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On a Mac

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- Click Print
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Oticon CROS

A revolutionary sound experience



Learning Objectives

After this course, participants will be able to:

... describe the acoustic limitations of individuals with single-sided deafness

... describe how an unprecedented signal processing technology can provide better conditions for speech understanding and localization

... identify the full portfolio of devices available to support Oticon CROS

... list the steps to setup and program Oticon CROS



The Oticon CROS family

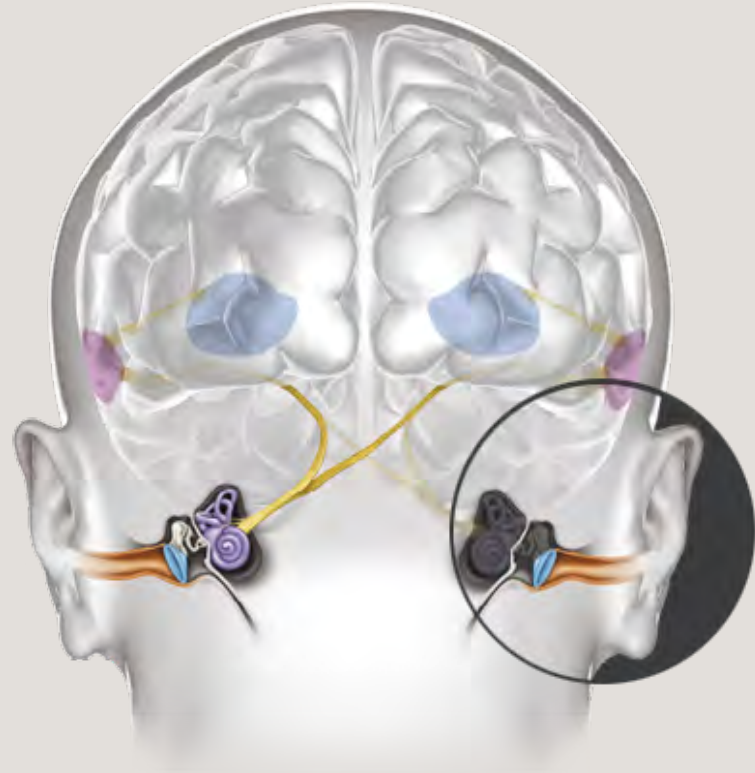
Outstanding sound quality for those with single-sided deafness

SSD can result in poor speech understanding especially in noise and reduced localization ability

Users need innovative technology that is reliable and compatible

The technology needs to give access to speech on the poor side and allow for streaming at the same time

Background
on SSD



How many of you...

**...have seen a
client with single-
sided deafness?**



**...in your mind,
what constitutes
single-sided
deafness?**

Single-sided deafness

Unaidable hearing in one ear and **normal hearing** or an **aidable hearing loss** in the other ear

Taylor 2010

Every year . . .

60,000
USA


= 1%

of the population

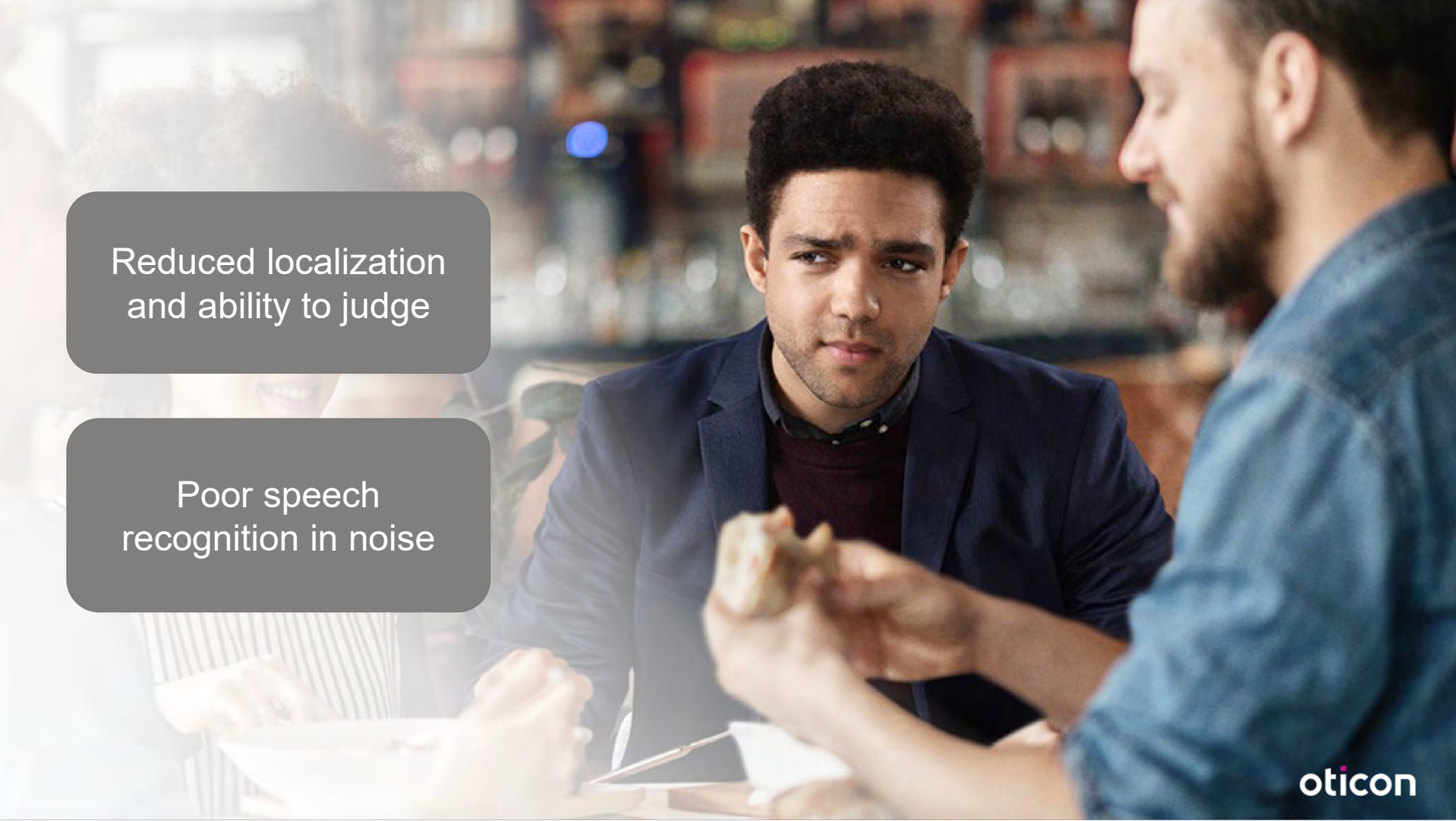
Who is affected?

SSD can occur in all population groups





What do they
struggle with?



Reduced localization
and ability to judge

Poor speech
recognition in noise

The importance of binaural hearing

2 ears are necessary in order to obtain the benefits of...

