CV 100|80|60|40|20 Introduction

Learner Outcomes

- Describe how SmartCompress technology can control compression in speech-in-noise environments and control gain in non-speech environments.

- Explain how to manage acoustic feedback with the Adaptive Feedback Canceller Pro in Captivate hearing aids.

- List and describe all the available features and technology in Sonic's Captivate hearing aids.

www.sonici.com

captivate.

What Life Sounds Like

www.sonici.com

SONIC
Everyday Sounds Better

Continuing 4S Foundation

Sonic is dedicated to improving life through enhanced hearing by constantly focusing on our 4S Foundation

Sound that's natural

Speech understanding in noise

Simplicity in all we do

Style that stands out

With Captivate, that adds up to a better hearing experience

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SONIC
Everyday Sounds Better

Revolutionary SoundDNA Platform

From clarifying conversations to streaming online entertainment, Captivate immerses patients in the sounds of life.

SoundDNA Platform

www.sonici.com

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Everyday Sounds Better

Updates to Success

A Quick Look Back to 2019

- More Processing Power
- New Algorithm → AFC Pro
- New Setting → SPiN Engage
- New Feature → Li-ion
- New Benefits → SmartCompress
- Robust Offering → 4 models,
                    3 levels

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Updates to Success

2020 Captivate Updates

- New! 2 additional Tech Levels 40|20
- Includes all 4 models in each Tech Level
- Addresses needs AND budgets
- Plus! Refreshed App Design

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))) **SONIC**
Everyday Sounds Better

Sound
That's Natural

www.sonici.com

))) **SONIC**
Everyday Sounds Better

Presented in partnership with
continu**eD**

Listen with Ease

With Captivate, Sonic delivers a natural sound with several technologies in play

SmartCompress

Adaptive Feedback Canceller Pro

Frequency Transfer

Extended Dynamic Range

SmartMusic

www.sonici.com

SmartCompress

Captivate 100|80|60

www.sonici.com

SmartCompress

**Configurable adaptive compression system for intelligent amplification in noise**

Natural and detailed amplification for your patients

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Sonic's Most Recent Solution

We have used Speech Variable Processing (SVP) to apply amplification in Speech in Quiet

- SVP measures and applies gain to the wideband acoustic signal
- Does not break up incoming signal into separate frequency regions
- Uses Phoneme Focus and Envelope Focus to address auditory resolution needs
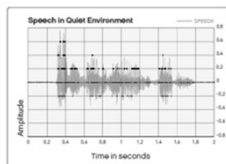
- We have used Environment Classification to assist SVP in identifying all other changing environments

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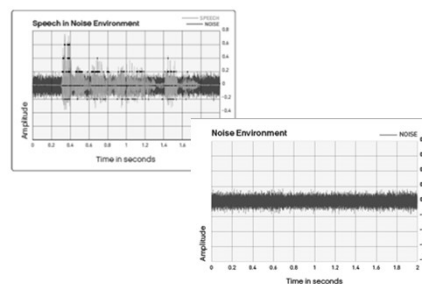
SVP with SmartCompress - Overview

In other words…
- SVP is optimized for Speech in Quiet

- **SVP with SmartCompress optimizes all other listening environments**

SmartCompress allows the system to intelligently overcome the challenges associated with rapidly changing listening environments for a natural, instinctive hearing experience

No longer a need for Environment Classification with SmartCompress!

www.sonici.com

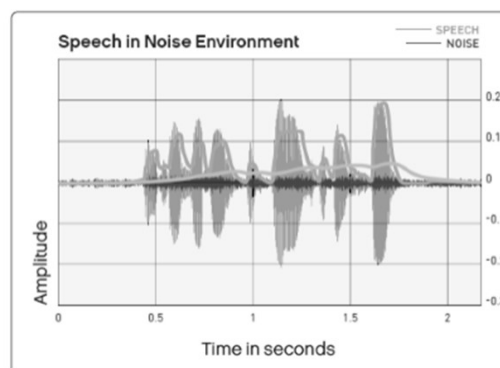**SONIC**
Everyday Sounds Better

SmartCompress - How does it do it?

SmartCompress uses two SNR level estimators, compared to one in traditional systems
- Green – fast phonemic estimator
- Blue – slow, long-term estimator

**Provides accurate measurement of environmental changes in real time**

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SmartCompress

Controls compression in speech-in-noise environments

- Adaptively varies the compression in speech-in-noise environments
- Determines how much the compression has to be decreased, or made more linear, for less noise in the output

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Controls gain in non-speech environments

- Adaptively limits gain when speech is not present
- Determines the occurrence of quiet and noise-only situations and applies less gain to the input

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High SNR

High

Speech in quiet

SmartCompress does <u>not</u> activate!

