Slide 1

Starkey Effortless Fitting Series

Moving Beyond with Advanced Features

Judy Grobstein, AuD-FAAA, MACAud — Manager of Education and Audiology
Steven Le, BSci, BAppSci, MClinAud(CCP) — Consumer Support Specialist and Trainer

Starkey

Hear better. Live better.

1

Slide 2

Starkey Effortless Fitting Series

Moving Beyond with Advanced Features

The webinar will start in..

5:00

Options for audio include computer speaker or dial-in at 02 8518 1923 / Access Code: 2633 742 4249

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For technical questions or log-in information please contact Vincent Santana at 0413 834 718 Vincent_Santana@Starkey.com.au

2

Slide 3

Starkey Effortless Fitting Series

Moving Beyond with Advanced Features

....

Judy Grobstein — Manager of Education and Audiology
Steven Le — Consumer Support Specialist and Trainer

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Slide 4

TECHNICAL DIFFICULTIES?

If not using speakers and you haven't already, please call into the call center number 02 8518 1923 and enter access code 2633 742 4249

Please be sure to keep microphones muted

If you have any technical issues, please contact Vincent Santana at vincent_santana@starkey.com.au or call him direct at 0413 834 718
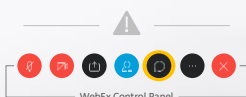
4

Slide 5

QUESTIONS?

Please share any questions you may have in the Chat Box directed to *All Panelists*. We will do our best to answer them throughout the training.

WebEx Control Panel

5

Slide 6

ENDORSED SESSION

This Session is endorsed for ACAud, AudA and HAASA points

You must stay logged on for the full session

AudA members must complete a 10 questions quiz with a passing score of 70% as well as your CPD Reflections and Evaluations

ACAud, HAASA and NZAS members must complete the quiz to receive full points.

6

Learner Outcomes

1 Participants will be able to describe how speech and music signals are individually optimized in the inspire fitting software

2 Participants will be able to identify the Starkey Sound noise management features and when to adjust them to enhance sound quality

3 Participants will be able to describe how to successfully fine-tune Starkey's frequency lowering feature

7

Starkey Effortless Fitting Series

1 From Basic to Brilliance

2 Moving Beyond with Advanced Features

8

Hearing Aid Satisfaction

HA Performance and sound	0.67
HCP Effectiveness	0.42
HA Physical Qualities	0.25
HA Maintenance	0.24
Cost (upfront and ongoing)	0.20

MarkeTrak 10 / Hearing Industries Association, 2019

9

Top Drivers of Hearing Aid Performance and Sound

Natural Sounding
Rich and Clear

Minimize background noise

Comfort for loud sounds

Ability to tell direction

MarkeTrak 10 / Hearing Industries Association, 2019

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Starkey Sound™

Always on.
Always automatic.
Always effortless.

11

Effortless Hearing for the Patient

Music

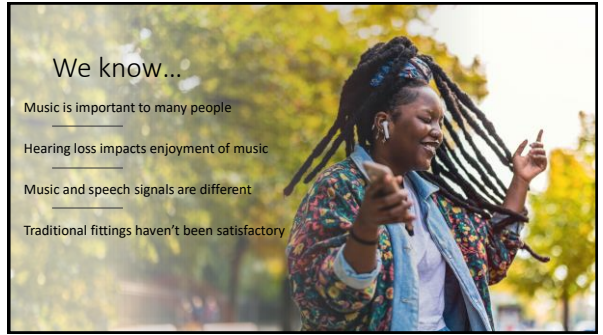**Environment Management**

Frequency Lowering

Fine Tuning Adjustments

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"Music is the universal language of mankind."

Henry Wadsworth Longfellow

13

We know...

Music is important to many people

Hearing loss impacts enjoyment of music

Music and speech signals are different

Traditional fittings haven't been satisfactory

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Music is Important

Proportion of Sample

Categories of Judged Importance of Music

0 = Not at All   5 = Very

Young - Old (69-77 years)

Old - Old (78-100 years)

Cohen, Annabel, et al. "The Importance of Music to Seniors." *Psychomusicology: A Journal of Research in Music Cognition*, vol. 18, no. 1-2, 2002, pp. 89–102., https://doi.org/10.1037/h0094049.

15

Impact of Hearing Loss

50%
Listened to music daily

30%
Reported hearing loss impacts the enjoyment of music

Too Loud / Soft

Melody Recognition

Understanding Lyrics

Volume Changes

Leek, Marjorie R., et al. "Enjoyment of Music by Elderly Hearing-Impaired Listeners." *Journal of the American Academy of Audiology*, vol. 19, no. 06, 2008, pp. 519–526., https://doi.org/10.3766/jaaa.19.6.7.