Binaural loudness summation

Binaural redundancy





Binaural squelch

Head shadow effect

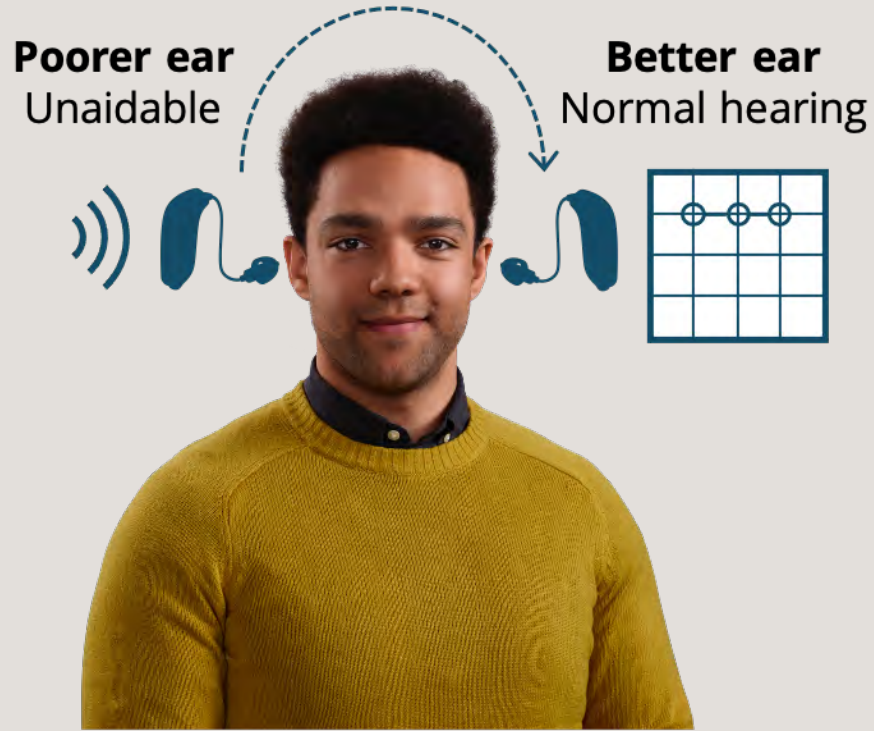
Dillon 2012

Treatment options for SSD

Benefits and Considerations

	CROS	BAHS
	 A black, behind-the-ear hearing aid with a thin wire connecting to a small, clear, dome-shaped processor.	 A small, tan-colored, behind-the-ear hearing aid with a green and silver connector.
Pros	<ul style="list-style-type: none">• Non-surgical• Can accommodate for hearing loss on better ear	<ul style="list-style-type: none">• Wears one device, nothing in better ear
Cons	<ul style="list-style-type: none">• The better ear may be partially occluded• User must wear two devices• Does not restore binaural hearing	<ul style="list-style-type: none">• Minimally invasive surgery• Does not restore binaural hearing

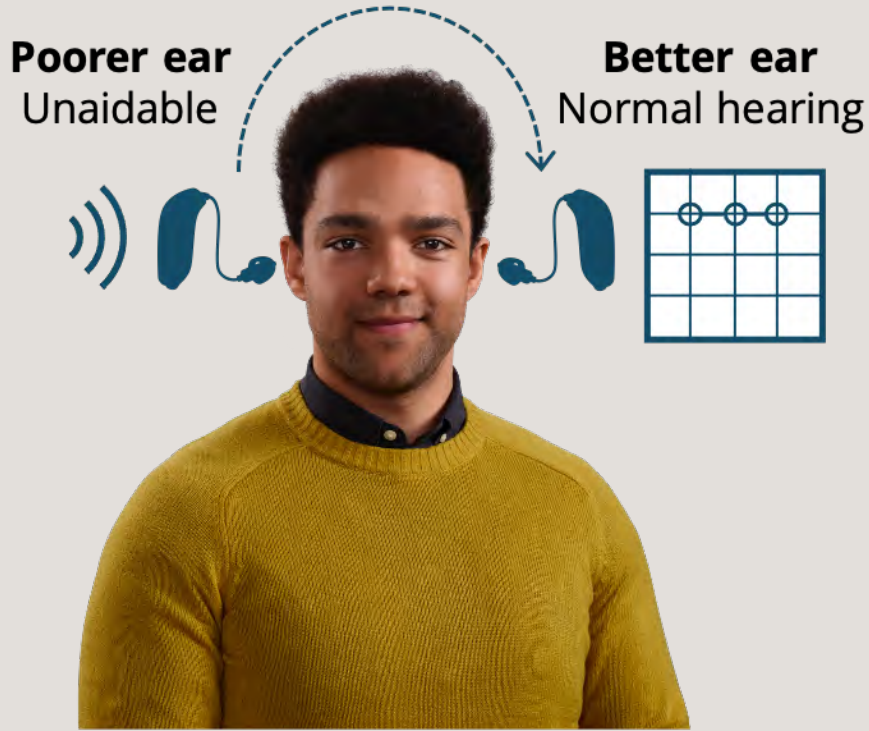
Oticon CROS solution



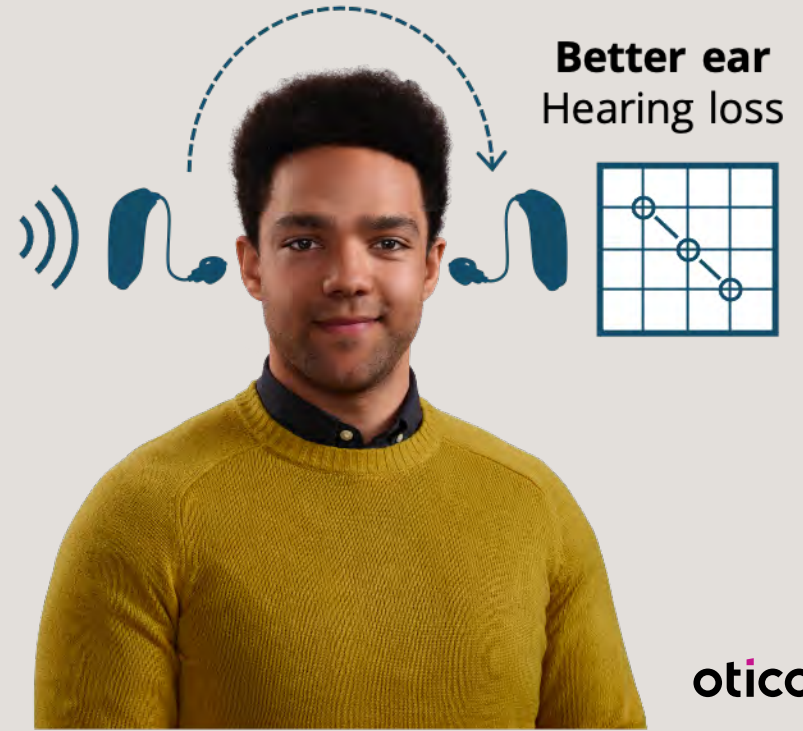
CROS stands for
“**Contralateral routing
of signal**”

Oticon CROS solution

CROS solution



BiCROS solution



Candidacy



Candidacy

**...can the user
benefit from
conventional
amplification?**



**...is one ear normal
or not?**

Are children candidates?

