one or more of your programs. You can use it by changing to the program where it is available.

Volume control

The volume controls your perception of loudness. Reduce the volume if sounds are uncomfortably loud. Increase the volume if speech, including your own voice, is too soft.

The volume level is shown as a number between 0 and 9.

If you are adjusting the volume setting often, or if adjusting the volume causes you discomfort, consult your clinician.

To change the volume level:

1. Push either the Increase or Decrease button.
2. Push either the Increase or Decrease button again, holding it down for a slightly longer time, until you either hear a beep and/or see a flashing 'V' appear on the display.

3. Continue to repeatedly push either the Increase or Decrease button until you reach the volume level you want.

In-built telecoil

The in-built telecoil allows you to receive signals from a

- hearing aid compatible telephone
- room fitted with an induction loop, or
- personal induction loop, such as a neck loop or cushion loop (commercially available).

The sound signal from an amplifier, TV or Hi-Fi can also be sent from an induction loop to the telecoil.

To select the in-built telecoil, push both the Increase and Decrease buttons at the same time, for a few seconds, until a 'T' shows on the display.

Make sure your finger presses both sides of the button area.

Your clinician can establish your program to operate as either a telecoil alone, or as a mix of your in-built telecoil and speech processor microphone.

When you are using the in-built telecoil and you change either the microphone sensitivity or volume level, the 'total' sound will change. That is, the combined sound from both the microphone and in-built telecoil will change.

For information on using your in-built telecoil when an external accessory is attached, see *Accessories and the telecoil*.

Button lock

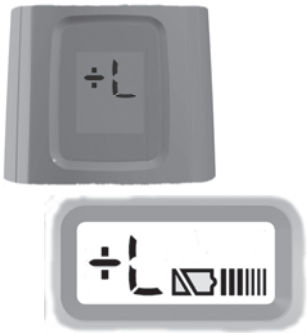
The button lock can be used to prevent children from changing the controls or to avoid accidental button presses changing the speech processor settings.

To lock or unlock the buttons, push both the Select and Decrease buttons for a few seconds.

The display will brief y show '+L' to indicate the buttons are locked.

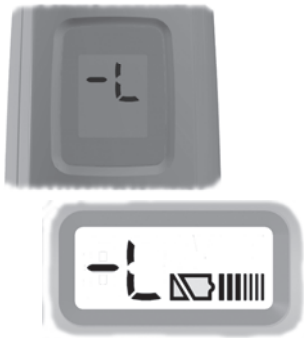
If you press any button when locked, an 'L' will brief y show on the display.

You will need to unlock the buttons before turning off the speech processor.



To unlock the buttons, press the Select and Decrease buttons together for a few seconds.

The display will brief y show '-L' to indicate the buttons are unlocked.



Resetting the Freedom speech processor

To reset the micrphone sensitivity or volume levels to return to the default settings, press all three buttons (Select, Increase, Decrease) together for a few seconds.

Make sure your f nger presses both sides of the Increase/Decrease button area. You will hear a sound and the display will go blank for a moment.

Private and public tones

Private and public tones can be used to hear when certain Freedom speech processor functions are started, and warnings occur.

The private tone is heard by you, and nobody else. It can be used with either Controller.

The public tone is only available with the Bodyworn Controller. It is heard by both you and people around you. It allows people around you to assist you when there is an alarm, for example when the batteries are going flat.

When using the Bodyworn Controller, both the private and public tones can operate, or either one.

If you wish to use one or both of the tones, ask the clinician to include them in your programs.

To stop the tone, press any button.

For more information on what the tones indicate, see *Troubleshooting*.

Batteries

Batteries should be replaced when any of the following occur:

- low or f at battery warning tones are heard
- low or f at battery help message shows on the display (H1 or H2)
- low battery warning (the half lit battery) shows on the Bodyworn Controller display
- you stop hearing sound
- the sound you hear becomes intermittent.

For information on the warning sounds or indicators, see *Troubleshooting*.

Remove batteries when they are f at, or when the battery pack is to be stored for a period of time.

Use only battery types recommended by your clinician or Cochlear. Other types may not have suff cient energy to allow your Nucleus Freedom speech processor to either function properly or last for a long time.

Never mix fully charged batteries with partially charged ones. It only takes one low or f at battery to stop the processor from working. Similarly, never mix brands or battery types, for example, zinc air with alkaline batteries.

Warnings:

Flat batteries may leak corrosive f uids and cause damage if left inside your Freedom Controller.

Dispose of used batteries in accordance with your local regulations.

Never dispose of batteries in f re.

Do not let children replace batteries without adult supervision.

Make sure that batteries are kept out of reach of young children.

Batteries can be harmful if swallowed. If swallowed, seek prompt medical attention at the nearest emergency center or Poisons Information Center.