16

Impact of Hearing Loss

The more severe the hearing loss, the worse the music appreciation scores.

There are few differences between mild and moderate hearing loss in terms of music appreciation.

The more severe the hearing loss, the greater the preference for lower pitched instruments.

Looi, Valerie, et al. "Music Appreciation of Adult Hearing Aid Users and the Impact of Different Levels of Hearing Loss." *Ear & Hearing*, vol. 40, no. 3, 2019, pp. 529–544., https://doi.org/10.1097/aud.0000000000000632.

17

Dedicated Music Memory

18
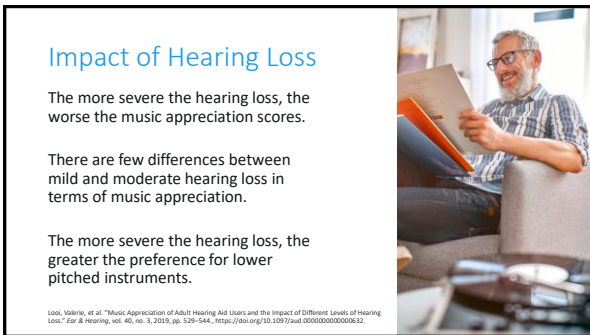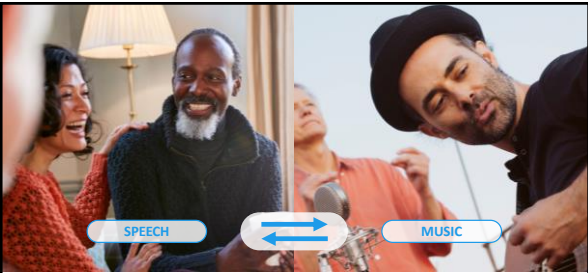
3

Dedicated Music memory

A memory environment that can be selected

A package of functionality including:
- A fitting rationale optimized for music
- Compression optimized for music
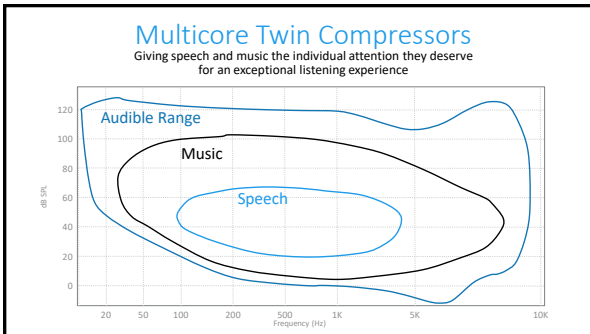- Controls in Inspire optimized for music adjustment

19

SPEECH MUSIC

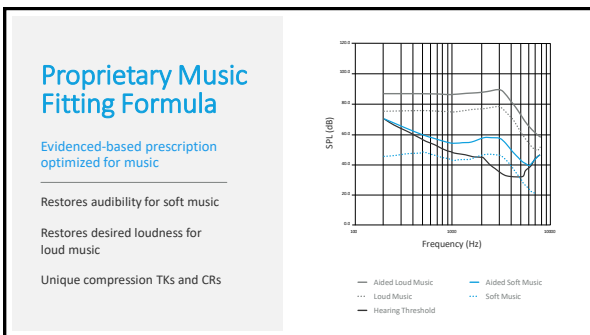## Multicore Compression Technology

20

Multicore Twin Compressors
Giving speech and music the individual attention they deserve
for an exceptional listening experience

Audible Range

Music

Speech

21

Dedicated Music Memory

Unique music-centric
fitting prescription

Shaped gain according to
hearing loss for quiet music

Flat, linear, insertion gain
for loud music

22

Proprietary Music Fitting Formula

Evidenced-based prescription
optimized for music

Restores audibility for soft music

Restores desired loudness for
loud music

Unique compression TKs and CRs

— Aided Loud Music   — Aided Soft Music
··· Loud Music   ··· Soft Music
— Hearing Threshold

23
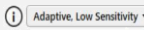
Unique Adjustments for Music

Omni Mic

No Noise
Reduction

Adaptive, Low Sensitivity ▾

Feedback
Sensitivity
Reduced

24

Music Memory

Fitting and evaluation of Music memory is subjective

- Individual variability of desired sound is likely much higher than for speech
- No objective measures exist for evaluating a hearing device fitting for music

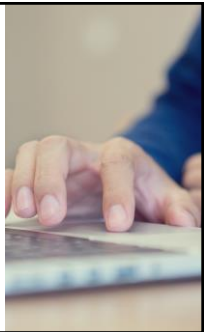Adjustments will need to be made based on patient feedback regarding music sound quality

25

Music Memory Controls

Dedicated Music memory can be programmed in multiple memory banks of the hearing device

Music-Centric controls

- To facilitate communication between patient and professional for addressing subjective music listening reports

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Dedicated Music Memory

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Dedicated Music Memory

28

Overall Fitting Considerations

Dedicated Music Memory is for acoustic music and not speech

Stream Boost and the Thrive App can be used to control streamed music

No two patients will perceive music the same way

Individualization of programing is key for musicians and music lovers

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Hear better. Live better.

