EXHIBIT A-5

Invalidity of 8,582,789 in view of Digital Hearing Aid Systems

On information and belief, systems comprising a digital hearing aid, receiver, and remote transmitter ("Digital Hearing Aid systems" or "DHA systems") were sold, on–sale, in public use, or otherwise publicly available prior to the earliest priority date of U.S. Patent No. 8,582,789 ("'789 patent") and qualify as prior art to the '789 patent at least under pre-AIA 35 U.S.C. §§ 102(a) and/or (b). DHA systems anticipate or, alone or with other references, render obvious, one or more of the Asserted Claims of the '789 patent.

The chart below illustrates how exemplary DHA system render the Asserted Claims of the '789 patent invalid as anticipated or obvious over the DHA systems alone or in view of additional secondary references, including but not limited to the references listed below and prior art identified in Defendant's Invalidity Contentions. One exemplary DHA system identified in this claim chart includes, for example, the Phonak Perseo digital hearing aid, MicroLink receiver, and Campus S transmitter ("Phonak system"), which were sold, on–sale, in public use, or otherwise publicly available at least as early as April 2003. The Phonak system is evidenced by, for example, the Phonak Perseo Brochure, Phonak Campus S User Guide, and Phonak – MicroLink User Guide, which published at least as early as the earliest claimed priority date of the '789 patent, as well as the additional information cited herein.

The citations and descriptions provided herein refer to the Phonak system as a representative system demonstrating the relevant prior art features and functionality of the DHA systems, and is not intended to limit the invalidity contentions to this specific implementation. On the contrary, as demonstrated herein, components of the DHA systems, including the receiver and transmitter, could be used interchangeably with different hearing aids or compatible systems. Additionally, the hearing aid device could have an integrated receiver within a unified assembly. Accordingly, the chart identifies other examples of exemplary components that could be substituted for or used interchangeably with the Microlink receiver and/or Campus S transmitter, including but not limited to the Oticon DigiFocus Compact digital hearing aid. Moreover, and as discussed in greater detail in the following chart, the prior art DHA systems may comprise one or more of the following components which could be used interchangeably and include substantially similar structures and functionality:

- Digital Hearing Aids: Phonak: Perseo, Perso with PersonalLogic, Claro 11, Claro 22, Claro 21dAZ, Claro dAZ, Claro dAZ FM, Supero 411, Supero 412, PicoForte3 SC-D, PicoForte3, SuperFront, Clasica, Aero 11, Aero 22, Aero 23 mZ, Aero 33, MicroZoom P2 AZ, Astro SC, Astro MC, Aero 211, Aero 211 AZ, Aero 311, Aero 311 AZ, Supero 412, Supero 413 AZ, Piconet 2 P2, Piconet P2 AZ, SonoForte P3 AZ, PowerZoom P4 AZ, NovoForte E3, NovoForte E4, Conversa, Unison; Oticon, Inc.: DigiFocus Compact, Syncro; Starkey Hearing Technologies: Genesis 4, Genesis DX with one or more of Precision Audio Imaging, Axent II, Sequel, Endeavour, Arista; Siemens Hearing Instruments, Inc.: Acuris with e2e wireless, Triano, Signia Select, Prisma 2, Music, Music Digital, Phoenix, Phoenix Pro, Infiniti 3; GN ReSound: ReSound Air; Sonic Innovations Inc.: Natura 3 with DIRECTIONALplus, Natura 2 SE, Altair, Tribute, Adesso; Widex: Senso Diva; Micro-Tech: Denali, Caballo, Dx3; Microsound A/S: Microsound Pilot with Eartunner; University Wisconsin + Nicolet Instrument Corp.: Project Phoenix; and any other prior art digital hearing aids devices, including, but not limited to devices offered by the following manufacturers: Argosy, Audifon, Beltone, Danavox, Hanaston, Interton, Oticon Philips, Phonak, Rexton, Siemens, Sonic Innovations, Unitron, and Widex.
- Receivers: Phonak: MicroLink (MLx S, ML 8, MLxi, ML3-ML7), MicroVox RX2
- Transmitters: Phonak: SmartLink, Campus S, ClearCall, SoundPilot FM, WatchPilot Classic, WatchPilot Elegance, MAXX, CrosLink, HandyMic

On information and belief, other configurations, models, or embodiments may also satisfy one or more claim limitations, and the inclusion of the examples identified in this chart do not preclude the existence or applicability of alternative implementations. Defendant reserves the right to

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supplement, amend, or otherwise update these contentions as additional information becomes available, including but not limited to information obtained through discovery.

To the extent IngenioSpec contends the DHA systems do not disclose one or more limitations of the claims, it would have been obvious to combine the DHA systems with the knowledge of a person of ordinary skill in the art ("POSITA") and/or with one or more of the following references to render the Asserted Claims the '789 patent invalid:

- US5721783 ("Anderson '783") was filed on June 7, 1995, and issued on February 24, 1998, and is therefore prior art under 35 U.S.C. §§ 102 (a), (b), and (e).

- US2004/0136555A1 ("Enzmann '555") was filed on January 13, 2003, and published on July 15, 2004, and issued on February 24, 1998, and is therefore prior art under 35 U.S.C. § 102 (e). Enzmann '555 is a printed patent publication that issued as U.S. Patent No. 5,721,783 ("Enzmann '783"), which also qualifies as prior art to the '789 patent at least under pre-AIA 35 U.S.C. § 102(e). Enzmann '555 and Enzmann '783 all have corresponding disclosures, and citation herein to Enzmann '555 includes and incorporates by reference citations to the corresponding disclosures in Enzmann '783.

- US20040170086A1 ("Mayer '086") was filed on October 23, 2003 with a priority date of October 27, 2002, and published on September 2, 2004, and is therefore prior art under 35 U.S.C. § 102 (e).

- WO1998031193A1 ("Fretz '193") was filed on January 9, 1998, and published on July 16, 1998, and is therefore prior art under 35 U.S.C. § 102(b), (e).

For any claim limitation, Defendant may rely on excerpts cited for any other limitation and/or additional excerpts not set forth fully herein to the extent necessary to provide further explanation for a reference's disclosure of a limitation. Where an excerpt refers to or discusses a figure or figure items, that figure and any additional descriptions of that figure should be understood to be incorporated by reference as if set forth fully herein.

With respect to the proposed modifications to the DHA system, such modification would have been obvious to try, an obvious combination of prior art elements according to known methods to yield predictable results, a simple substitution of one known element for another to obtain predictable results, a use of known techniques to improve a similar devices or method in the same way, an application of a known technique to a known device or method ready for improvement to yield predictable results, a variation of a known work in one field of endeavor for use in either the same field or a different one based on design incentives or other market forces with variations that are predictable to a POSITA, and/or obvious in view of teachings, suggestions, and motivations in the prior art that would have led a POSITA to modify or combine the prior art references.

To the extent that these Invalidity Contentions rely on or otherwise embody particular interpretations of terms or phrases in the asserted claims, Defendant is not proposing any such interpretations as proper interpretations or constructions of those terms or phrases. Various positions put forth in this document are predicated on IngenioSpec's apparent interpretation of its claims as evidenced by its Infringement Contentions. Those positions are not intended to and do not necessarily reflect Defendant's interpretation of the true and proper scope of the asserted claims. Defendant further incorporates by reference all reservations of rights set forth in the Invalidity Contentions, as if fully set forth herein.

Defendant's arguments throughout these invalidity contentions are based on IngenioSpec's apparent interpretation of the claims in its infringement contentions. Defendant does not agree that such interpretation is proper and reserve the right to argue that the mapped actions do not infringe any claims of the '789 patent. In the alternative, should the Court or factfinder construe and/or apply the claims in a manner consistent with IngenioSpec's interpretations in its infringement contentions for the '789 patent, the claims are invalid for at least the reasons set forth herein.