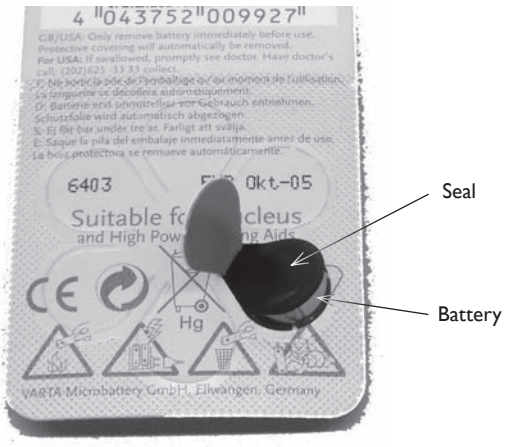
BTE Controller

Your Freedom BTE Controller uses three high power 675 zinc air batteries. Silver Oxide or alkaline batteries can also be used in very humid conditions: your Freedom BTE speech processor will only operate for a few hours when Silver Oxide or alkaline batteries are used. Do NOT use rechargeable NiMH button cells (HB 116/054).

High Power 675 zinc air batteries are sealed, usually with a tab. Always remove the seal or tab at least one minute before using, to allow air access to the battery, so it can operate.

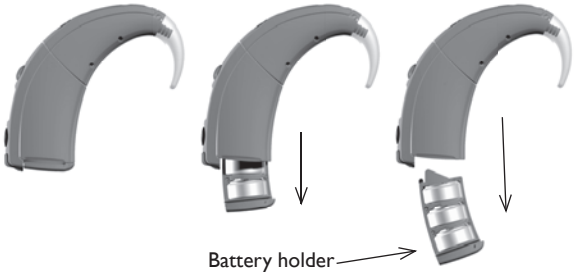
To change the batteries:

1. Remove the new set of batteries from their pack and make sure the seals are removed.
2. Let the new batteries stand for one minute, outside of their packaging with their seals removed, to allow the air to activate the batteries.



3. Turn off the speech processor and take it off.

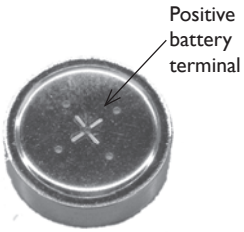
4. With your f ngernail in each side of the base of the battery holder, pull the battery holder down and out.



5. Remove the f at batteries by tipping the battery holder to one side. They slide out from one side only.

   The end of the BTE Controller can be used to push the batteries out. Alternatively, use your coil's magnet to pull the batteries out.

6. With the positive battery terminal (the side with the holes) facing down, slide the fresh batteries into place. Push them in from the right hand side when viewed from the back of the battery holder.



   Do not force the batteries into place. They should f t easily.

   Take care all the batteries have the holes facing down. Your speech processor will only work for a very limited time if a battery is put in the wrong way, and then all three batteries will need to be replaced.

The bottom battery stands out a little from the battery holder and appears not to be in position. This is normal.

7. Replace the battery holder by sliding it up from the bottom until the BTE Controller clips into place. The bottom battery will be correctly placed when the battery holder is in place.

Note: Dispose of used batteries in accordance with your local regulations. Never dispose of batteries in f re.

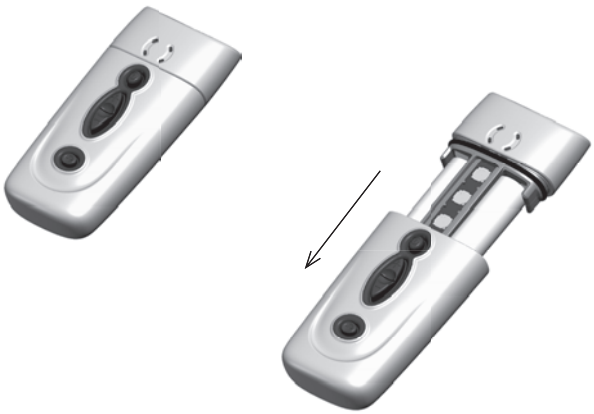
Bodyworn Controller

Your Freedom Bodyworn Controller holds two AAA batteries. Cochlear recommends rechargeable nickel/metal-hydride (NiMH) batteries, or disposable alkaline batteries. For optimum battery life of rechargeable batteries, use NiMH batteries of at least 800mAh capacity.

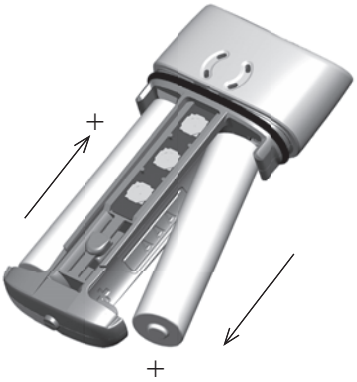
Replacing the batteries

To replace the batteries:

1. Turn off your speech processor.
2. Firmly hold the cover and slide it down, to reveal the battery compartment.



3. Remove the old batteries and replace with new ones. Make sure the + and - symbols on the batteries match the + and - symbols in the compartment.
4. Slide the cover back until it clicks into place.