SVP applies the prescribed gain and compression as designated by the selected fitting rationale along with any fine tuning actions made by the hearing care professional

Low

Speech in Quiet Environment — SPEECH

Amplitude / Time in seconds

Very low SNR

High

Low

Quiet and Noise-only environments

(Without speech)

SmartCompress via the Gain Control applies less gain to the incoming signal

**Offers greater listening comfort in non-speech listening environments**

Low SNR

High

Low
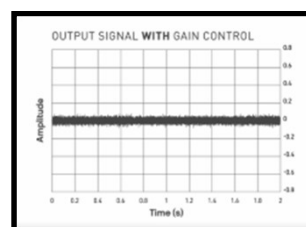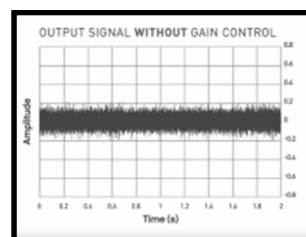
Speech-in-noise environments

SmartCompress via the Compression Control reduces compression

Minimizes the amplification of noise following short pauses in speech or even between phonemes

Improves the output SNR

Supports speech and listening comfort in complex environments
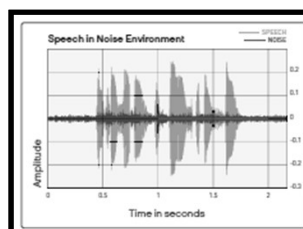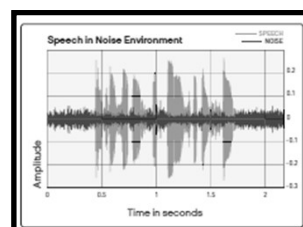
Summary: SmartCompress

✓ **Automatic**
- Robust analysis of environmental changes
- Reacts instantaneously, not based on rigid environment classification in rapidly fluctuating environments

Adaptive
- Tracks ongoing changes in signal-to-noise ratio (SNR)
- Uses SNR information to guide adaptive compression system
- Controls amplification based on the signal type
- Intelligently adjusts the gain

Flexible
- Easily personalized for individual needs in fitting software

Check out Sonic's Spotlight Paper on SmartCompress

✓

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Adaptive Feedback Canceller Pro

Captivate 100|80|60|40|20

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continu**eD**

A More Open Fit With Less Risk of Feedback

New! Algorithm exclusive to 2019 Products on the SoundDNA Platform

1 Feedback Management system with 2 technologies

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AFC Pro Advantage

- **Fewer distractions and interruptions from the annoyance of feedback in both stable and changing conditions**
- **Improved audibility of soft speech sounds, for a better target match**
- **More open fittings for a natural, own-voice sound**

Feedback Comparison Graphs
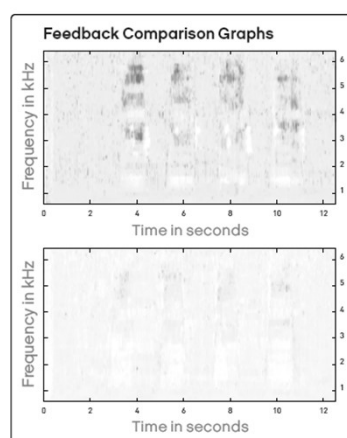
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3 Simple Goals for Feedback Management

1 - Decrease occurrence/annoyance of audible feedback

2 - Maintain speech intelligibility

3 - Successful Open-fittings | Sound quality

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New technology: STM Processing

AFC Pro is an adaptive phase cancellation system combined with a 2nd anti-feedback system

2nd system is new technology

Spectro-Temporal Modulation

- STM Processing

Designed to attenuate feedback from fast-changing conditions
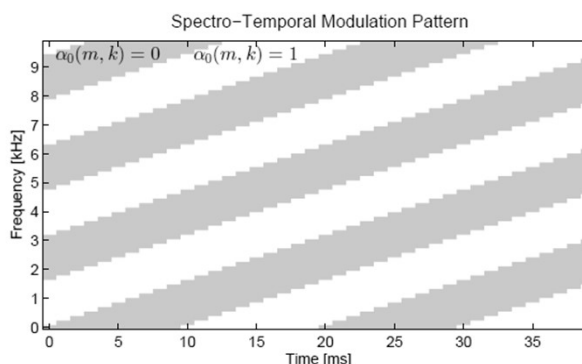
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STM Processing

What is Spectro-Temporal Modulation?

- An added signal that attenuates the feedback path

- Applying STM prevents feedback from occurring

- Replaces traditional loud/annoying feedback whistling sounds with soft/non-intrusive STM processed sounds

Spectro–Temporal Modulation Pattern

$\alpha_0(m, k) = 0$ $\alpha_0(m, k) = 1$

M. Guo and B. Kuenzle, 2017

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STM Processing - Conclusions

Conclusion 1: STM – applied only when the adaptive filter is insufficient to cancel feedback