Claims	Prior Art
1[pre]. A hearing enhancement system for a user, comprising:	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement system for a user." DHA Systems are hearing aids used in conjunction with a transmitter and/or a receiver, and are examples of the claimed "hearing enhancement system." The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 5 The Science of PersonalLogic™ Phonak has applied knowledge from new research and past experience to add a new dimension of individualized logic to automatic hearing systems – PersonalLogic. Combining new and proven features, PersonalLogic optimizes the functioning, operation and fitting of hearing systems for each individual user. Thanks to PersonalLogic, Perseo takes customization to a level beyond "custom-fitted" related to individual hearing loss. The new digital system from Phonak is the first hearing system with customized automatic operation, as opposed to operation based on factory set, unchangeable rules. Now, Perseo gives hearing professionals control over automatic operation, allowing them to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 7

Convenience and Comfort

Perseo is easier to wear and easier to fit

- For true "wear and hear" convenience and comfort in all situations, Perseo automatic operation is managed by Phonak-exclusive PersonalLogic.
- This breakthrough intelligence for automatic hearing instruments responds to acoustics, the listening situation and personal listening preferences.
- Perseo is easily programmed for individual needs using the **Listening Situation Manager**.

Clarity

Enhanced performance in multiple listening situations

- The **Clarity Component Enhancement** system realized in **Digital Perception Processing² (DPP²)** increases the clarity of speech and environmental sounds.
- Rapid-tracking **Adaptive digital AudioZoom (dAZ)** is automatically activated to improve speech understanding in noisy situations.
- For extra comfort and ease of listening, the **Fine-scale Noise Canceler** selectively reduces background noise in 20 channels.
- Optional **MicroLink FM** provides the ultimate Speech-to-Noise Ratio enhancement.

Phonak – Perseo Brochure at Page 15

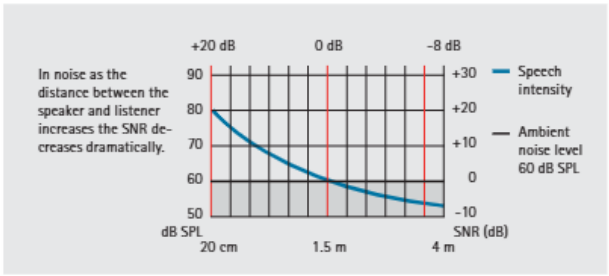
The perfectly integrated communication system

FM MicroLink

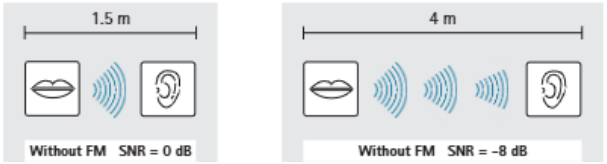
FM technology has allowed thousands of children to participate in standard education settings and to be actively involved in social activities. Phonak pioneered this development and the integration of FM into hearing instruments to produce communication systems that are effective in even the most demanding situations. Since the innovation of miniaturized Phonak **MicroLink** systems, FM has become an important solution also for adults with a high communication need in work and leisure environments.

All Perseo BTEs have been designed to incorporate MicroLink with its fully integrated appearance and operation. This integrated system is unique to Phonak.

Speech-to-Noise Ratio (SNR) as a function of distance between speaker and listener



Speech-to-Noise Ratio without FM is distance dependent



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Claims	Prior Art
	Phonak – Perseo Brochure at Page 28

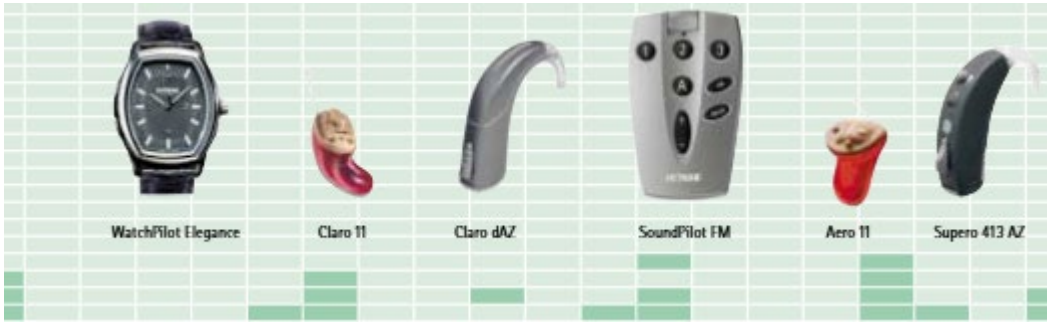


Phonak and Other DHA – Manufacturers News Article at Page 1

STÄFA, SWITZERLAND—Phonak has introduced EduLink, which it predicts will contribute greatly to the successful treatment of children with auditory processing disorders (APDs). This new device is an "ear set" that transmits the teacher's voice, using FM technology, directly to the child's ear, thus effectively reducing ambient and background noise for improved speech discrimination. EduLink is designed to complement existing therapies in the treatment of APD.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 2 People with sensorineural hearing loss need a more favorable signal-to-noise ratio to understand speech than do normal hearing listeners. Research has shown that hearing impaired listeners may require signal-to-noise improvements of 4 dB to 18 dB, depending on the magnitude of their hearing loss to achieve word-recognition scores equivalent to those with normal hearing. FM systems are able to improve the signal-to-noise ratio. FM systems improve the user's ability to understand speech in the presence of noise. Since the sound is delivered by FM radio waves, the strength and quality of the sound remains constant (across the operational distance) from the speaker to the hearing impaired individual. FM systems consist of a microphone usually placed four to six inches from the sound source, and a transmitter, which sends the signal via radio waves directly to the miniature FM receiver, which is connected to the personal hearing instrument. In other words, the entire FM system is a complete broadcasting and receiving system. Importantly, when using FM systems, the effects of background noise and reverberation are minimal. These factors help reduce background noise while enhancing and stabilizing the main sound source. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4 Phonak FM systems operate on an FM radio signal in the 216-217 MHz bands. These bands have been assigned by the FCC for use with equipment by the hard of hearing. There are 23 narrow band channels available from Phonak in this frequency range. In order for the transmitter and receiver to operate as a system, they must be on the same frequency or 'channel'. All Phonak FM transmitters and receivers are compatible with every other model of transmitter and receiver in the Phonak product line. Each transmitter and receiver channel 'frequency' is identified with a number. The number of the transmitter and FM receiver must be the same for these units to function together correctly. FM Transmitters and FM Receivers are available in many sizes and shapes to offer increased functionality. We will detail some of the Phonak equipment below:

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5 **2- HandyMic TX3**  The microphone with a built-in transmitter, used primarily for adults. The multi-microphone technology of the HandyMic combines omni directional, directional, and super directional microphones with an FM transmitter. The compact HandyMic transmits the speaker's voice directly to the hearing instrument user's FM receiver. The HandyMic can be set up directly in front of the sound source, slipped into the speaker's shirt pocket, or aimed at the speaker manually. With an audio cable, the HandyMic can also be connected to a sound system. As with all other Phonak FM products, the HandyMic has a range of 7 to 15 meters (23 to 50 feet). For business meetings, round table discussions, family gatherings, in a car, on a noisy street, at home Phonak Campus-S-User-Manual at Page 8  ❶ Channel selection: Press one of the channel selection buttons for 2 seconds. Δ = selects a higher channel ∇ = selects a lower channel ❷ Synchronization: Press the Direct Frequency Synchronization (DFS) button for 2 seconds to send the selected frequency to the receiver (MLxS or Perseo/Claro dAZ FM).