Note: Dispose of used batteries in accordance with your local regulations. Never dispose of batteries in f re.

Recharging NiMH batteries

Use the charger supplied to charge NiMH batteries for use with your body worn battery pack. For more information on how to use it, see the instructions supplied with the charger.

Caution:

Do not use the charger for zinc/carbon, alkaline, lithium or any other disposable batteries.

Always ensure the batteries are placed so the + and - symbols on the batteries match the + and - symbols in the compartment.

Generally, the following precautions apply so you can get the most out of your rechargeable batteries:

- Ensure your battery charger is suitable for the type of battery you are using.
- Only charge rechargeable batteries. Do not recharge disposable batteries, e.g. zinc/carbon or alkaline batteries.
- After storing rechargeable batteries for an extended period, it may be necessary to charge and discharge them (that is, use them until they are fully f at), several times to obtain maximum performance.
- Remove rechargeable batteries from the charger, immediately after they are charged.
- As you use rechargeable NiMH batteries, their battery life will fade. When batteries no longer last for a reasonable period of time, dispose of them carefully, in accordance with local regulations.

General precautions for the use of batteries

Generally, the following precautions apply so you can get the most out of your batteries:

- Carry spare batteries in a closed plastic bag for safety, making sure they do not come into contact with either each other or metallic objects, for example coins or hairclips. Any of these situations may accidentally short circuit and thus discharge the battery, which may heat up and even crack open.
- Store batteries in cool places.
- Do not heat batteries, for example never leave batteries in sunlight, behind a window or in a car.
- Never immerse batteries in water.
- Do not deform batteries. For example, do not force them into your speech processor. Do not drop batteries on hard floors.
- If a battery has leaked fluid, don't allow the fluid or liquid to come in contact with skin or eyes. If contact is made, wash with a lot of water and seek medical attention. It is always a good idea to wash your hands after you have handled batteries.

For more information, see *Care and Troubleshooting*.

Accessories

The following accessories, or wired assistive listening devices, can be connected to your Freedom speech processor:

- Lapel microphone, to improve communication in noisy environments.
- FM cable, to send sound signals from a commercially available FM listening system to your speech processor. For a list of the FM cables available, and for information on the one suited to your needs, contact your clinian.
- TV/Hi-Fi cable, to connect a TV, Hi-Fi or stereo, personal computer or other mains powered sound source to your speech processor.
- Personal Audio cable, to connect personal music systems, handheld games or other battery powered equipment to your speech processor.

  Caution: Do NOT use the Personal Audio cable to connect to equipment using a wall outlet, that is, to a mains powered device.

Note: The above accessories may not be available in all countries. Contact your clinician for further information.

In addition, commercially available wireless technology assistive listening devices you may want to try include:

- Induction loop systems
- FM systems

Your in-built telecoil operates with induction loop systems.

Connecting accessories

Your accessories plug into the socket either at the base of the BTE Controller or the Bodyworn Shoe.

To attach the accessory:

1. Use your f ngernail to lift the socket cover.
2. Push the accessory plug into the socket.
3. Push both the Increase and Decrease buttons at the same time for a few seconds to activate the accessory.

'EA' (external accessory) shows brief y on the display while the change is happening.

A short tone (if the private or public tone is turned on in that program) conf rms the accessory's connection. (The tone also sounds when the accessory is disconnected.)

Press either the Increase or Decrease button to adjust the sound level. If not pressed again within a short time, the display will go back to the program display.

An 'X' on the Bodyworn Controller display shows the accessory has been activated.

To stop 'hearing' the accessory, remove it from either the base of the BTE Controller or the Bodyworn Shoe.

When NOT using an accessory, ALWAYS keep the socket cover in place, over the socket, to protect your speech processor.

An accessory can be monitored by a hearing person using the monitor earphones. For more information, see *Care and Troubleshooting*.

Using accessories

Lapel microphone

When using a lapel microphone, you will only hear sounds through the lapel microphone. Adjusting either the microphone sensitivity or volume changes the level of sound heard through the microphone.

Audio mixing and other accessories

The sound from the speech processor's microphone will be mixed with that from the:

- personal audio cable
- TV/Hi-Fi cable
- FM cable or
- FM system

With the accessory activated, both an 'M' and 'X' show on the Bodyworn Controller display.

The microphone sensitivity button varies the level received by the microphone, while the sound from the accessory remains constant.

To hear more environmental sound, press the Increase button. To hear less environmental sound, press the Decrease button.

If you only want to hear the signal from the accessory, press the Decrease button until the microphone sensitivity is zero (0). This will switch off the external sounds received by the microphone.