Conclusion 2: STM – improves feedback cancellation

- In very challenging dynamic situations

- During rapid feedback path changes

- Without changing the feedback performance in other situations
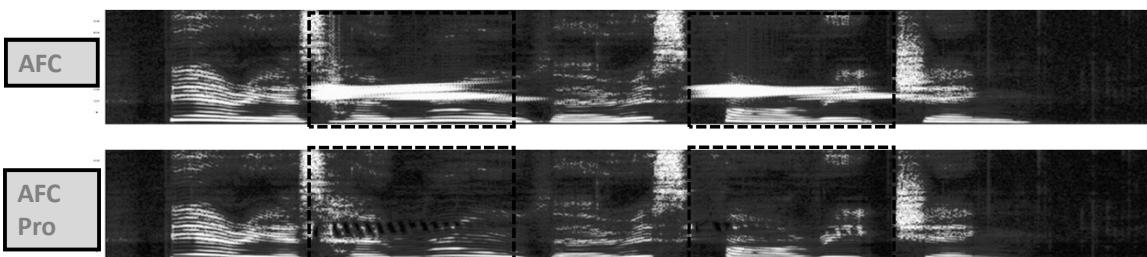
Conclusion 3: Simulations show STM is able to keep the hearing aid system stable to avoid feedback whistling sounds

M. Guo and B. Kuenzle, 2017

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Spectrogram examples

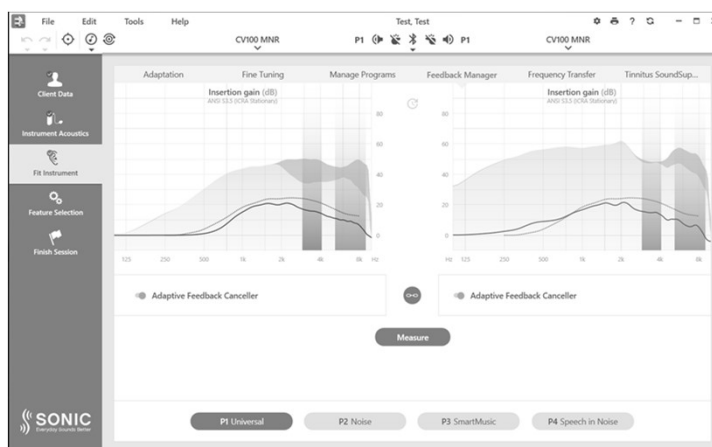# AFC Pro in EXPRESS*fit*® Pro

AFC Pro is located in the Feedback Manager screen

Easy to measure

Easy to apply

www.sonici.com

AFC Pro in EXPRESS*fit*® Pro

AFC Pro is not active when there is no feedback risk

- **Decreases sound artifacts that may occur**
- **Maximizes sound quality**
- **Uses a feedback monitor to identify sounds previously amplified**
  - Tonal sounds, music

---

3 Simple Goals for Feedback Management

✓ **1 - Decrease occurrence/annoyance of audible feedback**

✓ **2 - Maintain speech intelligibility**

✓ **3 - Successful Open-fittings | Sound quality**

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AFC Pro <small>video</small>

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Frequency Transfer

Captivate 100|80|60|40

www.sonici.com

Frequency Transfer

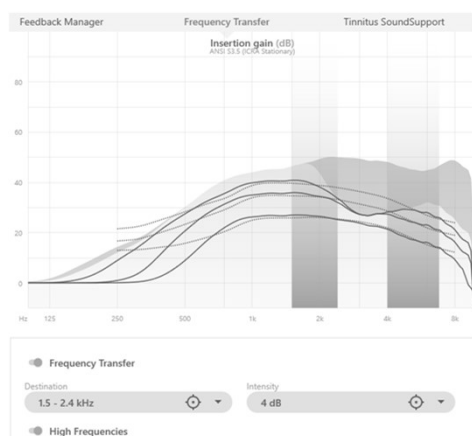**Helps identify consonants for patients with severe high-frequency hearing losses**

Access via Frequency Transfer control in EXPRESS*fit*® Pro

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Frequency Transfer

10 Destination Regions
- Adjusts HF source and LF destination regions

7 Intensity Settings
- Adjusts the strength of the HF sounds (source) when mixed with the LF sounds (destination)

High Frequency Attenuation
- Turns gain in the HF bands above the destination on or off

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Extended Dynamic Range

Captivate 100

www.sonici.com

Keep Loud Speech Clear

Premium feature to keep loud sounds clear in challenging listening environment

Specifically designed for signals with high intensity

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Extended Dynamic Range - Summary

Adaptively extends dynamic input range

Expands to growing sound levels only as needed

- Upper limit depends on input level of speech signal (from 95-113 dB SPL)

Allows loud peaks to be amplified with less risk of distortion

For everyday sounds

Available in Captivate[100] only

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SmartMusic

Captivate 100|80|60

www.sonici.com

Live Music at its Best

Greater enjoyment of live music

Enthusiasts and musicians alike can enjoy clear sounding music again

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---

4 Components to SmartMusic

Fixed Extended Dynamic Range
- Increases limit at the input to a fixed 113 dB SPL

Speech Variable Processing
- Maintains balance between harmonics

Wideband Frequency Response
- Important for perceived naturalness of music

Controls
- Fixed Hypercardioid polar setting
- Position of null does not change
- Eliminates noises from behind
- Concentrate on what's on stage

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Speech Understanding in Noise

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Everyday Sounds Better

Hear Conversations More Clearly in Noise

With Captivate, Sonic delivers what life sounds like in noise

SPiN Management

Binaural Noise Management

Impulse Noise Reduction

Soft Noise Reduction

Wind Noise Reduction

Tinnitus SoundSupport

SPiN Management

3 Technologies: CV 100|80|60
2 Technologies: CV 40|20

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Importance of the SNR

What's the best thing we can do for our patients?