29

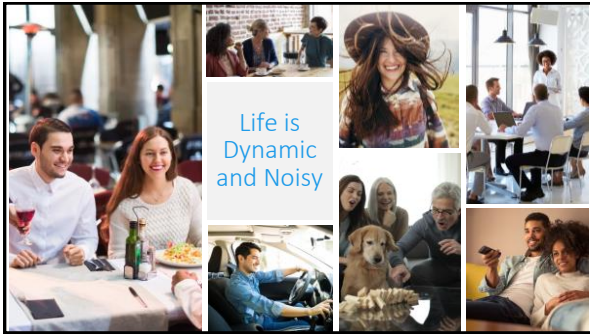## Effortless Hearing for the Patient

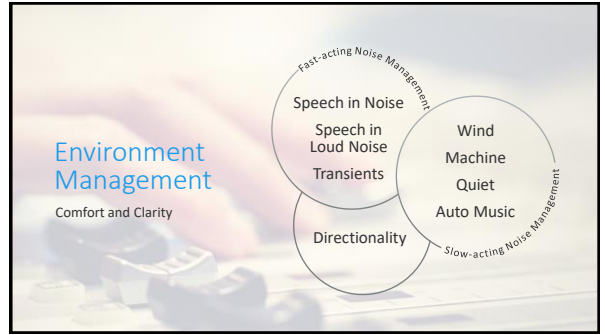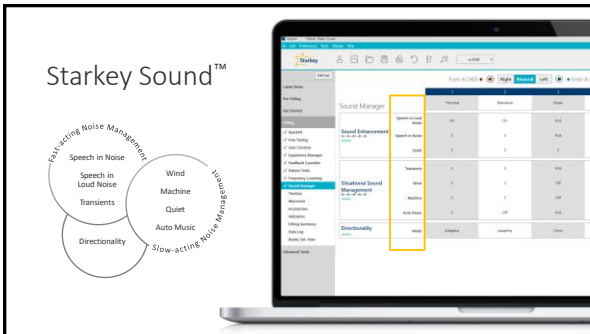| Music | Environment Management | Frequency Lowering | Fine Tuning Adjustments |

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Life is Dynamic and Noisy

31

Environment Management

Comfort and Clarity

Fast-acting Noise Management

Speech in Noise
Speech in Loud Noise
Transients

Wind
Machine
Quiet
Auto Music

Directionality

Slow-acting Noise Management

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Starkey Sound™

Fast-acting Noise Management

Speech in Noise
Speech in Loud Noise
Transients

Wind
Machine
Quiet
Auto Music

Directionality

Slow-acting Noise Management

33

Sound Enhancement

Speech in Noise

Speech in Loud Noise

Quiet

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Sound Enhancement

Speech in Noise

Reduces noise in between pauses of speech

Reduces listening effort

Speech in Loud Noise

Binaural noise management designed for dynamic background noise

Improves clarity and preserves spatial cues

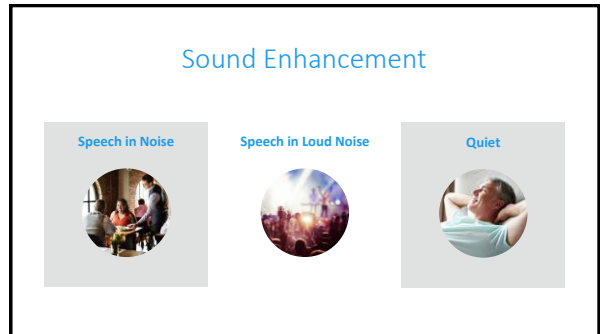**Quiet**

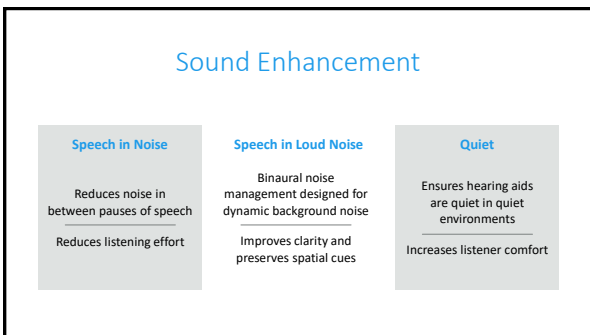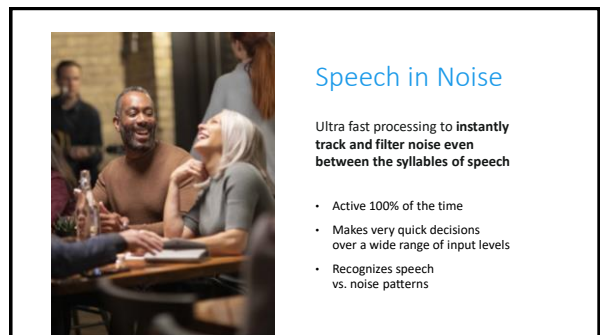Ensures hearing aids are quiet in quiet environments