When the accessory has a sound level control, it can be used to change the level of sound being heard from the accessory.

To change the sound level when using microphone sensitivity, press either the Increase or Decrease button. If not pressed again within a short time, the display will revert to the program display.

When you change the volume level, the total sound signal changes, that is the level of the accessory and the microphone signal change together. Generally the volume control level should be set at 2 or more.

To change the sound level when using volume:

1. Push either the Increase or Decrease button.
2. Push either the Increase or Decrease button again, holding it down for a slightly longer time, until you either hear a beep and/or see a f ashing 'V' appear on the display.

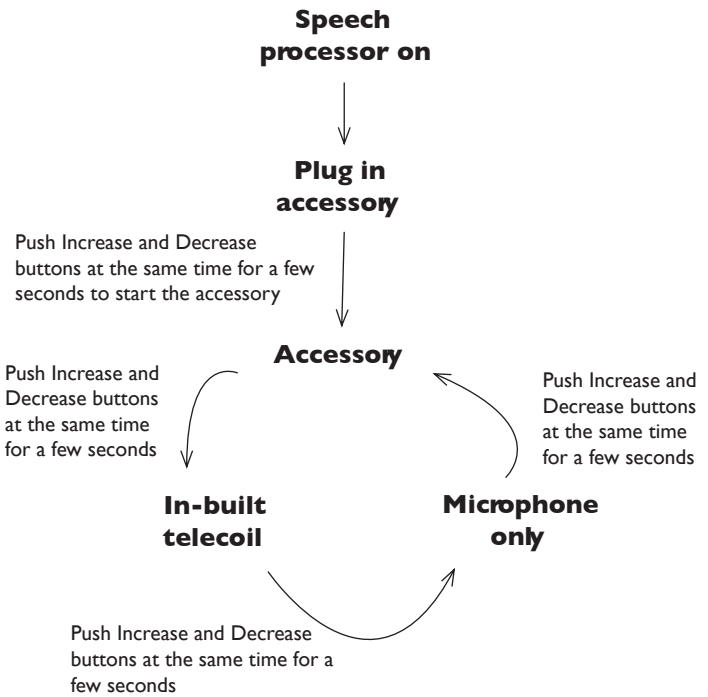
The balance between the amount of sound heard from the accessory as compared with that heard from the speech processor microphone will be set for each program when the clinician establishes that program.

If the sound level is unsatisfactory when you are using an accessory, ask your clinician to change it at your next programming session. Alternatively your clinician may give you different sound level options on different programs.

Accessories and the telecoil

When you are using an accessory with your speech processor, it is possible to change to use the in-built telecoil or the microphone only setting, with the accessory still attached to your speech processor. For example, if you are using your TV/Hi-Fi cable and then wish to use a telephone with a telecoil induction loop, you can switch to the in-built telecoil setting while the TV/Hi-Fi cable is still attached.

This set of actions is part of a cycle. Each time you push both the Increase and Decrease buttons at the same time, for a few seconds, you move on to the next setting. Starting from where you can hear the accessory, by pushing the buttons you move to the in-built telecoil, then to the microphone



and finally return to the accessory. To skip a setting, push the buttons a second time.

Note: When an accessory is not attached the cycle is microphone - telecoil - microphone.

From accessory to telecoil

To move to the in-built telecoil when the accessory is attached, push both the Increase and Decrease buttons at the same time, for a few seconds, until a 'T' shows on the display.

From telecoil to accessory

To move back to the accessory, twice push both the Increase and Decrease buttons at the same time, for a few seconds, until you can hear the accessory again.

From accessory to microphone

Alternatively you may wish to move from using your accessory, to using your microphone only, while leaving the accessory attached.

When using an accessory, to move to the microphone only setting, twice push both the Increase and Decrease buttons at the same time, for a few seconds, until an 'M' shows on the display (except when using a lapel microphone) or you hear sound through the microphone.

From microphone to accessory

To move back to the accessory, push both the Increase and Decrease buttons at the same time, for a few seconds, until you can hear the accessory again.

Make sure your finger presses both sides of the button area.

Care and Troubleshooting

Care

Your speech processor should work well, even when used in very cold or hot outdoor temperatures. Generally, in cold temperatures your body heat is suff cient to keep the speech processor warm, and working well. In very cold weather, wear a hat or headband over the BTE speech processor or Processing Unit.

If worn in hot temperatures it should work well. However, when not worn do not leave your speech processor in very hot areas, for example in sunlight, behind a window or in a car.

For information on the temperatures the speech processor is tested to, see *Technical information, Environmental conditions*.

Do not wear your Nucleus® Freedom™ speech processor while bathing or swimming. If your speech processor does get wet, wipe it dry and place it in the dry aid kit for at least twelve hours. If it then does not work, return it to your clinician. Cochlear cannot guarantee that they will be able to repair any water-damaged part.