CROS/BiCROS fittings


Candidacy is based on:

- Age
- Ability to monitor & adjust the listening environment

Intended use:

- Not intended for children below 5 years of age
- Caution is advised for children from 5 to 8 years of age





The Oticon CROS family

The expanded Oticon CROS family



Oticon
CROS PX
miniRITE R

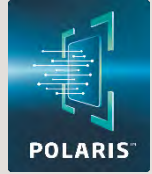


Oticon
CROS
miniRITE T

miniRITE T transmitter



miniRITE R transmitter



Colors

A variety of color choices



CO90
Chroma Beige



CO94
Terracotta



CO93
Chestnut Brown



CO63
Diamond Black



CO92
Steel Grey



CO91
Silver Grey



CO44
Silver

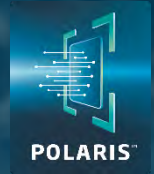


CO79
Hear Pink

*Hear Pink is only available for Oticon CROS PX miniRITE R

Oticon CROS PX miniRITE R

The rechargeable addition to the Oticon CROS family



A full day of power*

Exceptional sound quality

Unparalleled compatibility

*Lithium-ion performance varies depending on hearing loss, lifestyle and streaming behavior

Firmware version requirements

More- 1.1.0 or later

Opn S, Opn Play, Xceed, Xceed Play- 8.0 or later

Ruby- 1.0 or later



Unparalleled compatibility

**Except Oticon Opn S3 and Oticon Opn Play 2*

A choice of elegant power supplies

The Oticon charger family



A choice of elegant power supplies

The Oticon charger family



Super fast charging time

Charging times for a completely drained battery

3 hours	1 hour	0.5 hour
Fully charged	50% charged	25% charged



Charging times with SmartCharger

Charging of the power bank and miniRITE R transmitter



3 hours

Fully charged

1 hour

50% charged

0.5 hour

25% charged



4 hours

Fully charged
power bank battery


Up to 8 hours

Fully charged power bank
and hearing aids



Which one should I recommend?

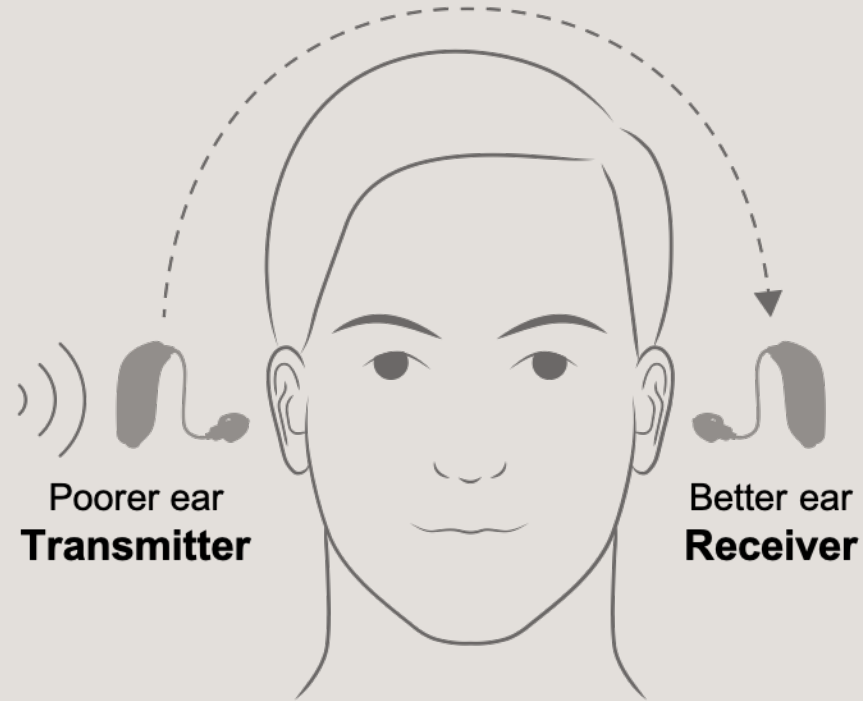




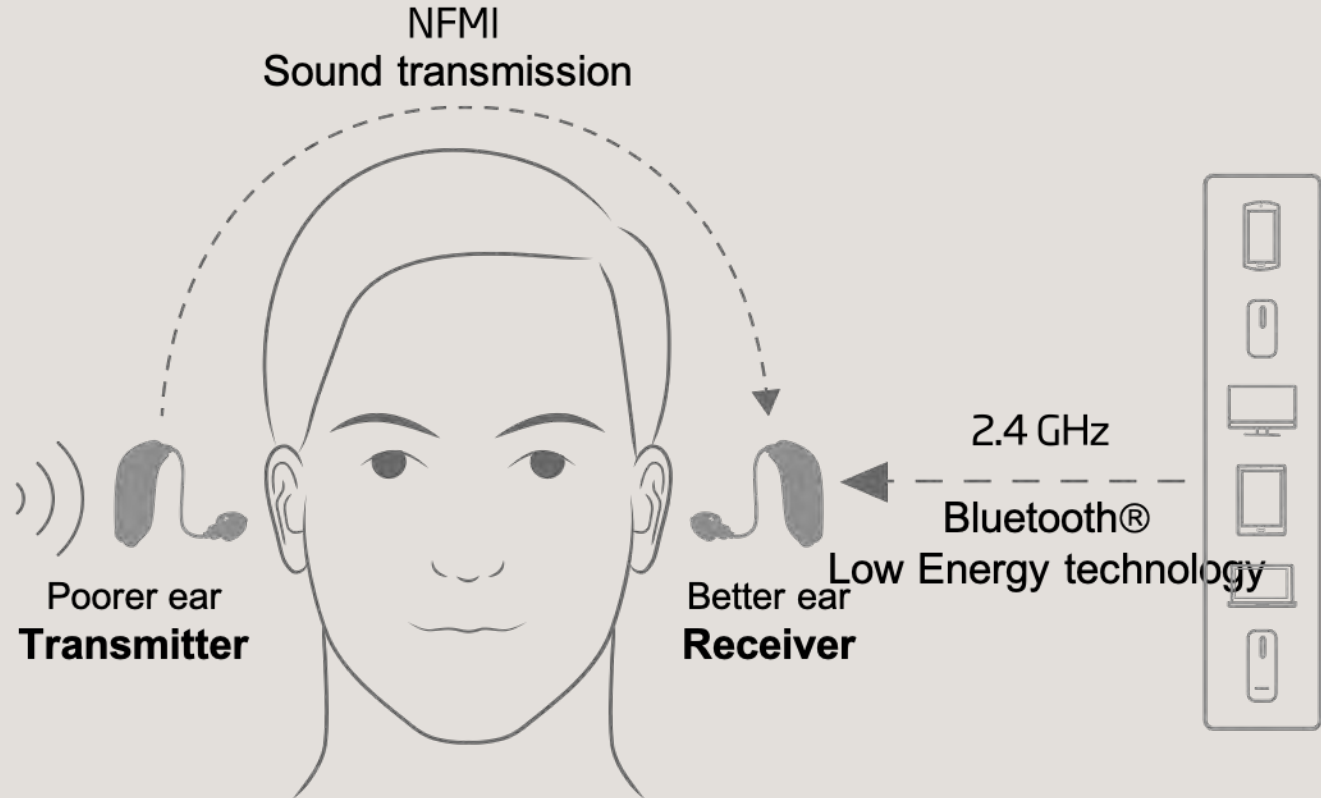
How does the Oticon
CROS solution work?