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 1 **FM features** – World's smallest FM microchip – Compatible with all Phonak FM transmitters – Cordless TV and Radio link up – FM performance corresponding to audiological fitting – Soft Squelch system – Built in antenna – Band H (173–185 MHz); band J (186–201 MHz); band N (207–217 MHz) Phonak – Claro 211 Product Information at Page 2 **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program. Phonak – Collections 2002 Product List at Page 2 

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

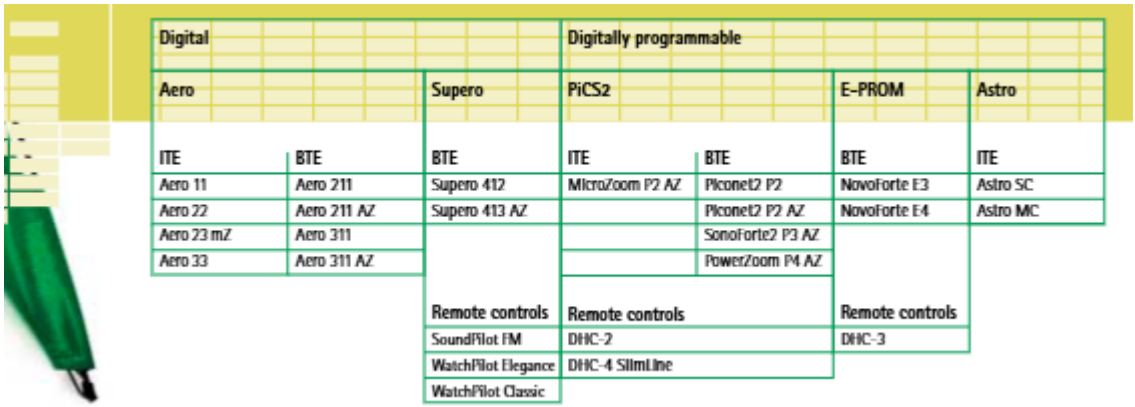
- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

Digital		
ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

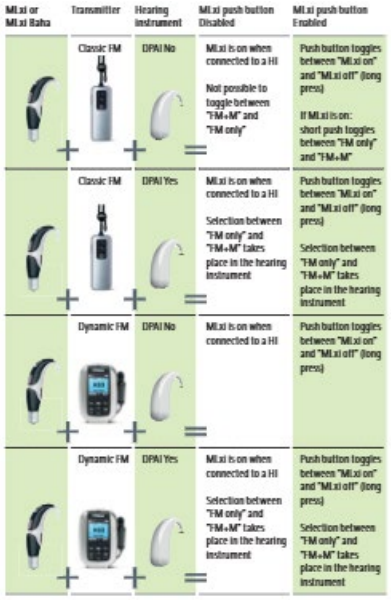
Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Phonak – Collections 2002 Product List at Page 11



Digital			Digitally programmable			
Aero		Supero	PiCS2		E-PROM	Astro
ITE	BTE	BTE	ITE	BTE	BTE	ITE
Aero 11	Aero 211	Supero 412	MicroZoom P2 AZ	Piconet2 P2	NovoForte E3	Astro SC
Aero 22	Aero 211 AZ	Supero 413 AZ		Piconet2 P2 AZ	NovoForte E4	Astro MC
Aero 23 mZ	Aero 311			SonoForte2 P3 AZ		
Aero 33	Aero 311 AZ			PowerZoom P4 AZ		
		Remote controls	Remote controls		Remote controls	
		SoundPilot FM	DHC-2		DHC-3	
		WatchPilot Elegance	DHC-4 SlimLine			
		WatchPilot Classic				

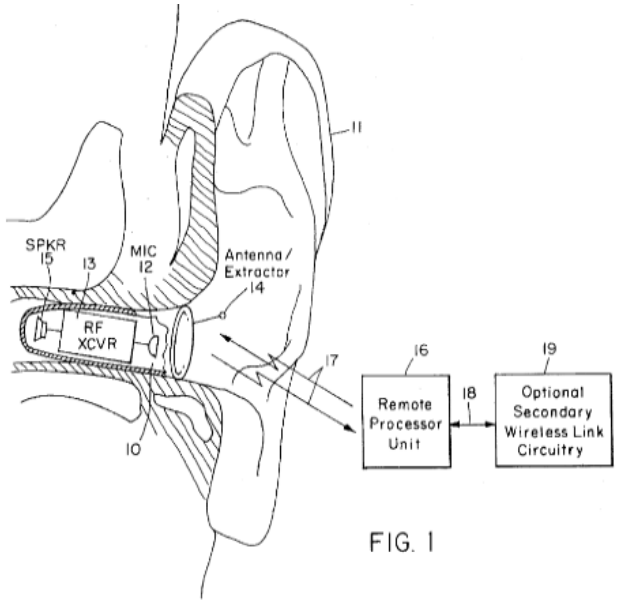
Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 31 Phonak FM provides a dramatic improvement of speech intelligibility because the signal is picked up directly at the source (the speaker's voice, the television's audio channel, or the telephone receiver) and is then transmitted without wires to the miniaturised receiver. The receiver (Phonak MicroLink MLx or MicroVox RX2) supplies a high-quality signal directly to the speech processor of the user's cochlear implant. Phonak – Fitting Guide for MLxi and MLxi Baha at Page 6 

Claims	Prior Art
	Phonak – Media Release re Product Offerings in F2003/2004 at Page 3 **Phonak Communications introduces the new MicroLink receivers with frequency synthesizer** Phonak Communications will introduce its new multi frequency MLx S and ML8 S receivers in the next few months. MLx S and ML8 S are the counterpart of Campus S transmitters, already introduced early 2002. Together, they comprise the new synthesized FM system generation, a system that transmits, without wires, speech to the hearing instrument in difficult listening situations. The key technology of the new system is its easy frequency adaptation. Given the extreme design constraints (low voltage, low power, miniature dimensions), the development of this technology represents an unprecedented breakthrough in wireless communication technology. Phonak – Microlink User Guide at Page 2  Phonak – Microlink User Guide at Page 6 **The direct-input technique** Using the audio cable supplied with the system, the HandyMic can be connected directly to any sound system, including a TV, radio, walkman, movie projector, amplifier, cassette-player etc. 

Claims	Prior Art
	Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 7 • A patient who uses 332 Power AudioZooms with 8% and 20% discrimination had not been able to use the phone for the past few years. After using the TX4, he has been able to communicate on the phone and he feels that his understanding on the phone is now about 95%. • A patient with a severe-to-profound unilateral hearing loss with 28% discrimination has been struggling to use the phone. He tried the TX4 and this allowed him to hear well on the phone for the first time in many years. TelCom User Guide at Page 2 Thank you for choosing the TelCom FM transmitter. The TelCom is a high-quality Swiss made product from Phonak, a world leader in hearing technology, innovation and reliability. It enhances communication on the telephone and optimizes hearing when watching television, or listening to other audio equipment (e.g. radio, CD player, personal computer,...). The wireless TelCom FM transmitter (FM = Frequency Modulation) sends the sound (e.g. television or telephone) to the FM receivers on the hearing instruments of the person listening. We recommend that you read this manual carefully to fully benefit from the many TelCom features. With proper care and usage, your TelCom will support your listening and communication needs for many years. Phonak – the leader in FM communication. Lewis – Speech perception in noise: directional microphones (2004) at Page 428 **study participants. These subjects used a Phonic Ear 805 CD BTE hearing instrument that had the capability to switch between omnidirectional and directional microphone modes. The Phonic Ear 441T microphone transmitter and the Phonic Ear 445R FM receiver served as the FM system. Speech**