Take off your speech processor when applying powder, makeup or hairspray. These substances can get into and damage your speech processor.

Avoid getting sand or dirt into any part of the system. If this happens, shake out as much as possible, and if necessary contact your clinician to arrange for its repair.

Storage

Store the speech processor overnight or when you are not using it, in a dry aid kit or drying pack. Moisture or humidity may cause the speech processor to cut-out or stop

working. Before using the dry aid kit, read the manufacturer's instructions for use.

To store your speech processor overnight, you may either leave your batteries in the Controller, or remove the battery holder from the Controller and place it separately, with the batteries in the holder, in the drying kit.

Warning:

Keep the drying chemical material away from young children. Swallowing this material can cause serious internal injuries.

For long term storage, remove the batteries from the Controller. Remember to store them separately, to avoid them from shorting each other.

You can also buy dry aid kits or drying packs that are able to be used with your speech processor, from an electronics store or pharmacy.

Cleaning

Keep battery contacts clean: use a moist cotton bud or swab to gently clean the battery contacts. Take care not to apply force, that may damage the contacts.

If batteries are dirty, wipe them with a clean DRY cloth. Be careful to keep batteries dry and free from moisture.

Keep clean the contacts where the Processing Unit and either the BTE Controller or Bodyworn Shoe connect: use a swab dampened with medicinal alcohol to gently clean the contacts.

To clean external parts of the system, wipe gently with a cloth slightly dampened with mild detergent. Regular cleaning prevents dirt from building up.

Disposal

Dispose of electrical components in accordance with your local regulations.

Warnings and precautions

For more details on warnings and precautions, refer to the *Warnings and Precautions* leaflet included in the documents you received with your speech processor.

Microphone protector

The Freedom speech processor is designed to be used with the microphone protector in place at all times.

The microphone protector can be replaced when it becomes dirty, or the sound quality deteriorates.

You may first ask a hearing person to check the sound quality by using the monitor earphones. Refer to *Monitor earphones* for further information.

To remove the microphone protector from the Processing Unit:

1. Switch off your speech processor and remove it from your head.
2. Remove the coil from the Processing Unit.
3. Remove the BTE Controller or the Bodyworn Shoe and Cable, from the base of the Processing Unit.

4. Starting at the base, slide your f ngernail or a narrow blunt edge, along the side edge of the microphone protector, until it lifts off the Processing Unit. Do NOT use sharp pointed items to remove the microphone protector.

5. Replace the microphone protector by clipping it back into place.
6. Replace either the BTE Controller or the Bodyworn Shoe and Cable.

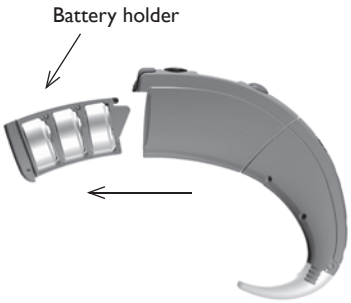
Note: Always use the microphone protector. It protects your speech processor from dirt and moisture.

Protective cover

A protective cover is attached to the base of the battery holder of the BTE Controller, under a rubber plug. If you f nd the batteries are not lasting as long as normal, the protective cover may be dirty.

To clean the protective cover:

1. Turn off your speech processor and remove it from your head.
2. Remove the battery holder: with your f ngernail or a narrow blunt edge in each side of the base of the battery holder: pull the battery holder down and out.



3. Remove the batteries from the battery holder.
4. Wash the battery holder (without the batteries) in warm soapy water.
5. Rinse the battery holder in clean water and dry well.

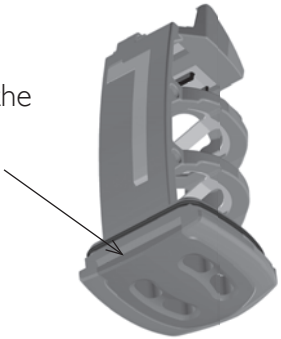
   Place it overnight in the drying kit.
6. Insert the batteries, and replace the battery holder in the speech processor.
7. Turn on the speech processor.

If battery life is still limited you may need to replace the protective cover itself. It is under the plug at the base of your battery holder.

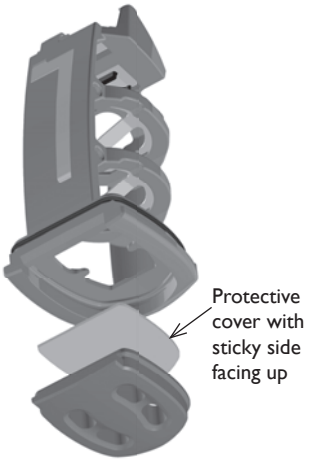
To replace the protective cover:

1. Turn off your speech processor and remove it from your head.
2. Remove the battery holder: with your f ngernail in each side of the base of the battery holder, pull the battery holder down and out.