Improve the SNR!

- Hearing impaired persons need a significantly greater signal-to-noise ratio (SNR) advantage over persons with normal hearing in order to understand an equal amount of speech

How? Noise Reduction Technologies

- Directional Microphones
- Digital Noise Reduction (DNR)

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SPiN Management - Overview

Speech in Noise (SPiN) Management includes up to three technologies
- SPiN Directionality
- SPiN Noise Reduction
- SPiN Engage*

*Captivate 100|80|60 Only

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Offers a completely new automatic, adaptive and multiband design

Designed to enhance speech, reduce noise and optimize the control of it all

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SPiN Management

- **SPiN Directionality**
  - Uses null steering to select the microphones' polar patterns that will produce the optimal SNR in 16 independent frequency bands

- **SPiN Noise Reduction**
  - Designed to reduce the gain of noise compared to speech operating in 16 independent frequency bands

- **SPiN Engage**
  - Informs Directionality and NR systems how soon to activate
 - Premium setting → Not available in **CV 40|20**

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SPiN Engage

3rd component of SPiN Management

Determines at which signal-to-noise ratio SPiN Directionality and SPiN Noise Reduction will adjust to the environment

Works within the same multiband design

Coordinates the onset of directionality and noise reduction as the SNR fluctuates in 16 independent frequency bands

High

More Noise

Less Noise

Low
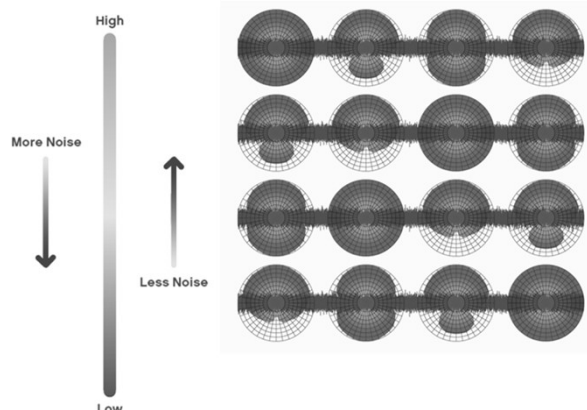
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SPiN Management Advantage

Better speech understanding in noisy listening environments

Settings that start at higher SNR levels to reduce background noise

Personalized to meet patients' preferences

Check Out Sonic's Spotlight Paper on SPiN Management

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Binaural Noise Management

Captivate 100|80

www.sonici.com

Relief From Distractions

Support your patients who encounter situations with distracting, uneven noise from side to side

Available in Captivate[100|80]

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Binaural Noise Management

Imagine this listening scenario

- **Summer day, driving in your car with the window down**
    - Having a conversation with a friend, with the radio on, plus wind
- **In environments with uneven noise, we naturally focus attention on the better side and actively mentally suppress the noise on the opposite side**
- **We do this to take advantage of the better audibility in one ear**

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Binaural Noise Management

Activates when noise levels become significantly different between ears

Shifts the hearing aid response into a mode that fully activates the NR system on the side with excessive noise

Reduces gain and fully activates the NR system on the opposite side

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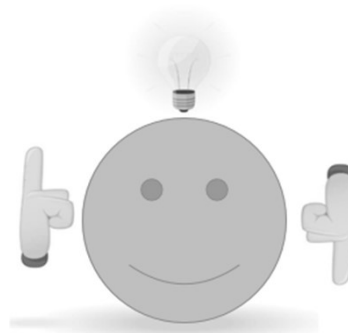
((((SONIC
Everyday Sounds Better

Further Relief from Distractions

Captivate 100|80|60|40|20

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Nobody Wants Noise

Impulse Noise Reduction*

- Lessens the discomfort of sudden, loud sounds

Soft Noise Reduction

- Reduces those low-level noises without affecting speech

Wind Noise Reduction

- Adjusts to outside activities by monitoring the environment and preventing the rush of wind from being amplified

*Not available in CV 20

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continu**ED**

Tinnitus SoundSupport

Captivate 100|80|60|40|20

www.sonici.com

Customizable Relief Sounds

Aims to reduce your patient's perception of tinnitus by providing amplification and generating sound relief

Available in all Captivate levels

www.sonici.com

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Tinnitus SoundSupport

Offers the following tinnitus relief sound options:

- 4 broadband sounds

White Noise	Pink Noise	Red Noise	Shaped to audiogram

- 3 nature-like sounds

Ocean 1	Ocean 2	Ocean 3

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Control Tinnitus Sounds - App

Sonic SoundLink 2 App

Adjust Tinnitus volume or mute

Modify Tinnitus sound by changing its modulation rate or frequency response

Simplicity
In All We Do

SONIC
Everyday Sounds Better

Simplify, with Captivate

Captivate delivers solutions that make sense

Lithium-ion Rechargeability

Dual-Radio System

If This Then That

Low Frequency Enhancement

Binaural Coordination & Synchronization

EXPRESS*fit*® Pro

Presented in partnership with

continu**eD**

Recharge Your Day, Just Like That

Lithium-ion rechargeable battery solution

Available in CV 40|20!