The Oticon CROS solution

 **TwinLink**
NFMI + 2.4 GHz



The Oticon CROS solution



TwinLinko dual streaming with Oticon CROS & CROS PX

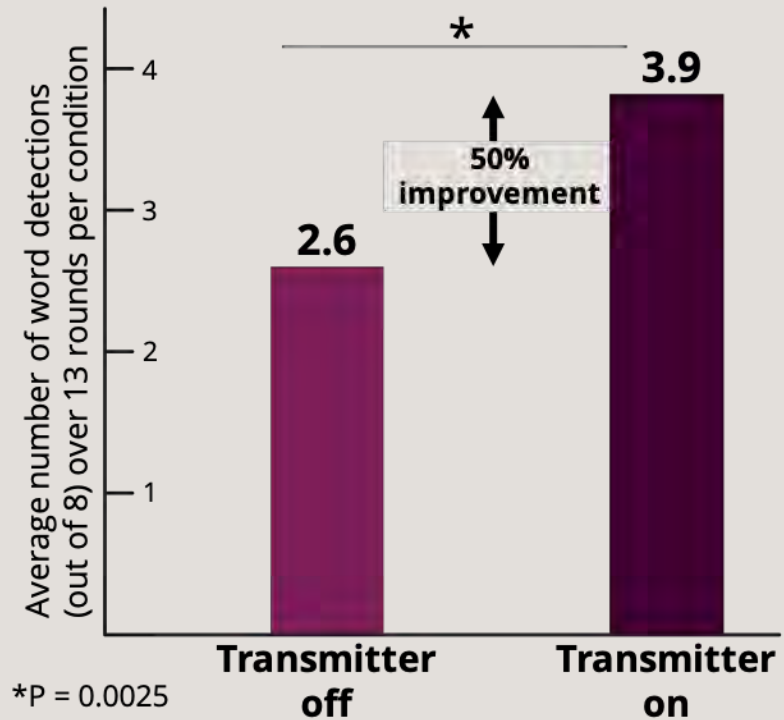
Receiver can simultaneously receive 2.4 GHz and NFMI streamed signals



TwinLink dual streaming benefits



Speech awareness



Callaway & Aaby Gade, 2019

Oticon CROS

SUMMARY

Oticon now introduces Oticon CROS, the first ever wireless CROS/BICROS solution using an open sound paradigm and with dual-streaming capability using TwinLink™.

Oticon CROS is a unique solution for persons with single-sided deafness and it now makes the advanced signal processing of the OpenSound Navigator™ feature available to even more people with hearing loss.

A 2019 internal study shows the benefit of having dual-streaming capability within a CROS solution. While streaming sound using 2.4 GHz Bluetooth Low Energy technology, the CROS transmission was switched on and off in order to determine whether or not transmission of sound from the test subject's poorer ear side affected a person's awareness of speech in the environment. Results showed a 50% improvement in speech awareness from 33% to 49% awareness when transmission was active during streaming from an external source.

This tells us that CROS/BICROS users can benefit greatly from having access to speech information in their environment, also when streaming.



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Clinical Research
Audiology Assistant
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The Oticon CROS solution

An overview



Transmitter



Receiver

Oticon CROS/CROS PX transmitter



Speaker unit has no acoustic purpose (retention only)

Signal is cleaned-up before being sent to the receiver

10 kHz broad bandwidth is transmitted to the receiver

Volume control adjusts the level of the transmission

No **Bluetooth®** Low Energy technology in the transmitter



The Oticon CROS solution

The receiving device



Transmitter



Receiver

Oticon CROS/CROS PX receiver hearing aid

Receiver functions as a **normal Polaris/Velox S** hearing aid

Receives **NFMI signal** from CROS/CROS PX transmitter

Can be controlled via the **Oticon ON app, ConnectClip or Remote Control**

Volume Control adjusts the overall volume (combined input)



Signal processing - Oticon CROS miniRITE T

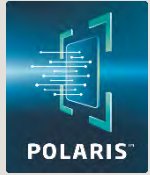
Optimized-for-CROS OpenSound Navigatoro



- Settings are **optimized for users with SSD**
- **Transition** is set to Low
- **5 dB noise reduction** in ALL environments

Signal processing - Oticon CROS PX miniRITE R

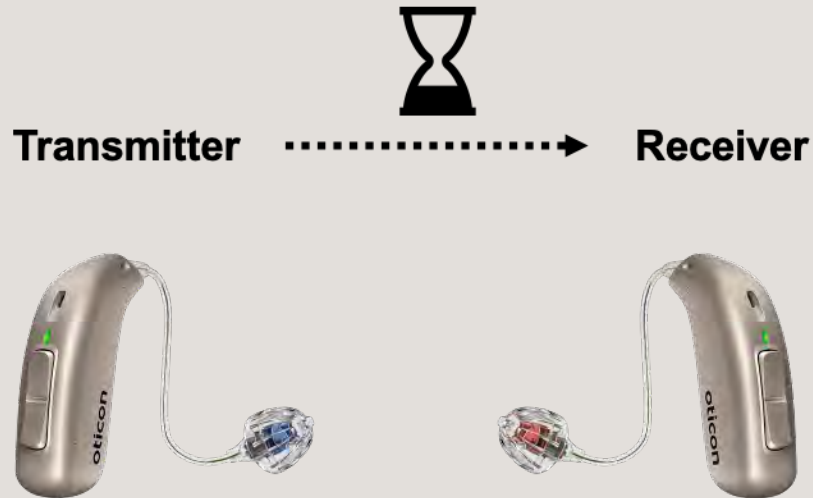
Optimized-for-CROS MoreSound Intelligenceo



- Settings are **optimized for users with SSD**
- **Environment configuration** is set to Complex (for influencing the **Spatial Balancer** activation)
- **6 dB noise suppression** in ALL environments
- **Virtual Outer Ear** is set to Balanced
- **Sound Enhancer** is set to Balanced

Signal processing – High pass filter

Oticon CROS/CROS PX



High pass filter with 1500 Hz cut-off:

- Sounds above 1500 Hz are transmitted via NFMI
- Sounds below 1500 Hz pass the head naturally

Using the combined Oticon CROS/BiCROS solution



Transmitter



Receiver

Changing the volume in a CROS solution

Volume control of transmitted sound
Short press



Transmitter

Oticon CROS/
Oticon CROS PX

Receiver

Volume control of transmitted sound
Short press

Changing the volume in a BiCROS fitting

Receiver with double push button (recommended)

**Volume
control of
transmitted
sound**
Short press



Transmitter

Oticon CROS/
Oticon CROS PX

Receiver

**Volume
control of
transmitted
sound**
Short press

Muting the transmitted signal

Mute/un-mute
Press min. 4 sec
(Short press to un-mute)