3. Lift the straight back edge of the rubber plug, from the base of the battery holder.



4. Peel off the protective cover from the base of the battery holder.
5. Peel the new protective cover off its paper backing. Attach the sticky side of the protective cover to the base of the battery holder.
6. Push the rubber plug f rmly back into place over the protective cover.



7. Replace the battery holder (with batteries), in the BTE Controller.

Warning:

Take care with the batteries and the protective cover. Small parts may be hazardous if swallowed or may cause choking if inhaled.

Troubleshooting

There are a number of indicators that something is not working on your Freedom speech processor:

- H message shows on the display
- battery level indicator shows on the display
- indicator light changes its f ashing pattern (if activated)
- tone sound is heard (if activated)
- sound stops (H4)
- sound becomes intermittent or is not at a good or comfortable level
- the display does not operate

Take the action suggested when a problem arises or is indicated. Do not use force on any of the components.

After each step, check if you hear any sound.

You may f nd the f rst H message is replaced with another. Take the action suggested to rectify that problem. Continue until no H messages are displayed.

If there is still a problem indicated after you have made all the checks, contact your clinician. The speech processor should only be repaired by a person authorised by Cochlear Limited.

Alternatively you may experience other problems which are listed under *Other problems*.

Help messages

The following help messages may show on your speech processor display:

Help message	Meaning	Action to take	Repeating help message
H1	Flat battery	Change all the batteries. * Note: you will stop hearing sound, and only be able to turn off the speech processor.	The help message will show for about five minutes or until the speech processor is turned off.
H2	Low battery	Be prepared to change all the batteries. * Push any button to return to the normal display.	The normal display will continue until the H1 message shows. If you don't push any button H2 will continue until H1 message shows.
H3	Coil error	Check • coil position • cable connections • for cable damage. If H3 still shows, replace the coil.	The help message will return if the coil connection is restored, and then lost again.
H4	Audio error	Follow the steps in the *Other problems* section, to try to fix the problem.	The help message will return after five seconds if there is still no sound, and/or the steps taken to try to fix the problem have not been successful.

* Refer to the *Batteries* section for further information.

Help message	Meaning	Action to take	Repeating help message
H5	Program corrupted	Continue to use an alternate program where it is available until you are able to return the speech processor to your clinician so a new program(s) can be installed.	The help message shows briefly, when another program is available to automatically replace the corrupted program. The help message shows permanently when no other programs are available, or all available programs have been corrupted.

Private and public tones

Private and/or public tones can be activated on by the clinician when the program is devised to indicate particular situations.

To stop either the private or public tone, press any button.

If you have difficulty hearing the private tone, ask your clinician to adjust it at your programming session.

Private tones

The private tone is heard by you, and nobody else. It can be used with either Controller.

When activated in the program, a tone sounds with

- a high sound when
  - the process or function has been successful, or
  - the buttons have been locked or unlocked

- a number of high sounds to indicate the program selected

  For example, when you move from program 2 to program 3, three sounds will be heard.
- two low sounds when the battery is low
- four low sounds when the batteries are f at
- a high then low sound when the wrong key is pressed

If you have diff culty hearing the private tone, ask your clinician to adjust it, at your programming session.

Public tones

The public tone is only available with the Bodyworn Controller. It is heard by both you and people around you. It allows people around you to assist you when there is an alarm, for example when the batteries are going f at.

When the public tone is activated in the program, a tone sounds with

- a low sound when
  - the process or function has been successful, or
  - the buttons have been locked or unlocked
- a number of low sounds to indicate the program selected

  For example, when you move from program 2 to program 3, three sounds will be heard.
- two high sounds when the battery is low
- four high sounds when the batteries are f at
- a low then high sound when the wrong key is pressed

- four high sounds which repeat every minute when H3 coil error or H4 audio error occurs.

Indicator light

The red indicator light can also be turned on by the clinician in the program.

When the indicator light is turned on, it:

- f ickers when incoming sounds are being received
- shows a slow f ash rate as a low battery warning
- shows a fast f ash rate for all other warnings. For example when the coil is off its position over the implant, or there is a sound error (H4).

The H message shows on the display to match the f ashing light warning. Take the action suggested for the displayed H message.

Bodyworn Controller battery indicator

The display on the Bodyworn Controller includes a battery level indicator.

When the battery is

- full, both battery segments are lit.
- low, one battery segment is lit.
- f at, the the H1 Help message shows.

Battery full

Battery low

Battery f at

Other problems

You may encounter some other problems that the H messages, indicator light and tone don't directly refer to. Take the following steps to try to f x the problem.

If there is still a problem after you have made all the checks, contact your clinician. The speech processor should only be repaired by a person authorised by Cochlear Limited.

1. No sound

If sound stops, check which H message is showing and follow the suggestions in the Help message table.