Robust battery life capacity for a full day's use following a short charging time

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Everyday Sounds Better
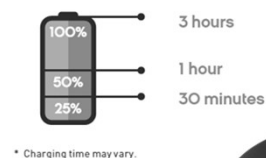
The Captivate Li-ion System

Dedicated model
- miniRITE T R

Available in ALL Captivate levels
- CV 100|80|60|40|20

Charger is black

Charging is fast, reaching full capacity in 3 hours.*

100% — 3 hours
50% — 1 hour
25% — 30 minutes

* Charging time may vary.

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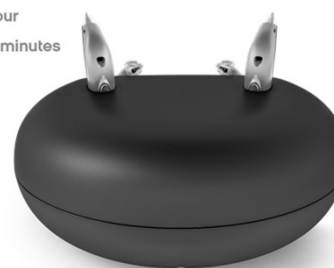
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Lithium-ion

Captivate miniRITE T R

Does not compromise rechargeability for size

Small, stylish, modern receiver-in-the-ear hearing instrument

- Suitable for mild to profound hearing losses
- Includes telecoil
- Includes double push button

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Made for
iPhone | iPad | iPod

SONIC
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Charger Overview

- **Inductive technology that allows contactless charging of the hearing instrument via induction coil**

- **The magnetic connection in the charger prevents the hearing instruments from falling out**

- **When the hearing instruments are inserted into the charger, it automatically starts charging**

- **The hearing instruments turn ON when they are removed from the charger**

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Dual-Radio System

Captivate 100|80|60|40|20

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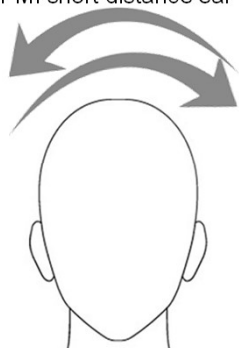

Wonderfully Wireless

Wireless connectivity is a way of life for today's hearing aid users

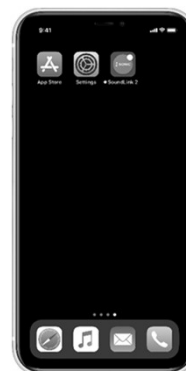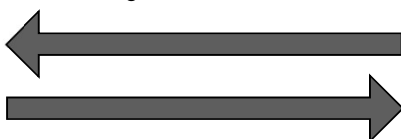www.sonici.com

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Dual-Radio Wireless Technology

Two wireless systems integrated into one hearing aid

a) NFMI short distance ear-to-ear

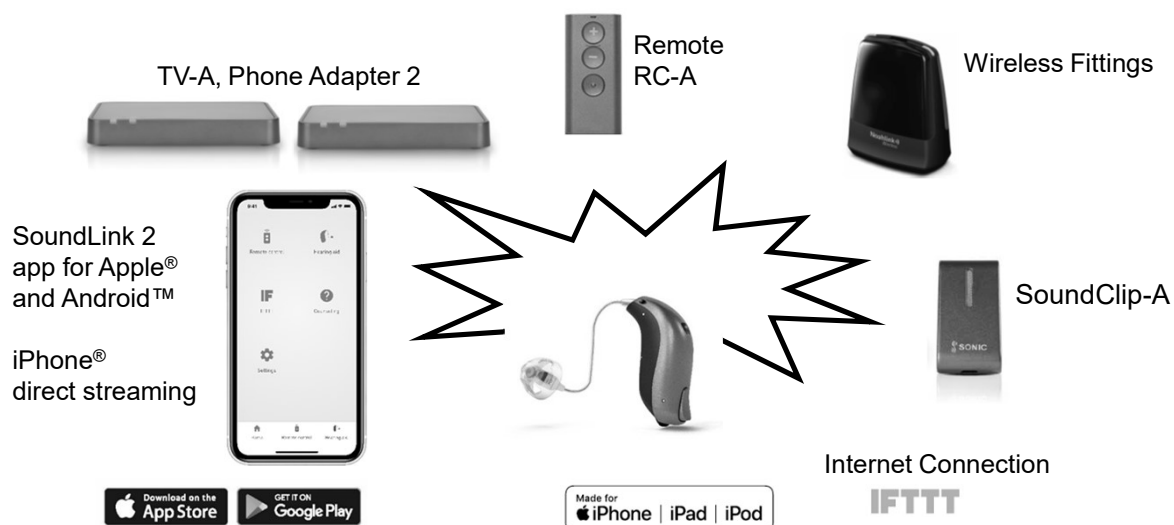b) 2.4 GHz long distance direct-to-hearing aid

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SoundLink 2 App

- **Controls wireless operations like volume and program change and more**

- **Compatible with an iPhone® or Android™ smartphone[1]**

- **Many conveniences such as "Find My Hearing Aid," advanced Tinnitus SoundSupport controls, battery life percentage indicators, etc.**

Download on the App Store

GET IT ON Google Play

[1] Captivate is a Made for iPhone® hearing aid that allows you to talk on the phone, stream stereo music, and stream video sound directly to your hearing aid. In addition, download the free SoundLink 2 app to control your hearing aid over your iPhone, iPad®, iPod touch®, and Android™ smartphones and tablets. For information on compatibility, please visit www.sonici.global/compatibility.