Claims	Prior Art
	Lewis – Speech perception in noise: directional microphones (2004) at Page 429 (2) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the omnidirectional microphone mode; (3) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the directional (adaptive) microphone mode; (4) monaural digital Phonak Claro 311 dAZ BTE HA utilized with one Phonak Microlink FM receiver with the EM attenuated (FM-only mode) and one Phonak Claro 311 dAZ BTE HA in the omnidirectional microphone mode worn on the opposite ear; and (5) binaural digital Phonak Claro 311 dAZ BTE hearing aids utilized with binaural Phonak Microlink FM receivers with the EM attenuated (FM-only mode). Lewis – Speech perception in noise: directional microphones (2004) at Page 431 All subjects were fit with digital Phonak Claro 311 dAZ BTE hearing aids bilaterally. All earmolds had select-a-vent (SAV) venting and #13 or 3 mm horn tubing. In addition to the hearing aids, subjects were fit with Phonak Microlink ML8 FM receivers bilaterally. These FM receivers attach to the bottom of a BTE hearing aid and may be utilized in either the "FM only" mode, which attenuates the hearing aid microphone by 20 dB, or in the FM plus hearing aid mode, which allows for FM input and input of environmental sounds via the hearing aid microphones simultaneously at the same output level. The Phonak TX3 HandyMic FM transmitter served as the FM transmitter. This transmitter has three microphone options: (1) Wide Angle, which picks up sounds arriving from all directions around the transmitter microphone equally; (2) Zoom, which provides reduced amplification to signals arriving from the rear (cardioid); and (3) SuperZoom, which provides reduced amplification to signals originating from the rear and the sides (hypercardioid). The

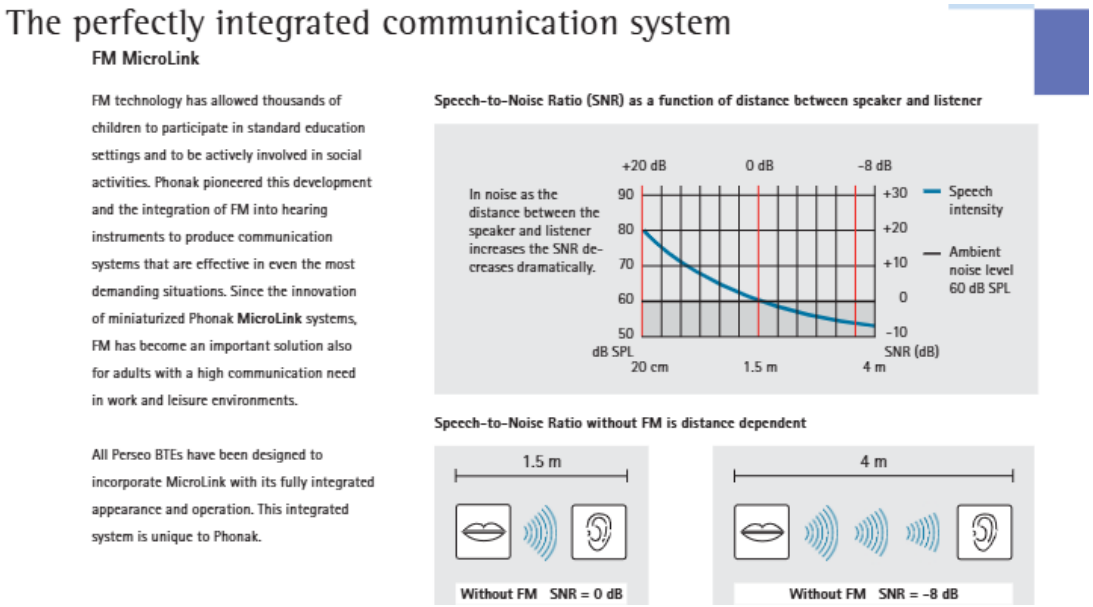
Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 11 *5. Telecoil use in church, theatre, or cinema (optional feature)* An increasing number of churches, theatres and public buildings have assistive listening devices installed, usually induction loops. These systems send out wireless sound to be intercepted by the telecoil in your hearing instruments. Ask your hearing care professional for details. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses wireless communication between an earpiece and a remote processing unit (RPU) connected to a wireless device such as a cellular telephone, which is an example of the claimed "hearing enhancement system." The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation.

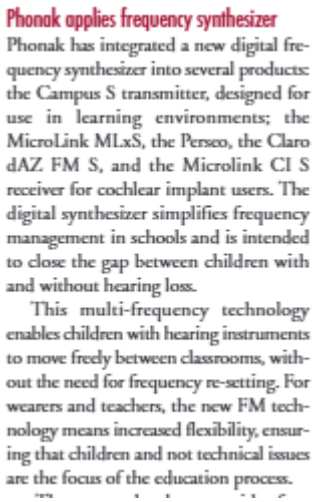
Claims	Prior Art
	Anderson ’783 at FIG. 1  FIG. 1 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid

Claims	Prior Art
	confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many

Claims	Prior Art
	successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950.

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitation. Anderson '783 discloses a system that includes a hearing aid device and an RPU. Anderson '783 at Abstract. DHA Systems similarly include Digital Hearing Aids (with or without Receivers) and Transmitters in wireless communication. Phonak – Fitting Guide for MLxi and MLxi Baha at Page 6. A POSITA would have understood that Anderson '783's RPU is analogous to DHA Systems' Transmitters, and Anderson '783's hearing aid device is analogous to DHA Systems' Digital Hearing Aids and/or Receivers. Combining or substituting one or more of the teachings of Anderson '783 with those of DHA Systems would have been nothing more than the combination or substitution of known elements to obtain predictable results. Moreover, such combinations or substitutions would have improved similar devices (those in Anderson '783 and DHA systems) in the same or similar ways. Thus, a POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 . A POSITA would have had a reasonable expectation of success in combining DHA Systems with the teachings of Anderson '783. Anderson '783's techniques are broadly applicable to hearing aid devices and were "well-known techniques" used in hearing aids—analogous to DHA Systems' Digital Hearing Aids. Anderson '783, 1:5–18. Further, DHA Systems already utilize wireless controls and transmission, so implementing the teachings of Anderson to apply controls and wireless transmission to a phone rather than a Transmitter would have been routine and conventional in light of the teachings of Anderson '783. DHA Systems and Anderson '789 are thus easily combined based on similar and familiar components to allow for power amplification. The modifications made to combine Anderson '783 and DHA Systems would have been routine and well within the level of a POSITA, who would have reasonably expected success in doing so. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] an audio system configured to receive input signals for broadcasting, and configured to up-convert the received input signals into up-converted signals to be wirelessly transmitted;	DHA Systems and Anderson '783 expressly or inherently disclose "an audio system configured to receive input signals for broadcasting, and configured to up-convert the received input signals into up-converted signals to be wirelessly transmitted." DHA Systems include Transmitters that receive audio signals from a microphone (e.g., input signals). DHA Systems also transmits audio signals to the Digital Hearing Aids or Receivers through FM transmission, which a POSITA would have understood includes "up-convert[ing]" by the Transmitter for wireless transmission after the signals are up–converted by a processor to enhance those signals. The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 15  Phonak and Other DHA – Manufacturers News Article at Page 1 *STÄFA, SWITZERLAND*—Phonak has introduced EduLink, which it predicts will contribute greatly to the successful treatment of children with auditory processing disorders (APDs). This new device is an "ear set" that transmits the teacher's voice, using FM technology, directly to the child's ear, thus effectively reducing ambient and background noise for improved speech discrimination. EduLink is designed to complement existing therapies in the treatment of APD.