Increases listener comfort

35

Speech in Noise

Ultra fast processing to **instantly track and filter noise even between the syllables of speech**

- Active 100% of the time
- Makes very quick decisions over a wide range of input levels
- Recognizes speech vs. noise patterns

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Slide 37

Speech in Noise

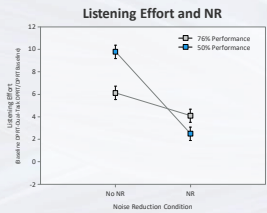| Off	1	2	3	4
Off	1	2	3	4
	Up to 8 dB	Up to 10 dB	Up to 12 dB	Up to 22 dB
	1600 default	2000 default	2400 default	2400 max

System Settings with
PREMIUM TECHNOLOGY

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Slide 38

Starkey's Speech in Noise Feature

Modifies channel gain to reduce listener effort

Significant cognitive benefits/ reduced listening effort

Less fatigue

Starkey has the most well researched digital noise reduction algorithm in any hearing aid

Listening Effort and NR

- 76% Performance
- 50% Performance

Desjardins & Doherty (2014)

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Slide 39

Speech in Loud Noise

Speech in Loud Noise Off On

Reduces steady-state and dynamic background noise

Reduces interfering sounds from the sides

Preserves interaural level differences for localization

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Slide 40

Quiet

Enhancing expansion with our patented fast-acting noise management, *Quiet* makes hearing aids quieter in low level environments

40

Slide 41

Quiet

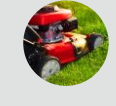| Off	1	2	3	4
Off	1	2	3	4
	Minimum Expansion	Moderate Expansion	Strong Expansion	Maximum Expansion
	1600 default	2000 default	2400 default	2400 max

System Settings with
PREMIUM TECHNOLOGY

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Slide 42

Situational Sound Management

Transient   **Wind**   **Machine Noise**   **Auto Music**

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Slide 43

Situational Sound Management

Transient

Quickly attenuates brief loud sounds

Increases listener comfort

Wind

Reduces sound of turbulence over microphone

Increases listener comfort

Machine Noise

Reduces level of steady state noise

Increases listening comfort

Auto Music

Optimizes environmental music without compromising speech

Enhances perception of music

43

Slide 44

Transient Sounds

- Sensorineural hearing loss can result in a reduced dynamic range and create an abnormal growth of loudness for sound
- Recruitment makes individuals sensitive to loud sounds
- Brief impulse sounds can be uncomfortable or even jarring
  - Glass breaking
  - Dishes clanging
  - Hammer pounding
  - Door slamming

44

Slide 45

Transients

Off	1	2	3	4
	Up to 6 dB	Up to 9 dB	Up to 12 dB	Up to 15 dB
	1600 default	2000 default	2400 default	2400 max

System Settings with **PREMIUM TECHNOLOGY**

45

Slide 46

Wind

Designed to keep patients comfortable in windy environments

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Slide 47

Wind

Off	1	2	3	4
	Up to 7 dB	Up to 15 dB	Up to 22 dB	Up to 30 dB
	1600 default	2000 default	2400 default	2400 max

System Settings with **PREMIUM TECHNOLOGY**

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Slide 48

Machine Noise

Designed to deliver comfort for loud steady state noise

48

Machine Noise

Off	1	2	3	4
Off	Up to 5 dB	Up to 10 dB	Up to 15 dB	Up to 20 dB
	1600 default	2000 default	2400 default	2400 max

System Settings with
PREMIUM TECHNOLOGY

49

Auto Music

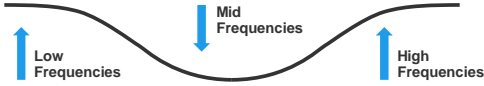Designed to optimize the sound quality of background music while prioritizing speech and maintaining comfort