If the H4 message is showing:

- Turn the speech processor off and then on.
- Increase the microphone sensitivity or volume level.

  If the level is very low, that is at around 0, and you are in a very quiet room, the H4 message may show.

  If no sound is heard, and the H4 message remains, reset the level to the original position. If you leave it at the higher level and change to use the in-built telecoil or connect an accessory then, if heard, the sound will be very loud.
- Try using the speech processor either with the in-built telecoil or an accessory, when available. If sound is heard and the indicator light f ickers if activated, when the in-built telecoil or accessory is used, then there is probably a problem with the speech processor's microphone.

  If you can hear sound while using any of these options, for continuing short term use, you can use the lapel

microphone with your speech processor. Return it to your clinician for repair.

- Have a hearing person use the monitor earphones to check if sound is being received. Refer to the *Monitor earphones* section following for further information.

2. Intermittent sound

If sound is intermittent:

- If you are in a quiet place, move to where there is a little more noise. It may be the sound level is very low.
- Turn the speech processor off and then on.
- Change the batteries - make sure they are fresh and of the same type and make.
- Check the batteries are correctly inserted.
- Check the battery terminals are clean.
- Wash or change the protective cover on the base of the BTE battery holder.
- Change your battery holder.
- Check the coil and its cable for broken or twisted wires.
- Check the coil is properly connected to the Processing Unit.
- Replace the coil.
- Have a hearing person use the monitor earphones to check if sound is being received. Refer to the *Monitor earphones* section following for further information.
- Change your Controller.

3. Uncomfortable sound

If the sound level is not comfortable, for example when the volume is low and the background noise is too high:

- Check if the microphone sensitivity or volume level is as recommended.
- Change the level.
- Speak into the microphone and watch how the indicator light responds, if it is on in that program.
- Change to another program to check if that program is more comfortable, or to use a SmartSound™ function better suited for the sound.
- Wash or replace the microphone protective cover.
- Use the lapel microphone and/or monitor earphones to monitor the sound being received.
- Ask your clinician to check your program setting(s) and discuss whether you need a different program setting.

4. Display not showing

The speech processor may still operate when the display is not showing.

Stop the power to the Processing Unit, and then restart it. To stop the power, you can either:

- Hold down the Select button until the speech processor is off.
- Twist the Processing Unit and either the BTE Controller or the Bodyworn Controller shoe until they no longer connect, then twist them back into place again.
- Slide the battery holder out, then in again.

After you have done one of the above, hold down the Select button to turn the speech processor back on, that is, until you either hear sound or the display shows.

Repeat the above steps. If the display is still not showing, follow the checks suggested for when the sound is intermittent.

Continue to use your speech processor until you are able to return the Processing Unit to your clinician for repair.

5. Electromagnetic interference

Try moving away from any electronic device that may be causing interference, for example buzzing sounds or distorted speech.

Most electronic devices produce electromagnetic fields. Headset cables, like antennae, pick them up. Common sources of interference include:

- radio and TV transmission towers
- mobile phone towers
- shopping centre and airport security systems
- some digital mobile phones
- battery chargers
- fluorescent lighting
- mains power boards

The electromagnetic interference (EMI) will be no louder than your programmed levels and will neither hurt you nor damage your speech processor. If you still hear buzzing or distorted speech, turn off your speech processor, take off your coil and consult your clinician.

Monitor earphones

Monitor earphones can be used by a hearing person to listen to the sound signal from either:

- microphone
- in-built telecoil
- microphone and in-built telecoil together
- lapel microphone
- accessory (other than the lapel microphone) and microphone together

To use the monitor earphones:

1. Make sure the speech processor is on.
2. Lift the socket cover and push the monitor earphones into the socket at the base of the BTE Controller or Bodyworn Controller shoe.

   Caution: Do not use force.

3. If you wish to test an accessory, plug it into the monitor earphone connector.

4. Press both the Increase and Decrease buttons for a few seconds to activate the earphones.

5. Have the hearing person listen to the sound. Note that monitor earphones only indicate that sound can be heard: they do not indicate the quality of the sound heard by the speech processor user.

If you attach the accessory after you have pressed the Increase and Decrease buttons, press them again to activate the accessory.

Press any button to continue the sounds through the monitor earphones. The sound will stop when no buttons have been pressed for 90 seconds. To re-start the sound in the monitor earphones, press both the Increase and Decrease buttons again for a few seconds.

Other Information

Technical information

Specifications

Physical configuration

Modular architecture: BTE Controller or Bodyworn Shoe and Cable is detachable from the Processing Unit, allowing connection of the Processing Unit to a different Controller.

Dual microphone architecture, microphones protected by a replaceable hydrophobic mesh.

The connection between the Processing Unit and any Controller or Bodyworn Controller shoe is splash proof.