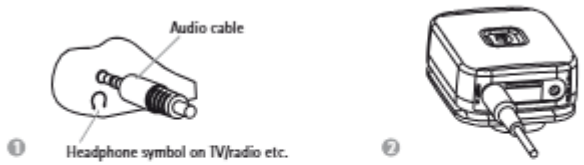
Claims	Prior Art
	Phonak and Other DHA – Manufacturers News Article at Page 2  **Phonak applies frequency synthesizer** Phonak has integrated a new digital frequency synthesizer into several products: the Campus S transmitter, designed for use in learning environments; the MicroLink MLxS, the Perseo, the Claro dAZ FM S, and the Microlink CI S receiver for cochlear implant users. The digital synthesizer simplifies frequency management in schools and is intended to close the gap between children with and without hearing loss. This multi-frequency technology enables children with hearing instruments to move freely between classrooms, without the need for frequency re-setting. For wearers and teachers, the new FM technology means increased flexibility, ensuring that children and not technical issues are the focus of the education process. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 2 People with sensorineural hearing loss need a more favorable signal-to-noise ratio to understand speech than do normal hearing listeners. Research has shown that hearing impaired listeners may require signal-to-noise improvements of 4 dB to 18 dB, depending on the magnitude of their hearing loss to achieve word-recognition scores equivalent to those with normal hearing. FM systems are able to improve the signal-to-noise ratio. FM systems improve the user's ability to understand speech in the presence of noise. Since the sound is delivered by FM radio waves, the strength and quality of the sound remains constant (across the operational distance) from the speaker to the hearing impaired individual. FM systems consist of a microphone usually placed four to six inches from the sound source, and a transmitter, which sends the signal via radio waves directly to the miniature FM receiver, which is connected to the personal hearing instrument. In other words, the entire FM system is a complete broadcasting and receiving system. Importantly, when using FM systems, the effects of background noise and reverberation are minimal. These factors help reduce background noise while enhancing and stabilizing the main sound source.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4 Phonak FM systems operate on an FM radio signal in the 216-217 MHz bands. These bands have been assigned by the FCC for use with equipment by the hard of hearing. There are 23 narrow band channels available from Phonak in this frequency range. In order for the transmitter and receiver to operate as a system, they must be on the same frequency or 'channel'. All Phonak FM transmitters and receivers are compatible with every other model of transmitter and receiver in the Phonak product line. Each transmitter and receiver channel 'frequency' is identified with a number. The number of the transmitter and FM receiver must be the same for these units to function together correctly. FM Transmitters and FM Receivers are available in many sizes and shapes to offer increased functionality. We will detail some of the Phonak equipment below: Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5 **2- HandyMic TX3**  The microphone with a built-in transmitter, used primarily for adults. The multi-microphone technology of the HandyMic combines omni directional, directional, and super directional microphones with an FM transmitter. The compact HandyMic transmits the speaker's voice directly to the hearing instrument user's FM receiver. The HandyMic can be set up directly in front of the sound source, slipped into the speaker's shirt pocket, or aimed at the speaker manually. With an audio cable, the HandyMic can also be connected to a sound system. As with all other Phonak FM products, the HandyMic has a range of 7 to 15 meters (23 to 50 feet). For business meetings, round table discussions, family gatherings, in a car, on a noisy street, at home

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5  The Phonak Campus **S** is a new addition to the Phonak product line - this multi-channel FM transmitter is developed for use in schools, universities and speech therapy. It is fully compatible with current Phonak FM products, and ready for operation with future generations of Phonak FM receivers. Campus **S** special features include a channel selector with digital display, an ergonomic user interface, a microphone with switchable directional / omni directional characteristics, handy storage for the microphone cable, connection to televisions, video recorders and radios, and an easily exchanged rechargeable battery.

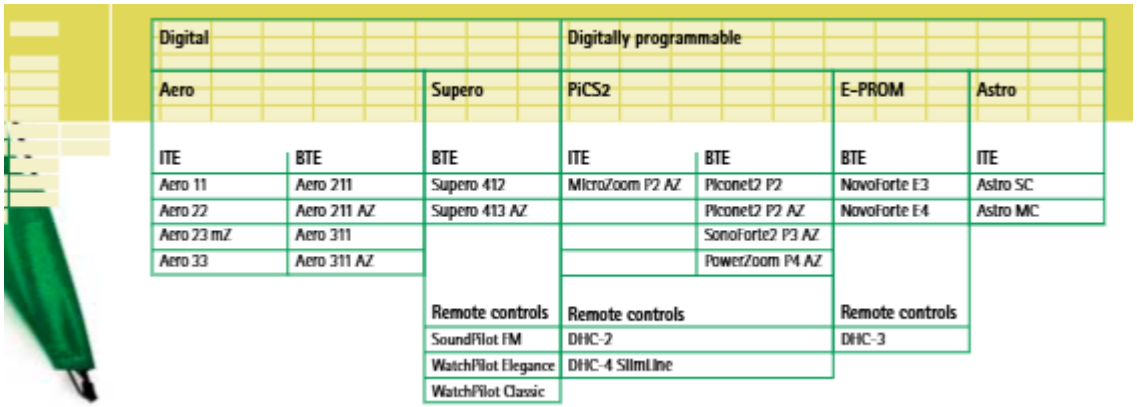
Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 6 **4- TelCom**  Phonak's TelCom is a stationary FM transmitter that allows optimized television, telephone, and audio system usage. While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice to the FM receiver. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is returned to the previous volume setting. TelCom is equipped with a frequency synthesizer for convenient setting of FM frequencies; it has a range of 7 to 15 meters (23 to 50 feet). For television, telephone, CD player, radio, personal computer and other equipment with audio output Phonak Campus-S-User-Manual at Page 1 Description  ❶ On/off button ❷ Channel selection buttons ❸ FM channel in use ❹ Battery status indicator ❺ Direct frequency synchronization ❻ There are different microphone options available (see page 6) ❼ Carrying clip ❽ Battery compartment ❾ Audio socket ❿ Battery charger socket ⓫ Label for your initials

Claims	Prior Art
	Phonak Campus-S-User-Manual at Page 2 Welcome to the world of multi-frequency FM communication. By choosing the Campus S, you now possess a state-of-the-art FM transmitter that delivers maximum performance in conjunction with the latest multi-frequency MicroLink receivers and the WallPilot, while retaining full compatibility with regular MicroLink receivers. This new FM system is extremely flexible in use and sets new standards for communication in the educational sector. It also performs excellently in other settings. The Campus S is a Swiss quality product that will make your communication much easier for many years to come. Phonak Campus-S-User-Manual at Page 3 Multi-frequency FM system components   ❶ Campus S: Multi-frequency FM transmitter, specially recommended for educational applications. ❷ WallPilot: Automatic frequency synchronizer, tunes receivers to a room frequency as people enter.

Claims	Prior Art
	Phonak Campus-S-User-Manual at Page 12 Connecting the Campus S to a TV set, video recorder, radio or CD player  You can use the Campus S also for high quality wireless transmission of sound from audio equipment like TV sets, video recorders, radios and CD players. ❶ Plug the audio cable into the headphone output of your audio equipment. ❷ Plug the other end of the cable into the audio input underneath your Campus S. Since the Campus S uses the microphone cable as an antenna, unroll the microphone cable. Phonak Campus-S-User-Manual at Page 13  ❸ Switch on your Campus S and the microphone, then the audio equipment. MiniMic MM8: This microphone allows you to talk directly to listeners while showing a video, for example. If you prefer not to speak, switch off (X) the microphone. Should your audio equipment not have a 3.5 mm connector please ask your hearing care professional for adapters for 6.3 mm jacks, RCA/Cinch or SCART connectors. Phonak – Claro 211 Product Information at Page 1 **FM features** – World's smallest FM microchip – Compatible with all Phonak FM transmitters – Cordless TV and Radio link up – FM performance corresponding to audiological fitting – Soft Squelch system – Built in antenna – Band H (173–185 MHz); band J (186–201 MHz); band N (207–217 MHz)

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 2 **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program. Phonak – Collections 2002 Product List at Page 3 FM 28 Phonak's unique FM solutions deliver unprecedented speech intelligibility to overcome excessive noise, reverberation and distance. Users of Phonak BTE instruments and users of many other instrument brands can benefit from FM solutions.  Campus S MLx