SoundDNA Connectivity Portfolio

TV-A, Phone Adapter 2

Remote
RC-A

Wireless Fittings

SoundLink 2
app for Apple®
and Android™

iPhone®
direct streaming

SoundClip-A

Internet Connection
IFTTT

Made for
iPhone | iPad | iPod

Download on the App Store
GET IT ON Google Play

Updates to SoundLink 2

Refreshed Design
- New and improved user interface, coloring and controls
- Demo mode
- Support for CV 40|20

Battery level indicator in %
- Battery level shown with 1% resolution for Li-ion battery only (10% otherwise)

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P1   P2   T3
Universal 1

Demo Hearing Aids
Battery status
100%   100%
Left   Right

Left
Demo, miniRITE

Right
Demo, miniRITE

Find my hearing aids

Troubleshooting

DEMO

Home   Remote control   Hearing aid

If This Then That

Captivate 100|80|60|40|20

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Make the Most of Smart Technology
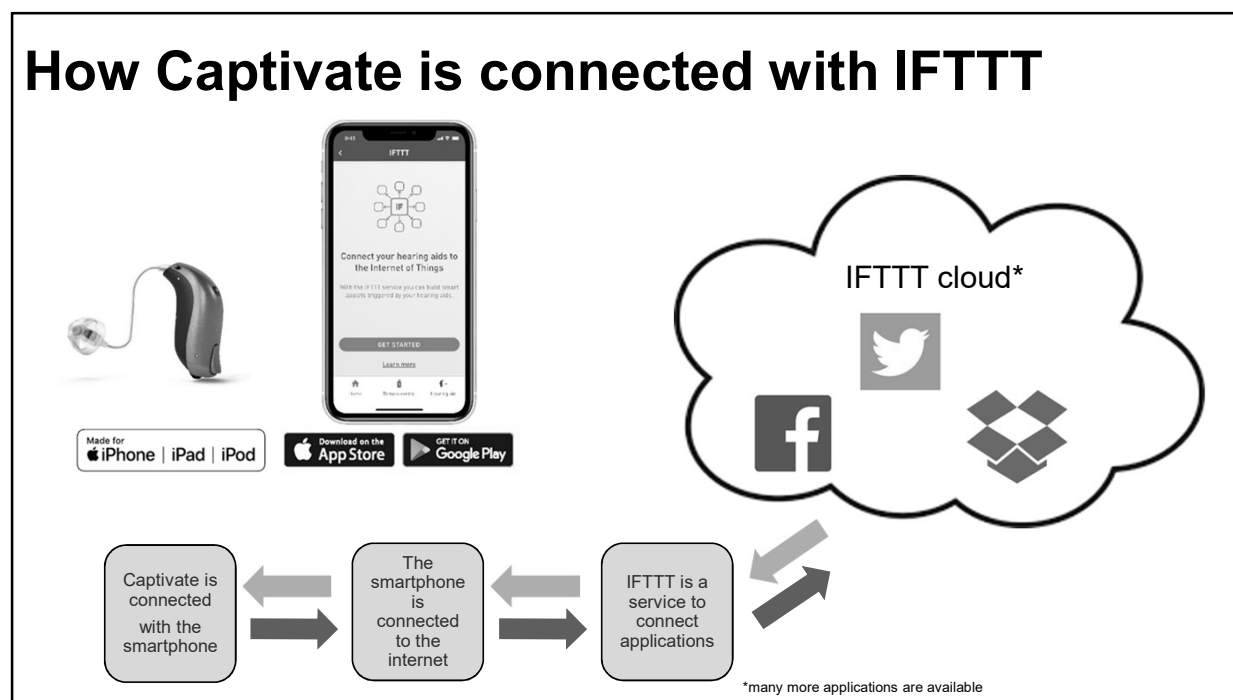

If This Then That brings the Internet of Things to Captivate

More than 550 internet-connected devices and services

SONIC
Everyday Sounds Better

How Captivate is connected with IFTTT

IFTTT cloud*

| Captivate is connected with the smartphone | The smartphone is connected to the internet | IFTTT is a service to connect applications |

*many more applications are available

Captivate and GO Service

GO service is the interface between Captivate and other services in IFTTT
SoundLink 2 app developed by R&D Team