Processing Unit and BTE and Bodyworn Controllers are protected against solid foreign objects greater than or equal to 1.0mm diameter, and protected against splashing water (classified IP44 as described by the international standard IEC 60529 (2001-02-01) - Degrees of Protection Provided by Enclosures (IP Code)).

Materials

Processing Unit and BTE Controller

ABS plastic is used for all components that come into contact with the user's skin, apart from the earhook, which is made out of EVA material.

Sealed internal epoxy fibreglass and polyimide printed circuit boards with electronic circuitry

Bodyworn Controller

PC/PBT plastic case

Coil & Cables

ABS plastic is used for all components that come into contact with the user's skin

Sealed internal epoxy fibreglass and polyimide printed circuit boards with electronic circuitry

Cable attached to the coil

Dimensions (Typical)

Processing Unit:	38 x 24 x 12 mm	(1.50 x 0.94 x 0.47 in.)
BTE Controller:	37.5 x 22.5 x 14.5 mm	(1.48 x 0.89 x 0.57 in.)
Bodyworn Controller:	78 x 35 x 17 mm	(3.07 x 1.38 x 0.67 in.)
Coil:	41 x 32.8 x 7 mm	(1.61 x 1.29 x 0.28 in.)

Weight (Typical)

Processing Unit:	4.2 g	(0.15 oz.)	
BTE Controller:	9.9 g	(0.35 oz.)	(includes 3 x ZnAir batteries)
Bodyworn Controller	25 g	(0.88 oz.)	(excluding batteries)
Coil and cable:	4.8 g	(0.17 oz.)	

Electronic circuitry

Custom analog and digital integrated circuit with Digital Signal Processing (DSP) capabilities

Dual microphone system

Internal Telecoil

Visual indicator of system function via a top indicator light

Visual indicator of system functional status via a display

Operating characteristics

Batteries

BTE Controller: PR44 (675) Zinc Air, or SR44 Silver Oxide or LR44 Alkaline batteries

Bodyworn Controller: AAA size, LR03 Alkaline or HR03 NiMH batteries

Power consumption

60mW typical

External Audio Input

Four-pin custom connector for connection to external audio accessories

Accessories

Lapel microphone

TV HiFi cable for mains power equipment

Personal audio cable for battery operated equipment

Monitor earphones

Transmitting cable and coil connection

Four pin connector at the point of connection with the Processing Unit, sealed when mated; cable permanently connected to the coil.

Controls

Push-button sealed 3 button interface, allowing Power On/Off, P1-P2-P3-P4 program switching and Microphone sensitivity/Volume control.

The functional status is displayed at all times via a display.

Bodyworn Controller display has a backlight.

Audio Amplification

Three audio inputs for dual microphones and AUX inputs or Telecoil. All audio processing is done using Digital Signal Processing (DSP)

Programmability Features

In-built Flash memory for storage of user programs

Signal Processing

The audio signal processing is implemented digitally using Digital Signal Processing (DSP) technologies.

Digital AGC & ASC with options such as ADRO™, BEAM™ and Whisper™.

Programmable speech coding strategies: ACE™, SPEAK and CIS with a wide range of programmable parameters available for user's selection on the same speech processor

Up to 22 high-resolution bandpass filters provide spectral energy estimates over the frequency range 100 to 8000Hz, depending on the program settings. Filters with the maximum outputs can be selected. These can be varied. The program determines the filters selected and hence the electrodes stimulated.

Environmental conditions

Storage Temperature:	-20° C (-4° F) to +50° C (+122° F)
Storage Relative Humidity:	0% to 90%
Operating Temperature:	+5° C (+41° F) to +40° C (+104° F)
Operating Relative Humidity:	0% to 90% RH, Splash-proof design

Note Check manufacturer's recommended operating conditions for batteries used in the speech processor

Equipment classification

The speech processor is internally powered equipment Type B as described in the international standard IEC/BSI BS EN 60601-1 (1990-01-01) - Medical Electrical Equipment Part 1: General Requirements for Safety.

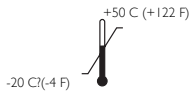
Certification and applied standards

The Nucleus® 24 cochlear implant system fulfils the essential requirements listed in Annex 1 of the EC directive 90/385/EEC on Active Implantable Medical Devices as last amended by EC Directive 93/68/EEC. It was approved for CE-Mark according to Annex 2 by Notified Body 0197 in 1993, 1996, 2001, 2004 and 2005.

CE 0197

Labelling symbols

The symbols below are found on the Freedom speech processor components and packaging.

Symbol	Meaning
	**See Instructions**
	**Fragile**
	**Temperature Limit**
	**Humidity Limit**
	**CE Registration Mark**
	**Type B Equipment**
IP44	**IP Rating** Protected against solid foreign objects greater than or equal to 1.0mm diameter, and protected against splashing water
Rx Only	**This device restricted** to sale by or on the order of a physician