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 11



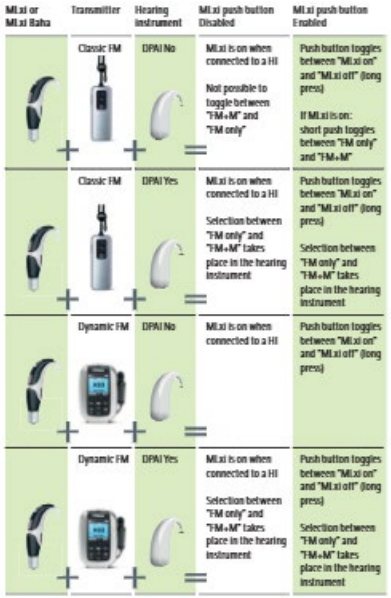
Digital			Digitally programmable			
Aero		Supero	PiCS2		E-PROM	Astro
ITE	BTE	BTE	ITE	BTE	BTE	ITE
Aero 11	Aero 211	Supero 412	MicroZoom P2 AZ	Piconet2 P2	NovoForte E3	Astro SC
Aero 22	Aero 211 AZ	Supero 413 AZ		Piconet2 P2 AZ	NovoForte E4	Astro MC
Aero 23 mZ	Aero 311			SonoForte2 P3 AZ		
Aero 33	Aero 311 AZ			PowerZoom P4 AZ		
		Remote controls	Remote controls		Remote controls	
		SoundPilot FM	DHC-2		DHC-3	
		WatchPilot Elegance	DHC-4 SlimLine			
		WatchPilot Classic				

Phonak – Collections 2002 Product List at Page 28



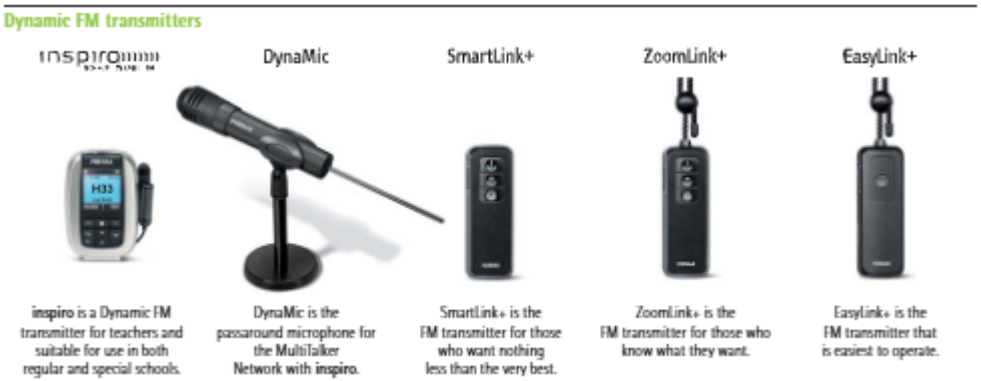
Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 29  Phonak's FM solutions: For maximum speech intelligibility Whenever even latest-generation hearing instruments approach their physical limits – noise, reverberation, or distance – count on Phonak's FM solutions to deliver maximum speech intelligibility. The frequent difficulties encountered by hearing instrument users when watching TV and making phone calls can be overcome with Phonak's FM technology. Phonak FM solutions improve the SNR by 12 to 20 dB. The FM systems by Phonak can be used with the majority of commercially available BTE instruments and cochlear implants. Recommended applications: Dialog: For example at home, on a busy street, at the shopping mall or in a restaurant. Group discussions: For example at a family get-together, in a very noisy restaurant, at business meetings or conferences. Making telephone calls: The Phonak FM system provides access to the many capabilities of modern telecommunications devices. Watching TV and listening to music: Phonak FM provides access to the entire spectrum of today's information and entertainment technologies. Schools and continuing education: For example in classes at schools and universities, on outings and excursions, in lectures or on museum tours. Transportation: For example in cars, trains, trams and buses. Sports of all kinds: For example when cycling, playing golf, skiing, jogging or hiking. Events: For example at the theater, in concerts, at the movies, in church services or at community meetings. Phonak – Collections 2002 Product List at Page 31 Phonak FM provides a dramatic improvement of speech intelligibility because the signal is picked up directly at the source (the speaker's voice, the television's audio channel, or the telephone receiver) and is then transmitted without wires to the miniaturised receiver. The receiver (Phonak MicroLink MLx or MicroVox RX2) supplies a high-quality signal directly to the speech processor of the user's cochlear implant.

Claims	Prior Art
	Phonak – Fitting Guide for MLxi and MLxi Baha at Page 6

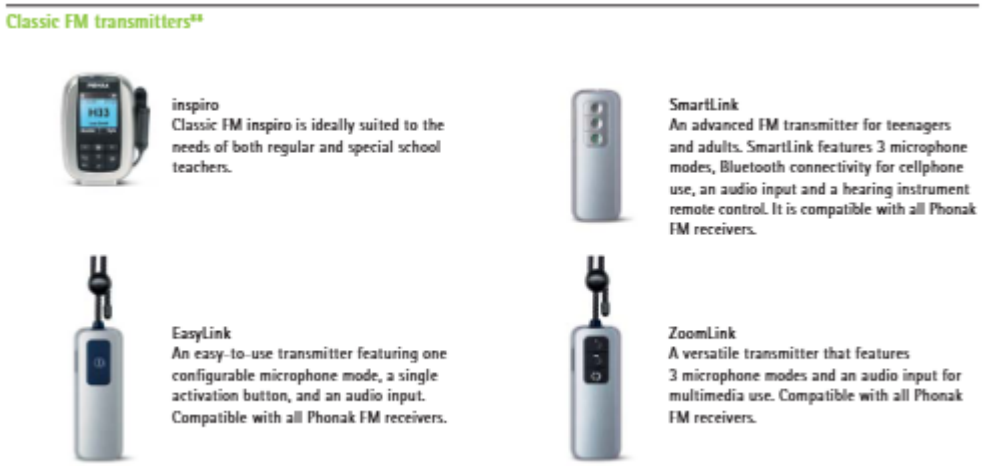


MLxi or MLxi Baha	Transmitter	Hearing instrument	MLxi push button Disabled	MLxi push button Enabled
+	Classic FM	DPAI No	MLxi is on when connected to a HI Not possible to toggle between "FM+M" and "FM only"	Push button toggles between "MLxi on" and "MLxi off" (long press) If MLxi is on: short push toggles between "FM only" and "FM+M"
+	Classic FM	DPAI Yes	MLxi is on when connected to a HI Selection between "FM only" and "FM+M" takes place in the hearing instrument	Push button toggles between "MLxi on" and "MLxi off" (long press) Selection between "FM only" and "FM+M" takes place in the hearing instrument
+	Dynamic FM	DPAI No	MLxi is on when connected to a HI	Push button toggles between "MLxi on" and "MLxi off" (long press)
+	Dynamic FM	DPAI Yes	MLxi is on when connected to a HI Selection between "FM only" and "FM+M" takes place in the hearing instrument	Push button toggles between "MLxi on" and "MLxi off" (long press) Selection between "FM only" and "FM+M" takes place in the hearing instrument

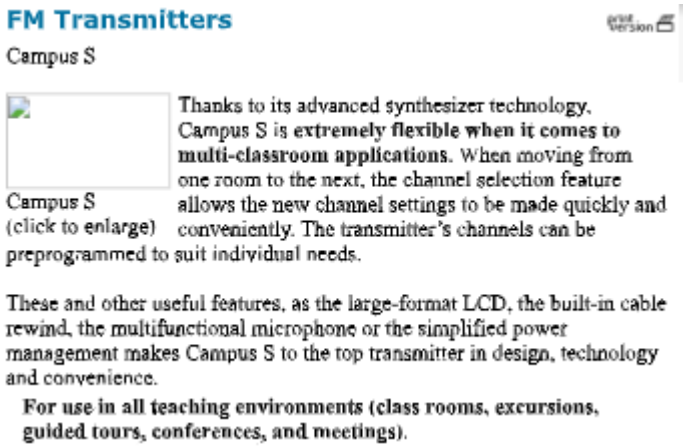
Phonak – Fitting Guide for MLxi and MLxi Baha at Page 9