If
This
Then
That

IFTTT cloud*

GO

*many more applications are available
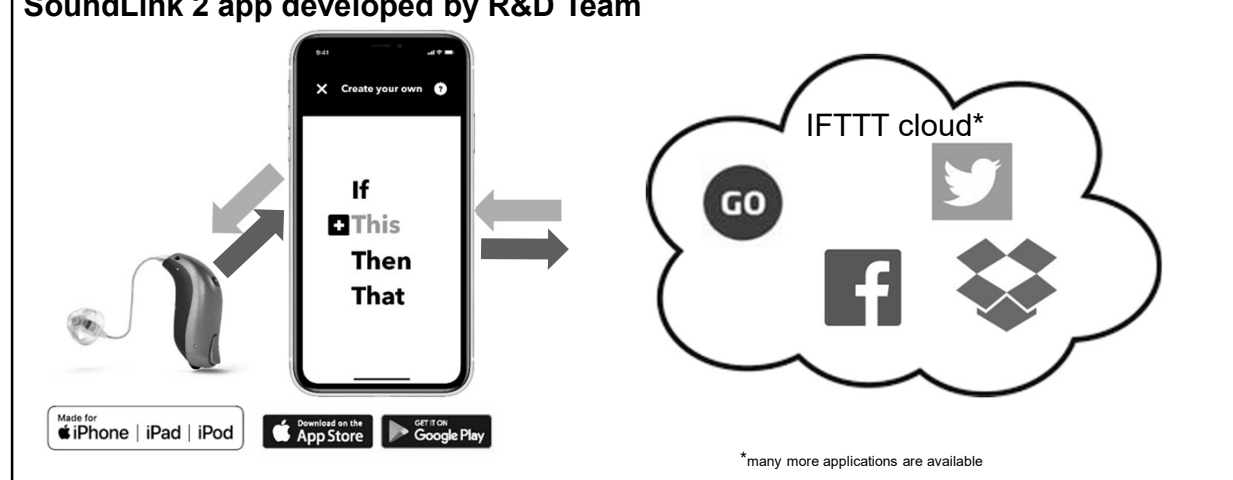
Low Frequency Enhancement

Captivate 100|80|60|40|20

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Deep Bass Dynamics

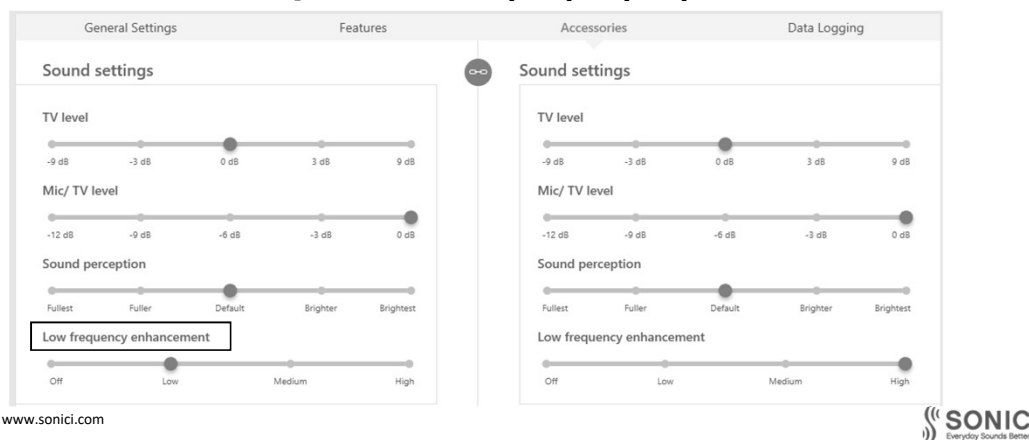**Add low frequencies into direct audio streaming for a high fidelity signal**

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Low Frequency Enhancement

Available in Captivate 100|80|60|40|20

www.sonici.com

Two Ears Working As One

Captivate 100|80|60|40|20

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The World of Binaural

Binaural Coordination

- **Automatically share information between left and right ears**
- **Natural, listening experience patients forget they're wearing devices**

Binaural Synchronization

- **Volume and program changes made to one ear are simultaneously made on the other**
- **Mute features easily synchronizes with the touch of one button**
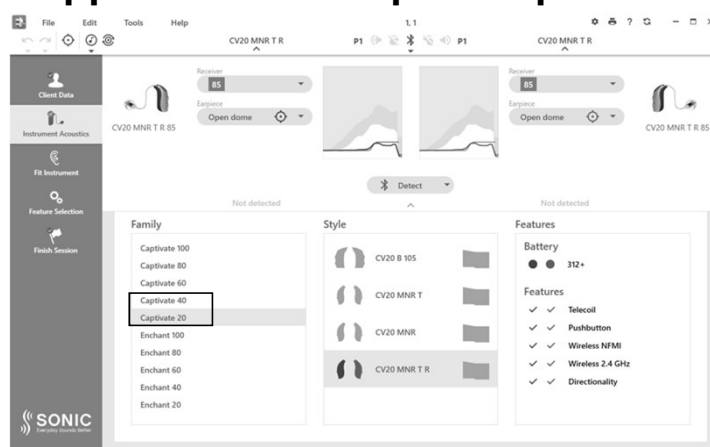
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EXPRESS*fit*® Pro

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EXPRESS*fit*® Pro Delivers…Again

Support for new Captivate products

Stunningly Simple

- **Adaptation Manager**
- **Transfer Fitting**
- **Real Ear Fit**
- **SoundStudio**
- **Noahlink Wireless capability**

Captivate 100|80|60|40|20

www.sonici.com

captivate.