50

Gain Changes

51

Gain Changes
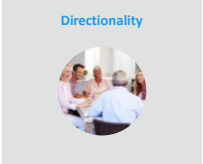

Low Frequencies

Mid Frequencies

High Frequencies

52

♫

Auto Music

Off	1	2	3	4
Off	1 Minimum	2 Moderate	3 Strong	4 Maximum

Feature change +8dB gain offsets

53

Sound Manager

Directionality

54

Sound Manager

Directionality

Improves speech
understanding in noise

Optimizes speech in noise

55

The Proof Is Conclusive: **Directionality Works**
Speech in noise intelligibility benefit 5-11 dB

56

Microphone Modes

Automatic

Adaptive   Dynamic

Fixed

Directional   Omni

57

Directionality- Speech ID

58

Examples of
SPEECH ID
Everyday

HOME   FAMILY

WORK   SOCIAL   RECREATION

59

The Industry's First and Only

Edge Mode

On-Demand Adaptive Tuning

Giving patients more control in
challenging listening environments

60

10

Edge Mode
Puts the power of AI at the patient's fingertips to optimize hearing

Audibility **Clarity** **Comfort**

Provides instant adjustments to the hearing aid response, enhanced noise management, and directionality whenever the patient needs more help

61

Tap Control/User Control
2400

Edge Mode Button
2400 | 2000 | 1600
Will appear on the Home screen by default

62

Effortless Hearing for the Patient

Music

Environment Management

Frequency Lowering

Fine Tuning Adjustments

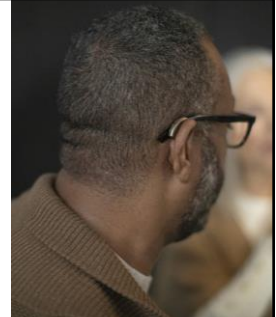Starkey
Hear better. Live better.

63

Who benefits from frequency lowering?

High frequency hearing loss

Little-to-no improvement in word recognition *with traditional approaches to high frequency amplification*
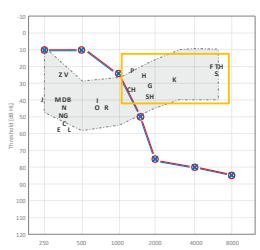
Increased distortion with appropriate high frequency gain

Reduced high frequency audibility regarding fitting variables

64

Precipitous High Frequency Hearing Loss

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"s" & "z"
Over 20 linguistic uses for /s/ and /z/

"th" & "ch"
Fricatives and affricates **account for about 50% of English consonants**

3k Hz +
Frequencies above 3,000 Hz contribute **approximately 25 percent of the audible speech cues** required for recognition of spoken language

High frequency
Cues in the 3500-9000 Hz region are **either important or do not create a disadvantage** for many hearing aid fittings.

66

Why it's Important

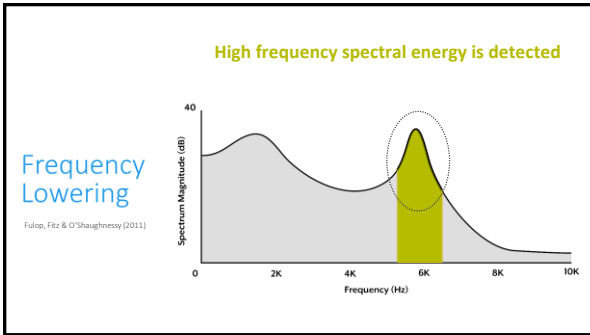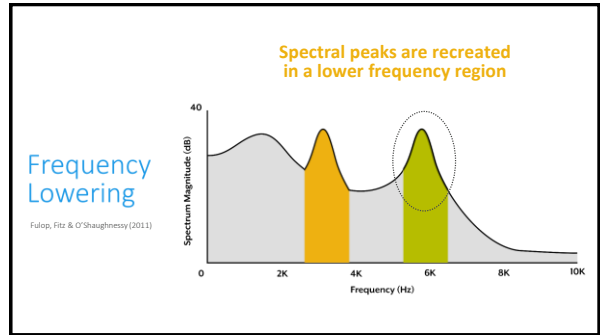|	
Recognition of Sentences in Quiet and Noise	Spatial Unmasking
Localization	Recognition of Fricatives
Speech Clarity	Music Quality
Novel Word Learning	Ease of Listening

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Starkey

Frequency Lowering

Intelligently identifies high-frequency speech cues

Replicates them lower in frequency in real time to restore audibility

Maintains a broad bandwidth

Preserves the harmonic nature of speech

68
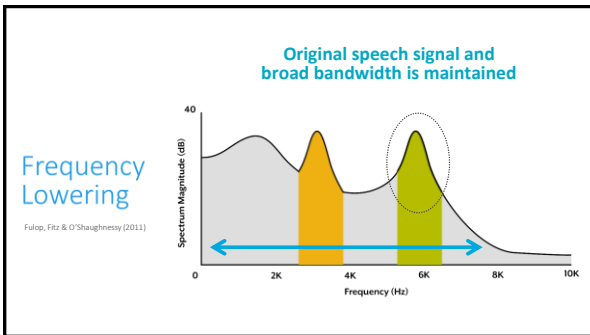

High frequency spectral energy is detected

Frequency Lowering

Fulop, Fitz & O'Shaughnessy (2011)