Oticon CROS PX cannot be muted

Volume control with a miniRITE receiver

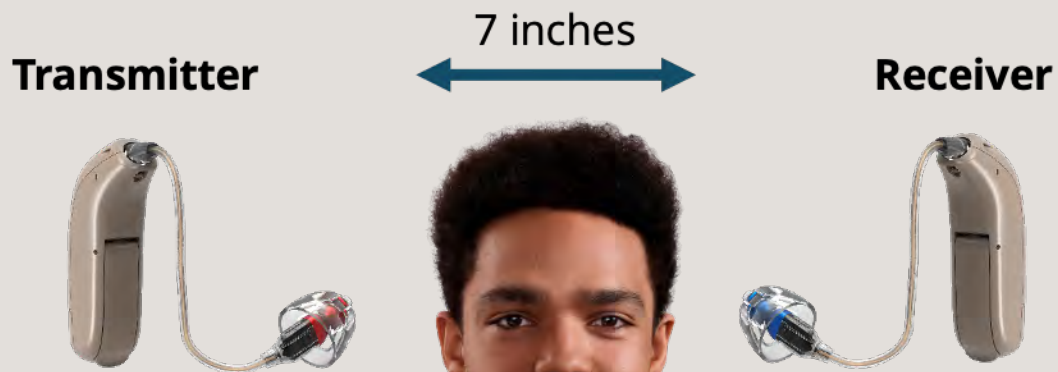
miniRITE receiver



} **miniRITE**
no volume control



Wearing Oticon CROS





Fitting an Oticon CROS/BiCROS solution in Oticon Genie 2

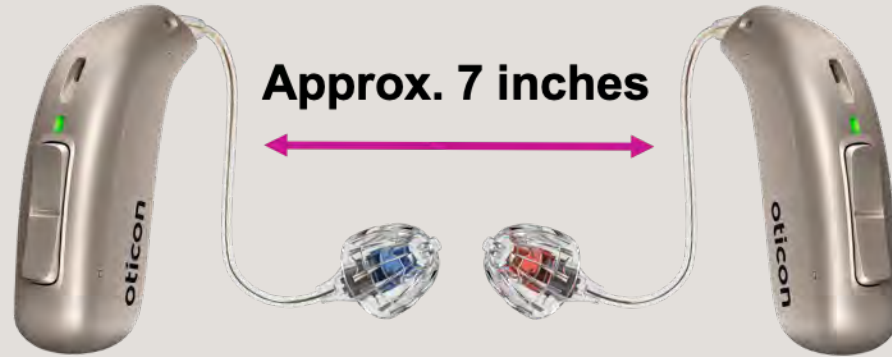
Preparing for the fitting

Oticon CROS PX miniRITE R



Ensure the receiver hearing aid and Oticon CROS PX are fully charged

Pairing transmitter and receiver for the first time



Close proximity pairing

Selection: Select instruments

The screenshot shows the Oticon Genie 2 software interface for instrument selection. The main window displays the Oticon logo, a navigation menu, and a central area with an audiogram graph and a 3D head model. The audiogram graph plots dB HL (0 to 120) against frequency (125 to 8k Hz). A pink line indicates the hearing level, with a green shaded area below it. A callout box points to the 'miniRITE R' instrument on the left side of the graph. Below the graph, there are four panels for configuration: FAMILY, STYLE, FEATURES, and another STYLE/FEATURES panel. The 'miniRITE R' is selected in the STYLE panel, and 'CROS transmitter' is selected in the second STYLE panel. A callout box points to the 'CROS transmitter' selection. The bottom left panel shows a 'Table of features' link.

miniRITE R is displayed

Select CROS transmitter

Fitting: testing signal

The screenshot shows the Oticon Genie 2 software interface for fitting a hearing aid. The main workspace displays a graph titled "P1: GENERAL, VAC+" showing "Insertion gain Target and simulated" in dB across a frequency range from 125 Hz to 8 kHz. A red 'X' is overlaid on the user silhouette, and a pink callout box points to it with the text "User can hear transmitted sound".

The interface also includes a sidebar with "FITTING" options, a "GAIN CONTROLS" section with a frequency response table, and a "SOUND CONTROLS" section with a volume control slider and a "CR" button.

125	250	500	625	750	1k	1.25	1.4	1.5	1.7	2k	3k	4k	5k	6k	8k	All
53	66	74	80	84	87	91	92	93	95	102	104	95	89	84	83	MPO
0	0	0	0	0	1	2	2	3	3	1	-1	-2	-3	-3	-3	Loud
0	0	0	0	0	2	3	3	4	4	2	0	-1	-1	-1	-1	Moderate
0	0	0	0	0	2	4	4	4	5	2	0	-1	-1	-1	-1	Soft



Fitting: CROS / BiCROS

The screenshot displays the Oticon Genie 2 software interface for fitting CROS/BiCROS. The window title is "Genie 2 | 2021.2 [CROS, Oticon]". The menu bar includes "File", "Genie 2", "Edit", "Hearing Instrument", "Preferences", "Tools", and "Help". A "DISCONNECT" button is visible in the top right. The main interface features the Oticon logo, a "More 1 OpenBass dome" indicator, and navigation buttons for "WELCOME", "SELECTION", "FITTING" (highlighted), and "END FITTING".

On the left, a sidebar shows the "FITTING" menu with options: "Fine-tuning", "CROS / BiCROS" (highlighted with a pink box), "Feedback Analyser", "REM", "REM AutoFit", "MoreSound Intelligence", "Program Manager", and "Acoustics". Below this is a "MORE TOOLS" section.

The central area displays a graph titled "P1: GENERAL, VAC+ Insertion gain Target and simulated". The y-axis is labeled "dB" and ranges from 0 to 80. The x-axis is labeled "Hz" and ranges from 125 to 8k. A red line represents the simulated insertion gain, and a grey shaded area represents the target. A "Reserve gain" indicator shows 10 dB. To the right of the graph is a diagram of a human head wearing a CROS/BiCROS hearing aid, with a red 'X' on the left ear and a blue arrow indicating sound transmission from the right ear.

Below the graph, the text "CROS should now transmit sound" is displayed with an information icon. At the bottom, the "PROGRAM SETTING" section shows three buttons: "BiCROS", "CROS" (selected), and "NO CROS / BiCROS". A pink callout box points to these buttons with the text "Select the mode for each program".

Fitting: CROS / BiCROS

The screenshot displays the Oticon Genie 2 software interface for fitting CROS/BiCROS hearing aids. The window title is "Genie 2 | 2021.2 [CROS, Oticon]". The top menu bar includes "File", "Genie 2", "Edit", "Hearing Instrument", "Preferences", "Tools", and "Help". A "DISCONNECT" button is visible in the top right. The main interface features the Oticon logo, a "More 1 OpenBase dome" indicator, and a progress bar with four stages: WELCOME, SELECTION, FITTING (highlighted), and END FITTING. A left sidebar lists fitting options: FITTING, Fine-tuning, CROS / BiCROS (highlighted with a pink box), Feedback Analyser, REM, REM AutoFit, MoreSound Intelligence, Program Manager, and Acoustics. The main workspace shows a graph titled "P1: GENERAL, VAC- Insertion gain Target and simulated" with a y-axis in dB (0 to 80) and an x-axis in Hz (125 to 8k). A red line represents the simulated gain, and a dashed line represents the target. A "Reserve gain" indicator shows 10 dB. To the right is a 3D head model with a blue arrow indicating sound transmission from the left ear to the right ear, marked with a red 'X'. Below the graph, text reads "CROS should now transmit sound" with an information icon. A pink arrow points to a "CROS Quick Fitting Guide" button in the bottom left. A large pink arrow points from the text "Access to Quick Fitting Guide" to the button.