**Style
That Stands Out**

Captivate. Distinctive Style.

www.sonici.aom

Flexibility in Focus

4 models – miniRITE, miniRITE T, miniRITE T R, BTE 105
5 performance levels – 100|80|60|40|20
7 color options available

miniRITE   miniRITE T   miniRITE T R   BTE 105

beige   taupe   brown   grey   dark grey   black   gold†

† Gold color available in the Captivate¹⁰⁰ miniRITE only.

Design is in the Details of Captivate

* Not all features are available on all models

1. **Dual Covered Microphones**
   » Allow for sophisticated directional features to enhance performance in noise
   » Keep unwanted debris and moisture from entering the device
2. **Program Button**
   » Provides easy access for up to four listening memories
   » Provides push-button volume control (miniRITE only)
3. **Volume Control**
   » Programmable range
   » Configurable alerting tones provide audible cue as volume is changed
4. **Wireless Connectivity**
   » NFMI enables binaural communication between devices
   » 2.4 GHz technology provides connectivity to external audio sources (mobile phone, television, computer, etc.)
5. **Battery Compartment: miniRITE, miniRITE T, BTE 105**
   » Easy-open design
   » Integrated on/off switch
   » Size 13 (BTE 105) or 312 (miniRITE, miniRITE T) battery
   » Tamper-resistant lock keeps the battery secure from children
6. **Acoustic Options miniFIT System**
   » Four receiver sizes in four lengths (miniRITE, miniRITE T, miniRITE T R)
   » Earhook or Thin Tube options (BTE 105 only)
   » Custom Molds and miniFIT Domes available in a variety of sizes and configurations
7. **Rechargeability**
   » Lithium-ion rechargeable solution (miniRITE T R only)
8. **Ingress Protection Rating**
   » Hydrophobic coating and overall design protects against dust and continuous immersion in three feet of water or more
   » IP68
9. **ProWax miniFit System**
   » Protects receiver from moisture and cerumen (miniRITE, miniRITE T, miniRITE T R)
   » Replaceable by the patient
10. **Telecoil**
    » Telecoil provides clear telephone reception (miniRITE T, miniRITE T R, BTE 105)
11. **If This Then That (IFTTT)**
    » Connects Captivate instruments to other internet devices via Sonic Go service
12. **DAI/FM**
    » Optional adapters for BTE 105 only

Model Overview

	miniRITE	miniRITE T	miniRITE T R	BTE 105
Battery Size	312	312	312	13
Power Model	Power Receiver	Power Receiver	Power Receiver	
Directional Microphones	■	■	■	■
Program Button	■	■	■	■
Volume Control	□	□	□	□
Telecoil		■	■	■
Wireless Connectivity	■	■	■	■
Receiver Sizes	Small (60) Medium (85) Power (100) Power (105)	Small (60) Medium (85) Power (100) Power (105)	Small (60) Medium (85) Power (100) Power (105)	
Earhook				□
Thin Tube				■
IP Rating	IP68	IP68	IP68	IP68
Tinnitus SoundSupport	■	■	■	■
IFTTT Internet Connection*	■	■	■	■
DAI/FM				■
Li-ion Rechargeability			■	

■ Standard □ Optional

* Requires SoundLink 2 App.

Feature Overview

	captivate.100	captivate.80	captivate.60	captivate.40	captivate.20
Sound Quality					
Signal Processing	"Speech Variable Processing"				
SmartCompress	10 Options	6 Options	2 Options		
Frequency Bandwidth	10 kHz	8 kHz	8 kHz	8 kHz	8 kHz
Phoneme Focus	■	■	■	■	■
Envelope Focus	■	■	■	■	■
Extended Dynamic Range	■				
Low Frequency Enhancement	■	■	■	■	■
Frequency Transfer	■	■	■	■	
Tinnitus SoundSupport	■	■	■	■	■
Adaptive Feedback Canceller Pro	■	■	■	■	■
Noise Management					
SPiN Noise Reduction	4 Options	4 Options	3 Options	2 Options	2 Options
SPiN Engage	4 Options	3 Options	2 Options		
Impulse Noise Reduction	4 Options	3 Options	3 Options	2 Options	
Wind Noise Reduction	■	■	■	■	■
Soft Noise Reduction	■	■	■	■	■
Directionality					
SPiN Directionality	High/Med	Med	Med	Low	Low
Omni Directionality	■	■	■	■	■
Fixed Directionality	■	■	■	■	■
True Directionality	■				

Final Comments

Thank you for joining us today for Sonic's Course:

- Captivate 100|80|60|40|20 Introduction

Any Questions?

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