69

Spectral peaks are recreated in a lower frequency region

Frequency Lowering

Fulop, Fitz & O'Shaughnessy (2011)

70

Original speech signal and broad bandwidth is maintained

Frequency Lowering

Fulop, Fitz & O'Shaughnessy (2011)

71

Harmonic structure is preserved

Frequency Lowering

Fulop, Fitz & O'Shaughnessy (2011)

72

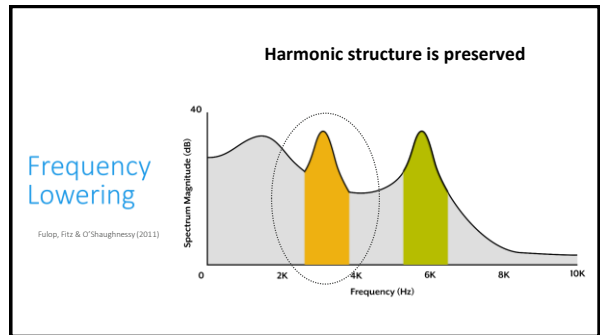
12

Professional Fitting Tools

Smart Candidacy Criteria

Default Logic

Professional Controls

Best Fit Settings

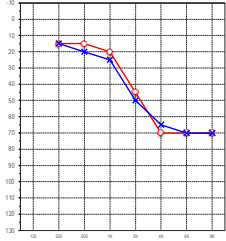Starkey

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Smart Candidacy Criteria

All thresholds below 1000 Hz are 55 dB or better

Slope is > 25 dB per octave between 250 Hz – 4000 Hz

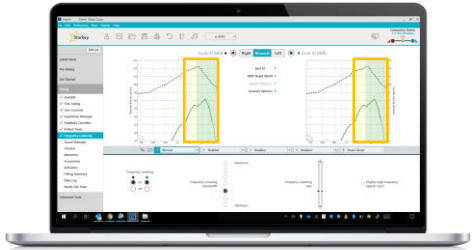Any threshold between 1000 Hz – 3000 Hz is 55 dB or worse

All thresholds between 4000 Hz – 8000 Hz are 55 dB or worse

74

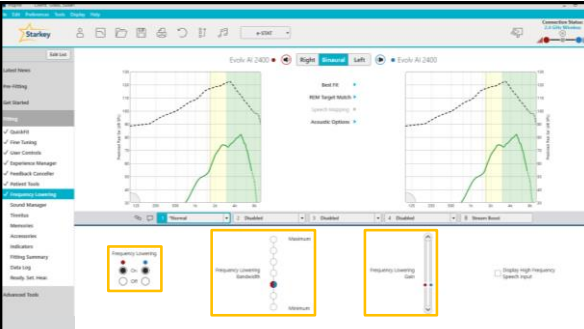

Frequency Lowering

75

Source and Target Regions

YELLOW region indicates Target Region

GREEN region indicates Source Region

Graph Legend

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Professional Controls

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13
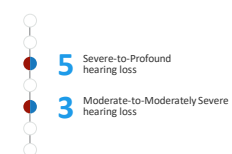
Best Fit Settings

Frequency Lowering Bandwidth

5 Severe-to-Profound hearing loss

3 Moderate-to-Moderately Severe hearing loss

Frequency Lowering Gain

3 All hearing losses

79

Frequency Lowering Bandwidth

Adjusts the **Source** and **Target** regions

7 discrete settings

SETTING 1   SETTING 3   SETTING 5   SETTING 7

80

Frequency Lowering Gain

Frequency Lowering Gain

Controls amount of recreated signal

Extends from 0 dB – 10 dB

Can be changed in 1 dB increments

81

Sound Quality

Some patients will report altered sound quality with the feature engaged

The goal at the **time of fitting** is to focus on the **value** of the feature and **tolerance** for it

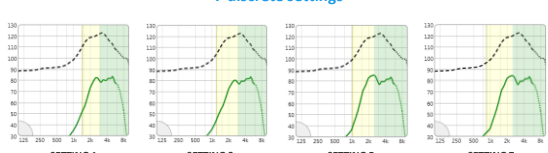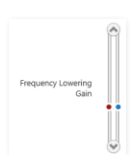Use a **behavioral validation** tool to validate improved word recognition score

Fine tuning for sound quality should occur at the **follow-up visit**

82

Just because you *can* doesn't mean you *should*...