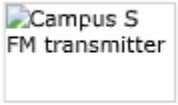


Claims	Prior Art
	Phonak – Fitting Guide for MLxi and MLxi Baha at Page 9

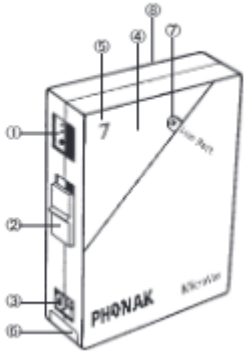


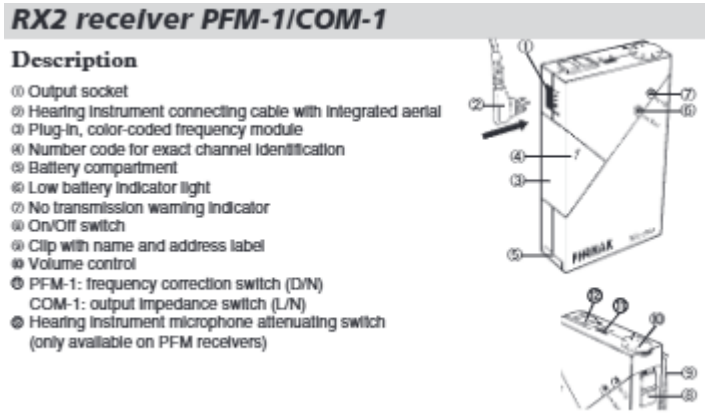
Phonak – FM Transmitters including Campus S and TelCom at Page 1



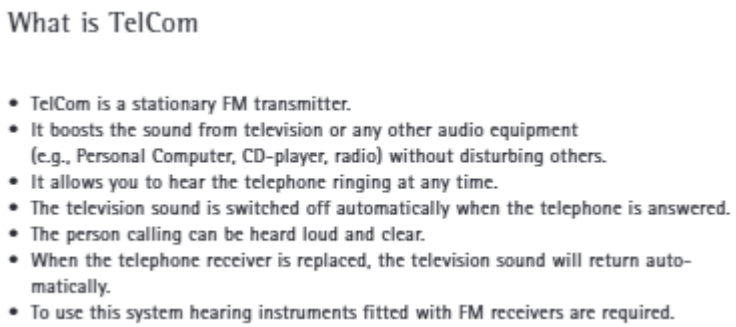
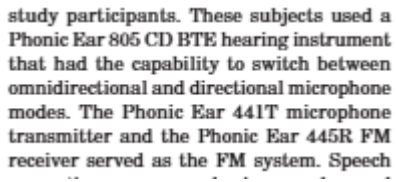
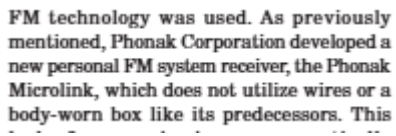
Claims	Prior Art
	Phonak – FM Transmitters including Campus S and TelCom at Page 1 TelCom  TelCom (click to enlarge) Phonak's TelCom is the first stationary FM transmitter **that allows optimized television, telephone, and audio system usage**. While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice clearly and crisply. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is turned back up to the previous volume setting. The TelCom has an operating range of 7 to 15 meters (23 to 50 feet). **For television, telephone, CD player, radio, personal computer and other equipment with audio output.** Phonak – History of Various Hearing Aid Manufacturers at Page 5 **2001** **TelCom – For combined television and telephone reception** TelCom is the first stationary FM transmitter for combined use with television (also radio, personal computer, CD-player) and telephone. Although the television can be heard loud and clear, the telephone ringing signal can be heard simultaneously . When the telephone is picked up, Phonak – History of Various Hearing Aid Manufacturers at Page 6 **Campus S – Top marks in FM Communication**  Campus S FM transmitter The Campus S is a state-of-the-art FM transmitter specially developed for use in schools, universities, and speech therapy. Thanks to its advanced synthesizer technology, Campus S is extremely flexible when it comes to multi-classroom applications.

Claims	Prior Art
	Phonak – Lewis Article re ML8 Improving Speech Perception in Noise with Directional Microphones and Frequency Modulation (FM) Technology (2002) at Page 2 Personal FM systems have also been shown to improve speech intelligibility in noise (Hawkins, 1984; Fabry, 1994; Crandell & Smaldino, 2000). Past investigations have demonstrated that the utilization of FM technology can improve speech intelligibility in noise by as much as 20-25 dB (see Crandell and Smaldino, 2000). With a personal FM system, the speaker's voice is picked-up via FM wireless microphone located near the speaker's mouth - where the effects of reverberation, distance, and noise are minimal. The FM system converts the acoustic signal to an electrical waveform at the microphone, and the signal is transmitted via FM signal, from the transmitter to the receiver. Both the transmitter and the receiver are tuned to the same transmitting and receiving frequency. At the receiver end, the electrical signal is amplified, converted back to an acoustical waveform and conveyed to the listener. Phonak – Media Release re Product Offerings in F2003/2004 at Page 3 **Phonak Communications introduces the new MicroLink receivers with frequency synthesizer** Phonak Communications will introduce its new multi frequency MLx S and ML8 S receivers in the next few months. MLx S and ML8 S are the counterpart of Campus S transmitters, already introduced early 2002. Together, they comprise the new synthesized FM system generation, a system that transmits, without wires, speech to the hearing instrument in difficult listening situations. The key technology of the new system is its easy frequency adaptation. Given the extreme design constraints (low voltage, low power, miniature dimensions), the development of this technology represents an unprecedented breakthrough in wireless communication technology. Phonak – Microlink User Guide at Page 2 The desired signal – for example, a speaker's voice or the sound from a TV – is picked up by the microphone which is placed near to the source of the sound. The transmitter sends an FM signal to the receiver, which immediately relays this to the hearing instrument for you to hear – crystal clear!

Claims	Prior Art
	Phonak – Microlink User Guide at Page 2  Phonak – Microlink User Guide at Page 6 **The direct-input technique** Using the audio cable supplied with the system, the HandyMic can be connected directly to any sound system, including a TV, radio, walkman, movie projector, amplifier, cassette-player etc.  Phonak – Microlink User Guide at Page 17 ***TX2*** **Description** ① Microphone socket ② On/Off switch ③ Audio input socket for connecting TX2 directly to external audio equipment (e.g. TV, radio, tape recorder etc.) ④ Color code for channel identification ⑤ Number code for exact channel identification ⑥ Battery compartment ⑦ Low battery warning light ⑧ Clip with name and address label 