Access to Quick Fitting Guide

Oticon CROS & Oticon CROS PX Quick Fitting Guide

The CROS transmitter coupled with a compatible Oticon hearing aid, is a solution for people with single-sided deafness (SSD).

A CROS fitting is appropriate when hearing on the better ear is normal, whereas a BiCROS fitting is appropriate when hearing on the better ear is impaired and hearing loss must be compensated for.

In this guide, both fitting scenarios are described in a few simple steps.

Following link will provide an overview of the compatibility of the CROS transmitters: oticon.global/cros-compatibility

1. Place the transmitter and receiving hearing aid within 20-30 cm of each other on a table or on client's ears.

2. Selection step:

Detect the hearing aid on the better ear. If the hearing aid family and/or style supports a CROS fitting, the CROS transmitter will appear for selection in the Style list for the other ear.

The CROS transmitter exists as a miniRITE T and miniRITE R style.

3. Selection step:

Select CROS transmitter for non-hearing aid ear. The CROS transmitter and receiving hearing aid will pair once you proceed with the fitting session.

The CROS transmitter is not detected or connected to the software, but it is actively streaming throughout the fitting. Make sure both devices have fresh batteries (or are fully charged) and are turned on.



4. Fitting step:

The client can now hear streamed sound from the CROS transmitter in the receiving hearing aid.

Check active streaming by running finger along transmitter microphone and listen for the microphone activity in the receiving hearing aid.

5. Fitting step:

Go directly to CROS/BiCROS tab in left taskpane to select mode: BiCROS, CROS, or No CROS/BiCROS.

The selection of mode controls which microphones are in use. It is possible to create several programs in the hearing aid, each with its own mode.



A step-by-step guide for fitting Oticon CROS and BiCROS solutions in Oticon Genie 2

Fitting: CROS / BiCROS – a CROS fitting

The screenshot shows the Oticon Genie 2 software interface for fitting CROS/BiCROS hearing aids. The window title is "Genie 2 | 2021.2 [CROS, Oticon]". The top menu includes "File", "Genie 2", "Edit", "Hearing Instrument", "Preferences", "Tools", and "Help". A "DISCONNECT" button is visible in the top right. The Oticon logo is on the left, and a "Mars 1 OpenBina device" is shown. The main navigation bar has four icons: WELCOME, SELECTION, FITTING (highlighted), and END FITTING. A left sidebar lists fitting options: FITTING, Fine-tuning, CROS / BiCROS (highlighted with a pink box), Feedback Analyser, REM, REM AutoFit, MoreSound Intelligence, Program Manager, and Acoustics. Below the sidebar are "MORE TOOLS" and "SoundStudio" with a "ind demo" button. The main workspace shows a graph titled "P1: GENERAL, VAC+ Insertion gain Target and simulated" with a y-axis of "dB" (0 to 80) and an x-axis of "Hz" (125 to 8k). A "Reserve Gain" indicator shows "10 dB". To the right is a 3D head model with a blue arrow indicating sound transmission and a red "X" indicating a problem. A text box below the head says "CROS should now transmit sound" with an information icon. At the bottom, a "PROGRAM SETTING" section has "BICROS" and "CROS" buttons, with "CROS" selected. A pink arrow points to the "CROS" button with the text "Select CROS mode".

Fitting: CROS / BiCROS – a CROS fitting

Genie 2 | 2021.2 [CROS, Oticon]

File Genie 2 Edit Hearing Instrument Preferences Tools Help

DISCONNECT

oticon

More 1 OpenBase done

WELCOME SELECTION **FITTING** END FITTING

P1

FITTING

Fine-tuning

CROS / BiCROS

Feedback Analyser

REM

REM AutoFit

MoreSound Intelligence

Program Manager

Acoustics

MORE TOOLS

VC

P1: GENERAL, VAC-

Insertion gain Target and simulated

dB

Reserve gain

10 dB

IST

80

60

40

20

0

125 250 500 1k 2k 4k 8k Hz

CROS should now transmit sound

GAIN CONTROLS SOUND CONTROLS

1 2 3

Adjust the adaptation step

125	250	500	625	750	1k	1.25	1.4	1.5	1.7	2k	3k	4k	5k	6k	8k	All	CR
63	76	84	90	94	97	101	102	103	105	112	114	105	99	94	93	MPO	
0	0	0	0	0	1	2	2	2	2	1	0	-1	-2	-2	-2	Loud	
0	0	0	0	0	1	2	3	4	4	2	1	0	0	0	0	Moderate	
0	0	0	0	0	2	3	3	4	4	2	1	0	0	0	0	Soft	

SoundsStudio

Re

oticon

Fitting: CROS / BiCROS – a BiCROS fitting

The screenshot displays the Oticon Genie 2 software interface for fitting a CROS/BiCROS hearing aid. The window title is "Genie 2 | 2021.2 [CROS, Oticon]". The top menu includes "File", "Genie 2", "Edit", "Hearing Instrument", "Preferences", "Tools", and "Help". A "DISCONNECT" button is visible in the top right. The main interface features the Oticon logo, a "More 1" indicator, and navigation icons for "WELCOME", "SELECTION", "FITTING" (highlighted), and "END FITTING".

On the left, a sidebar lists fitting options: "FITTING" (expanded), "Fine-tuning", "CROS / BiCROS" (highlighted with a pink box), "Feedback Analyser", "REM", "REM AutoFit", "MoreSound Intelligence", "Program Manager", and "Acoustics". Below this is a "MORE TOOLS" section.

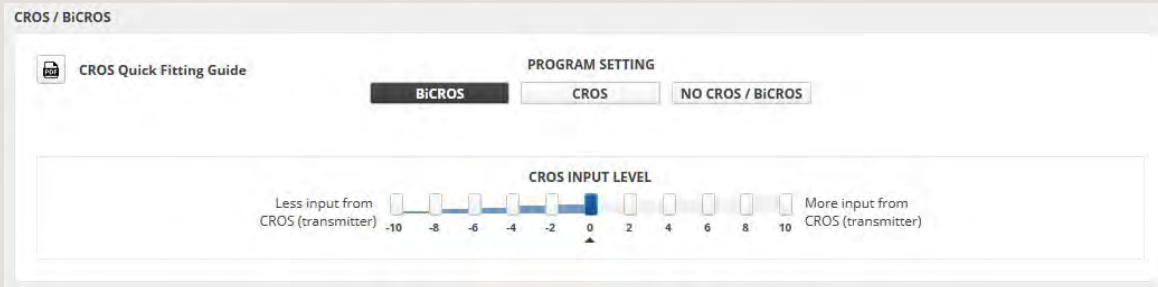
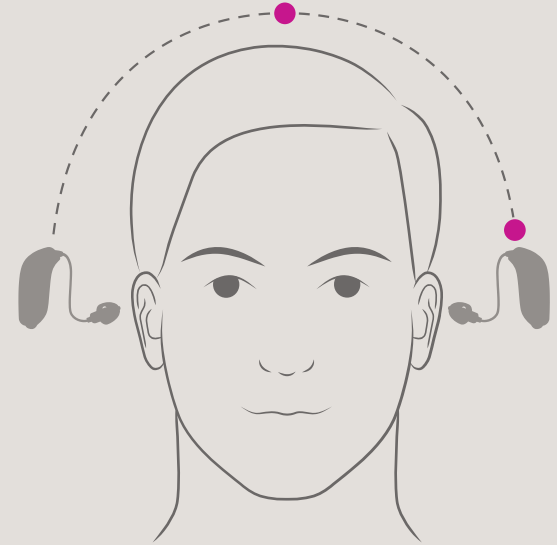
The main workspace shows a graph titled "P1: GENERAL, VAC-" with the subtitle "Insertion gain Target and simulated". The y-axis is labeled "dB" and ranges from 0 to 80. The x-axis is labeled "Hz" and ranges from 125 to 8k. A red line represents the simulated insertion gain, showing a peak around 2k Hz. A vertical bar on the left indicates "Reserve gain" at 10 dB. To the right of the graph is a diagram of a human head wearing a hearing aid, with sound waves and the text "CROS should now transmit sound".