83

"A listener's **reaction** to a new processor at the time of fitting may **change** after they wear it for a few weeks. If I fine tune only in response to their **initial reaction**, I might tune away any possibility that they would get **benefit** over time. Obviously, the initial fitting needs to be **physically and acoustically comfortable**, but can also offer some **new audibility** that the wearer agrees to take home."

Susan Scollie, Ph.D.

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Slide 85

Frequency Lowering Validation

85

Slide 86

Validation Strategy

Turn Frequency Lowering OFF

Mask lip reading cues

Present a sample word list

Have patient repeat words

Score % correct

LIST 1	SCORE
Key	
Days	
Plays	
Toy	
Cities	
Bricks	
Pig	
Cloud	
Ways	
Ear	
TOTAL	

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Slide 87

Validation Strategy
Continued

If the patient scores < 80%, turn Frequency Lowering ON

Repeat the steps above

— **GOAL** —
To see an improvement in word recognition score with the feature **ON** vs **OFF**

LIST 1	SCORE
Key	
Days	
Plays	
Toy	
Cities	
Bricks	
Pig	
Cloud	
Ways	
Ear	
TOTAL	

87

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Real World Examples

PATIENT 1
S Test Frequency Lowering OFF — 80%
S Test Frequency Lowering ON — 94%

PATIENT 2
S Test Frequency Lowering OFF — 50%
S Test Frequency Lowering ON — 70%

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Slide 89

Real World Examples

PATIENT 3
S Test Frequency Lowering OFF — 30%
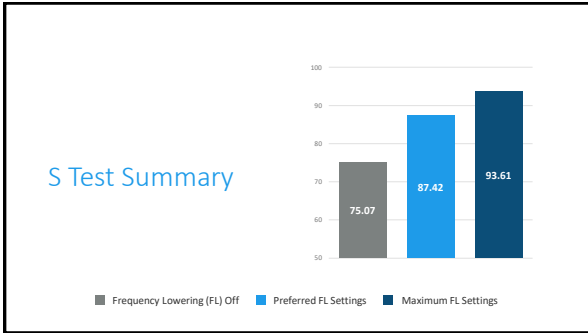S Test Frequency Lowering ON — 100%

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Slide 90

Frequency Lowering Studies

20 subjects

3 conditions
Off | On | Maximum

Symmetrical, mild steeply sloping to severe or profound, sensorineural hearing loss

90

Slide 91

S Test Summary

Bar chart:
- Frequency Lowering (FL) Off: 75.07
- Preferred FL Settings: 87.42
- Maximum FL Settings: 93.61

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Slide 92

Win | Helps establish best bandwidth and gain settings

Win | Validation of benefit

Win | Patient counseling

92

Slide 93

Frequency Lowering Adjustment Guide

	PATIENT REPORT	ADJUSTMENT	CONSIDERATIONS
OWN VOICE	Own voice sounds like static or echo	Decrease Gain / Decrease Bandwidth	Adjust Gain first. If reports persist, adjust Bandwidth
INTELLIGIBILITY	/s/ sounds too lispy	Decrease Gain	Keep in mind that a slight 'lisp' on /s/ sounds is normal
INTELLIGIBILITY	/s/ sounds too unnatural	Decrease Bandwidth	
INTELLIGIBILITY	Difficulty detecting /s/ sounds or identifying plural sounds	Increase Gain / Increase Bandwidth	Adjust Gain first. If report persists, adjust Bandwidth.
INTELLIGIBILITY	Others voices echo	Decrease Bandwidth / Decrease Gain	Adjust Bandwidth first. If report persists, adjust Gain.
SOUND QUALITY	Echo or lisp artifacts	Decrease Bandwidth	Alternatively decrease Bandwidth and Gain until report is resolved.
SOUND QUALITY	Processing too noticable	Decrease Gain	

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Slide 94

Resources

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Slide 95

Effortless Hearing for the Patient

- Music
- Environment Management
- Frequency Lowering
- Fine Tuning Adjustments

Starkey
Hear better. Live better.

95

Slide 96

Comment vs. Complaint
Let's make these more positive…

"Tell me the good, bad, and the ugly."

"What do you like or dislike?"

"What surprised you most?"

96

Patient Concern

Mrs. Jordan has a severe hearing loss and has been fit with Evolv AI hearing aids and AP earmolds. She is hearing well but reports that sometimes things are "oddly unnaturally quiet" especially when she's at home.
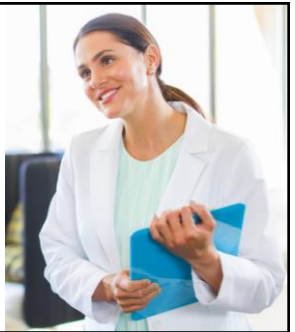
What can you do in the Inspire® X software to help her?

97

Poll

Which feature would you adjust?