At the bottom, there is a "CROS / BiCROS" section with a "CROS Quick Fitting Guide" icon and a "BICROS" button. Below this is a "CROS INPUT LEVEL" slider ranging from -10 to 10 dB, with labels "Less input from CROS (transmitter)" and "More input from CROS (transmitter)".

Select BiCROS mode

Balancing the transmitter and receiver

The transferred sound should not be louder than the sound naturally entering the better ear



Fitting: CROS / BiCROS – a BiCROS fitting

The screenshot shows the Oticon Genie 2 software interface for BiCROS fitting. The main window displays a graph titled "P1: GENERAL, VAC- Insertion gain Target and simulated" with a frequency axis from 125 to 8k Hz and a dB axis from 0 to 80. A red line represents the simulated gain, and a dashed line represents the target. A "Reserve gain" indicator shows 10 dB. To the right of the graph is a diagram of a person's head with a blue arrow indicating sound transmission from the left ear to the right ear. Below the graph is a "GAIN CONTROLS" section with a table of gain values for various frequencies and a "CR" button.

125	250	500	625	750	1k	1.25	1.4	1.5	1.7	2k	3k	4k	5k	6k	8k	All	CR
63	76	84	90	94	99	103	104	103	105	112	114	105	99	94	93	MPO	+
0	0	0	0	0	1	2	3	2	3	1	2	0	-1	-2	-2	Loud	
0	0	0	0	0	2	4	4	4	5	4	5	4	2	2	2	Moderate	
0	0	0	0	0	5	10	11	11	14	15	15	14	13	11	11	Soft	

Fine-tune the overall gain as required

End Fitting: buttons and indicators

Genie 2 | 2021.2 [CROS, Oticon]

File Genie 2 Edit Hearing Instrument Preferences Tools Help

DISCONNECT

oticon

More 1
OpenBase done

WELCOME SELECTION FITTING **END FITTING**

END FITTING

- Save and Exit
- Buttons and Indicators**
- Batteries
- Accessories
- Generate Report

LINKS

- Motivational Tool
- Technical Data
- Instruction Videos

Operate Pushbutton

Program	VC	Shutdown
CROS program Apply a short press. No program change available.	CROS VC Apply a short press. Will change input only from the CROS transmitter.	CROS Mute or Shutdown Apply a very long press. Will mute or shutdown the CROS transmitter only.
<input checked="" type="checkbox"/> Use program change	<input type="checkbox"/> Volume control	<input type="checkbox"/> Mute or Shutdown function
<input type="checkbox"/> Use VC	<input type="checkbox"/> Volume control is always on	<input type="checkbox"/> Mute or Shutdown is always accessible
<input checked="" type="checkbox"/> Shutdown	<input type="checkbox"/> Volume range	

Remove User

SoundStudio

Reference sound d

No configuration for CROS buttons

End Fitting: buttons and indicators

Genie 2 | 2021.2 [CROS, Oticon]

File Genie 2 Edit Hearing Instrument Preferences Tools Help

DISCONNECT

oticon

WELCOME SELECTION FITTING **END FITTING**

END FITTING

- Save and Exit
- Buttons and Indicators**
- Batteries
- Accessories
- Generate Report

LINKS

- Motivational Tool
- Technical Data
- Instruction Videos

SoundStudio

Reference sound

OPERATE PUSHBUTTON BEEPS CONNECTCLIP VISUAL INDICATORS

Start-up

- Jingle

Shutdown

- Shutdown beep

Beep signal

Frequency: **Medium** Level

Volume control indicators

- Start-up volume (beep)
- Min/max volume (beep)
- Volume change (click)
- Mute indicator

Tinnitus volume control indicators

- [unclear]
- [unclear]
- [unclear]

Program change indicator

CROS beep signal

Frequency: **High** Level

CROS volume control indicators

Start-up volume (beep) is always on

CROS battery low indicator

Pre-warning is always on

Out of battery is always on

CROS other indicators

Service repair mode is always on

High frequency for CROS

Medium frequency for receiver

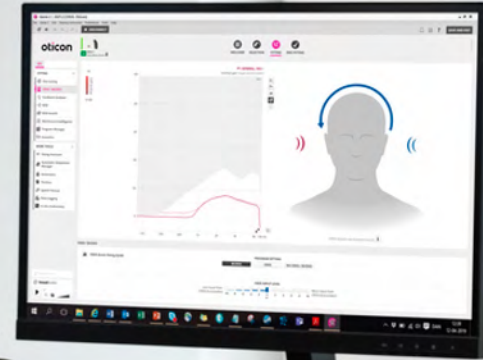
Fitting tips....

Wireless fitting is recommended

CROS transmitter is not visible in Oticon Genie 2

Transmitter is active during fitting

No firmware updates for CROS transmitter





Oticon CROS/BiCROS verification

Objective verification

A healthcare professional, a woman with glasses and a brown jacket, is smiling and holding a Real Ear Measurement (REM) device. She is standing next to a man with grey hair, who is sitting at a desk. The device is a black and silver unit with a speaker and a microphone. The woman is holding a pair of black cables connected to the device. In the background, there is a computer monitor displaying a software interface with graphs and data. A poster on the wall shows an anatomical diagram of the human ear. The setting appears to be a modern, well-lit office or clinic.

Verification with REMs are considered Best Practice

Real-ear verification

Delivering a fitting that sounds transparent to the user

Best practice

Allows for objective verification of functionality

Safeguards audibility



Real Ear Measurement Verification Guide

Real-Ear-Measurement Verification Guide for CROS/BI-CROS

Introduction

One of multiple best practice guidelines is to verify a hearing aid fitting through real-ear measurements (REM) (ASHA, 2006), hence ensuring a more optimized target match by taking the ear canal acoustics into account, compared to a basic fit procedure (Amies, Pundarik & Gessling, 2017). REM can help to safeguard audibility when fitting a Contralateral Routing of Signals (CROS) or a Bilateral CROS (BiCROS) system to objectively verify its functionality and perform adjustments to meet the auditory needs of the client.

The primary aim of a CROS/BiCROS fitting is to transfer sound from the unusable ear to the better ear, hence eliminating the head shadow effect. To achieve this, the signal is picked up by a CROS transmitter on the poorer ear and sent to a receiver hearing aid on the better ear. The output of the signal should match the acoustic characteristics of the sound provided to the better ear, either without amplification (CROS) or with amplification (BiCROS), delivering a fitting that sounds transparent to the client (Pundarik, 2006).

Quick guide for verifying an Oticon CROS solution

The following paragraph is the recommended approach for verifying an Oticon CROS solution, as described by Bicketts, Bernier & Maelzer (2018). The guide is generic and will not provide details on different manufacturer's REM equipment.

A CROS solution helps overcome the head shadow for clients with normal hearing thresholds on the better ear that does not require amplification. An open acoustics is used on this ear to ensure that the natural open ear resonance (REUR/REUG) is minimally changed by the earpiece.

Preparation in Genie 2

1. Selection step: Connect the receiver hearing aid and select CROS transmitter for the unusable ear. A guide on connecting and fitting Oticon CROS/BiCROS solutions is available from our website (Oticon CROS Quick Fitting Guide, see references).
2. Fitting step: First, select an open dome/open custom earpiece in Acoustics. Second, go to Feedback Analyzer. Perform a feedback test with the hearing aid placed on the better ear (optional).

Measure the Real-Ear-Unaided-Response (REUR) for the better ear

3. Remove the receiver hearing aid from the better ear.
4. Place the REM module on both ears and insert the probe tube only into the better ear.
5. Position the REM speaker at e.g., 45° to the better ear (45° to 90° may be selected depending on the physical set-up of REM equipment and must consistently be used for both ears). See Figure 1.
6. Measure the REUR by presenting a standard real-speech signal (e.g., shaped speech or STS) at a moderate speech level (65 dB SPL). The obtained response will be the target for the following REM measurements.

Measure the Real-Ear-Occluded-Response (REOR) for the better ear to confirm an open fit

7. Apply only the hearing aid on the better ear (CROS transmitter is turned off or not used).
8. In Genie 2, go to CROS/BiCROS. Select **CROS** as the program setting to ensure that the hearing aid's microphones are muted.
9. Position the REM speaker at e.g., 45° to 90° to the better ear (same angle as in step 5 is required). See Figure 1. The probe tube should remain in the better ear.
10. Measure the REOR by presenting a standard real-speech signal at a moderate speech level (65 dB SPL). Use the same signal and level as for the REUR measurement. The obtained response should approximate the REUR obtained in step 6, if this is not the case, select a more open dome or a smaller receiver, if possible.

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Quick guide for verifying an Oticon BiCROS solution

The following paragraph is the recommended approach for verifying an Oticon BiCROS solution, as described by Bicketts et al. (2018) and Pundarik (2006).

A BiCROS solution helps overcome the head shadow when the client also has a hearing loss in the better ear that requires amplification. First, the hearing care professional should fit the hearing aid to the better ear to compensate for the individual hearing loss and provide audibility (use REM AuditFit or stand-alone REM fitting to target). Gain and output may be fine-tuned to match the needs of the client. REM verification of the hearing aid on the better ear alone is not part of this guide.

Preparation in Genie 2

1. Selection step: Reconnect the fitted hearing aid and select a CROS transmitter for the unusable ear. A guide on connecting and fitting the Oticon CROS/BiCROS is available from our website (Oticon CROS Quick Fitting Guide, see references).

Measure the REAR for the better ear

2. Place the probe module on both ears and insert the probe tube only in the better ear.
3. Apply the hearing aid on the better ear and the CROS transmitter on the poorer ear.
4. Position the REM speaker at e.g., 45° to the better ear (45° to 90° may be selected depending on the physical set-up of REM equipment and must consistently be used for both ears). See Figure 1.
5. In Genie 2, go to CROS/BiCROS. Select **No CROS / BiCROS** for the program setting to ensure that only the hearing aid's microphones are activated.
6. Measure the REAR by presenting a standard real-speech signal (e.g., shaped speech or STS) at a moderate speech level (65 dB SPL). The obtained response will be the target for the following REM measurement. The REAR measured with sound presented from the side may deviate slightly from the target match of the hearing aid fitting due to a different position of the loudspeaker.

Measure the REAR for the CROS transmitted sound to the better ear to match it to this ear's REAR target

7. Position the REM speaker at e.g., 45° to 90° degrees to the poorer ear (same angle as in step 4 is required).
8. Ensure that your REM equipment offers the possibility to use/activate the reference microphone on the REM module on the poorer side. Activate it during this measurement of the REAR in the better ear while using the REM module now facing away from the loudspeaker. The probe tube should remain in the better ear. Visit the user instructions of your REM equipment to learn how the reference microphone on the specific REM module can be selected/activated for CROS verification.
9. In Genie 2, go to CROS/BiCROS. Select **CROS** as the program setting to only measure the transparency of the transmitted sound up against the REAR of the better ear obtained in step 6.
10. Measure the REAR again (second curve) by presenting a standard real-speech signal at a moderate speech level (65 dB SPL). Use the same signal and level as for the REAR measurement in step 6. The obtained response should approximate the REAR obtained in step 6, providing a fitting that sounds transparent to the client.
The REAR for the poorer ear may deviate from the REAR for the better ear at some frequencies. Due to the change of position between the measurements, the effect of room acoustics in a typical clinical set-up, and the influence of the REUR when open acoustics is used for the better ear. The frequency response of the transmitter cannot further be adjusted without changing the gain settings for the hearing aid. Overall deviation in loudness between REAR of the better ear and REAR of the poorer ear can be balanced in the CROS Input Level if this is measured in this step or subjectively reported by the client.
11. In Genie 2, go to CROS/BiCROS. Select **BiCROS** as the program setting to finalize the fitting.

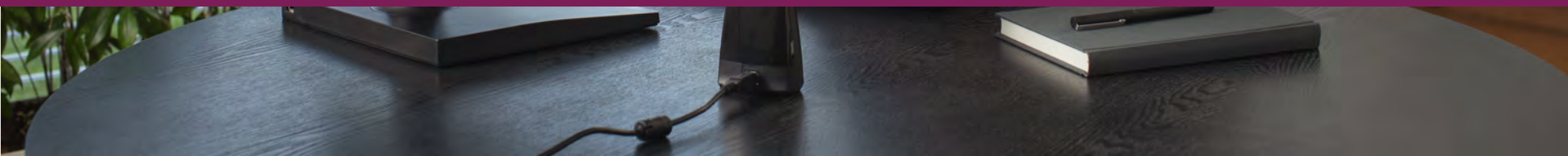
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Subjective verification and counseling





Remote fitting options for Oticon CROS/BICROS



Oticon CROS family benefits

A young man with dark hair and a beard, wearing a dark blue blazer over a maroon shirt, is smiling warmly at a woman with curly hair on the left and another man on the right. They are in a restaurant or cafe setting with blurred tables and chairs in the background.

**Exceptional sound
quality your patients
can count on**

**More choice, more
compatibility**

**Access to speech
while streaming with
TwinLink**



Oticon CROS

A revolutionary sound experience



Rob Dowling, AuD
Education & Training Specialist, Blue Ridge Region

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life-changing technology