A. Speech in Noise

B. Quiet

C. Wind

D. Machine

98

Solution

Adjust the Quiet Setting

Go to the Sound Manager screen.

Decrease the level of the Quiet (Expansion + Low Level Noise Reduction) setting in one or more environments to reduce the amount of noise adaptation occurring for soft sounds that fall below the WDRC kneepoint.

99

Patient Concern

Ms. Social has a lot of friends and a large family, so she is always on the go doing something.

She enjoys dining out quite often, but reports hearing conversation at the tables behind her as much as the people at her own table. She's wondering if we can fix that for her.

100

Poll

What adjustment would you make to help your patient with her report of hearing people at another table better than those she's sitting with?

A. Increase her MPO

B. Change Directionality in her Restaurant Memory to Omni

C. Change Directionality in her Restaurant Memory to Directional

D. Ask her to have her friends at the table speak louder

101

Solution

Change mic setting to Directional

Adjust gain/ compression

102

17

9/4/2023

Patient Concern

Dr. Landon is taking dance classes with her husband and wants to know if there is a way to manage music so that it doesn't overpower the conversation with her husband or the instructor.

What can you do in the Inspire® X software to address this issue?

Starkey
Hear better. Live better.

103

Solution

Adjust the Auto Music Feature

• Access Auto Music from the Sound Manager page

• Click on the Details under Situational Sound Management

• Decrease the Auto Music setting so the music is not as robust.

Auto Music

When music is detected in the environment, the hearing aids will automatically adjust their settings to provide an optimal music listening experience. When speech is detected, the hearing aid settings will change back to those optimized for speech listening.

The Music Strength control adjusts the amount of gain adaptation toward music listening settings that occurs when music is detected.
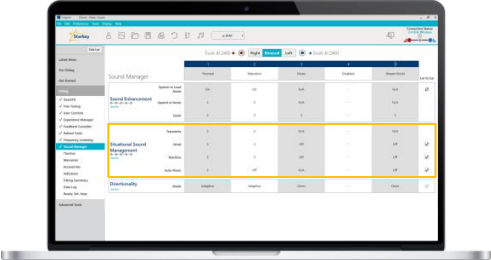
104

Patient Concern

Ms Smith reports the sound in her hearing aids will sometimes fade in and out….this is very bothersome to her."

How can we address this issue in Inspire?

105

Default Sound Manager Settings

106

Patient Concern

Ms. Jones is wearing Evolv AI 2400 RIC R hearing aids, has a precipitous high frequency hearing loss and reports that when she is talking to her friends, the /s/ sounds are a bit lispy.

What can be done to help her with this?

107

"/s/ sounds are too lispy"

Which frequency lowering adjustment would you make?

A. Increase FL Gain

B. Decrease FL Gain

C. Increase FL Bandwidth

D. Turn off frequency lowering

108

18

"/s/ sounds are too lispy"

109

"Speech sounds unnatural"

110

Have patience and be creative

There is no one right answer

Be flexible and willing to try a variety of solutions

111

Expert Assistant

112

Questions

Judy Grobstein, AuD-FAAA, MACAud
Judy_Grobstein@Starkey.com

113

We're Here to Support You

Professional
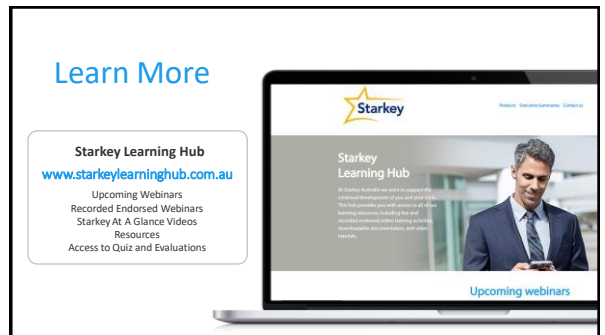Audiology Support

1800 024 985

Contact your
Product Specialist

Vincent Santana
NSW/SA

Connie Lu
VIC/TAS

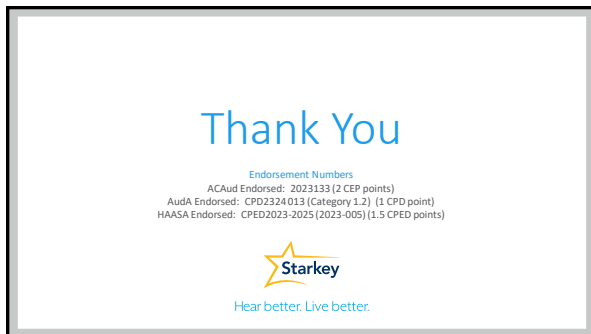Phil Nelson
QLD/NT

Georgina Allam
WA/ACT

114

115

116

117