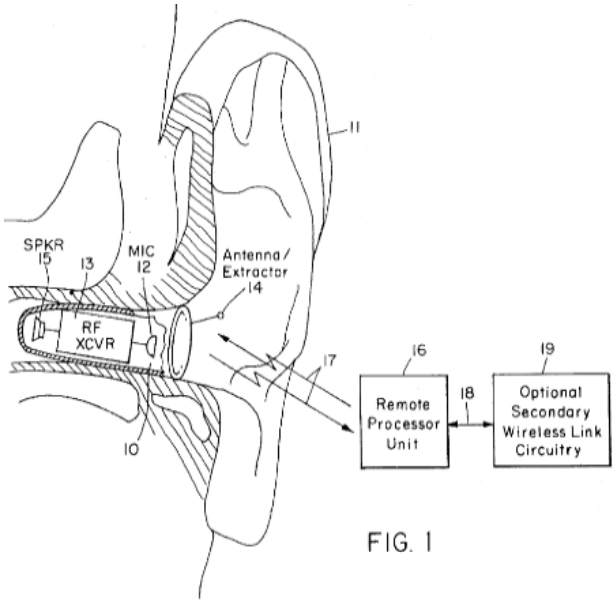
Claims	Prior Art
	Phonak – Microlink User Guide at Page 35  **RX2 receiver PFM-1/COM-1** **Description** ① Output socket ② Hearing instrument connecting cable with integrated aerial ③ Plug-in, color-coded frequency module ④ Number code for exact channel identification ⑤ Battery compartment ⑥ Low battery indicator light ⑦ No transmission warning indicator ⑧ On/Off switch ⑨ Clip with name and address label ⑩ Volume control ⑪ PFM-1: frequency correction switch (D/N) COM-1: output impedance switch (L/N) ⑫ Hearing instrument microphone attenuating switch (only available on PFM receivers) Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 3 The transmitter can be worn around the neck, in a pocket, or set on a table. There is a coated wire antenna approximately 12" long attached to the transmitter. The authors found it beneficial to tape the antenna to the neck loop cord provided with the system. This keeps the antenna from moving around where it is prone to getting caught on clothing or other objects. We have had several patients who returned with the antenna broken or who had the protective tip come off. The TX3 can be plugged into external sources such as television, radio, CD players, etc. Judging from anecdotal reports, this feature has increased our study participants' enjoyment of TV and music substantially. They have been amazed at how they can walk out of a room and still hear the music or TV program. It has added a lot of flexibility to their lives. Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 3 There is also a new phone transmitter called the TX4 or Tel-Com (Figure 2). It is a conical space-age-looking device that attaches to the phone. It can also be used as an external sound source for television, radio, CD players, etc. This can serve as more of a permanent system than the TX3, which has to be hooked/unhooked from an external source. Therefore, a patient

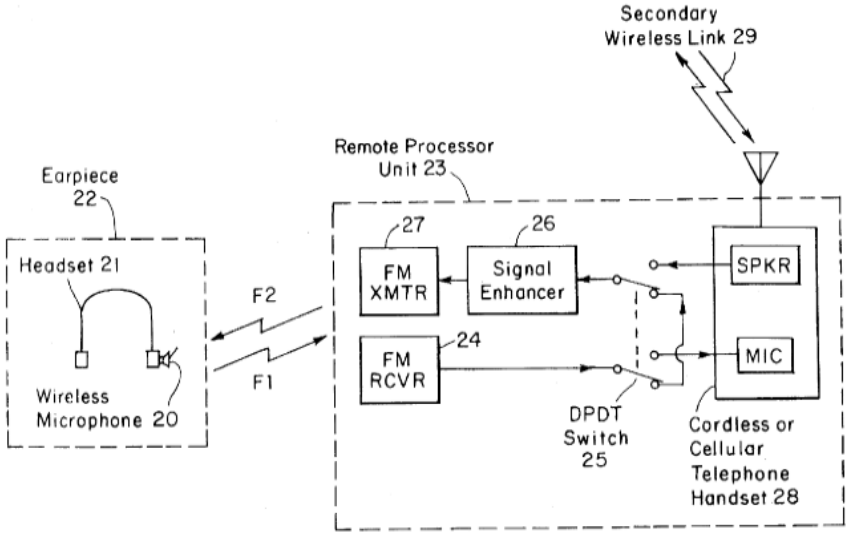
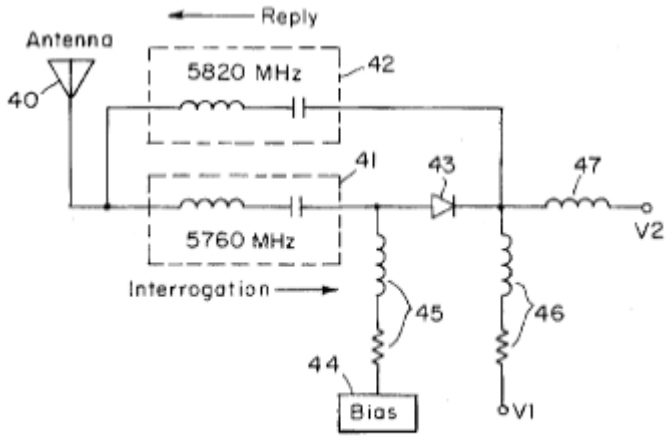
Claims	Prior Art
	Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 4 The TX4 can be used for television, radio, stereo, or CD player, making it flexible for external sound sources. It also allows for binaural hearing on the telephone. Or, if the patient has good dexterity, he/she can have one ear listening to the phone and one to the room conversation, if needed. Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 7 • A patient who uses 332 Power AudioZooms with 8% and 20% discrimination had not been able to use the phone for the past few years. After using the TX4, he has been able to communicate on the phone and he feels that his understanding on the phone is now about 95%. • A patient with a severe-to-profound unilateral hearing loss with 28% discrimination has been struggling to use the phone. He tried the TX4 and this allowed him to hear well on the phone for the first time in many years. TelCom User Guide at Page 2 Thank you for choosing the TelCom FM transmitter. The TelCom is a high-quality Swiss made product from Phonak, a world leader in hearing technology, innovation and reliability. It enhances communication on the telephone and optimizes hearing when watching television, or listening to other audio equipment (e.g. radio, CD player, personal computer,...). The wireless TelCom FM transmitter (FM = Frequency Modulation) sends the sound (e.g. television or telephone) to the FM receivers on the hearing instruments of the person listening. We recommend that you read this manual carefully to fully benefit from the many TelCom features. With proper care and usage, your TelCom will support your listening and communication needs for many years. Phonak – the leader in FM communication.

Claims	Prior Art
	TelCom User Guide at Page 3  What is TelCom • TelCom is a stationary FM transmitter. • It boosts the sound from television or any other audio equipment (e.g., Personal Computer, CD-player, radio) without disturbing others. • It allows you to hear the telephone ringing at any time. • The television sound is switched off automatically when the telephone is answered. • The person calling can be heard loud and clear. • When the telephone receiver is replaced, the television sound will return automatically. • To use this system hearing instruments fitted with FM receivers are required. Lewis – Speech perception in noise: directional microphones (2004) at Page 428  study participants. These subjects used a Phonic Ear 805 CD BTE hearing instrument that had the capability to switch between omnidirectional and directional microphone modes. The Phonic Ear 441T microphone transmitter and the Phonic Ear 445R FM receiver served as the FM system. Speech Lewis – Speech perception in noise: directional microphones (2004) at Page 429  FM technology was used. As previously mentioned, Phonak Corporation developed a new personal FM system receiver, the Phonak Microlink, which does not utilize wires or a body-worn box like its predecessors. This

Claims	Prior Art
	Lewis – Speech perception in noise: directional microphones (2004) at Page 429 (2) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the omnidirectional microphone mode; (3) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the directional (adaptive) microphone mode; (4) monaural digital Phonak Claro 311 dAZ BTE HA utilized with one Phonak Microlink FM receiver with the EM attenuated (FM-only mode) and one Phonak Claro 311 dAZ BTE HA in the omnidirectional microphone mode worn on the opposite ear; and (5) binaural digital Phonak Claro 311 dAZ BTE hearing aids utilized with binaural Phonak Microlink FM receivers with the EM attenuated (FM-only mode). Lewis – Speech perception in noise: directional microphones (2004) at Page 431 All subjects were fit with digital Phonak Claro 311 dAZ BTE hearing aids bilaterally. All earmolds had select-a-vent (SAV) venting and #13 or 3 mm horn tubing. In addition to the hearing aids, subjects were fit with Phonak Microlink ML8 FM receivers bilaterally. These FM receivers attach to the bottom of a BTE hearing aid and may be utilized in either the "FM only" mode, which attenuates the hearing aid microphone by 20 dB, or in the FM plus hearing aid mode, which allows for FM input and input of environmental sounds via the hearing aid microphones simultaneously at the same output level. The Phonak TX3 HandyMic FM transmitter served as the FM transmitter. This transmitter has three microphone options: (1) Wide Angle, which picks up sounds arriving from all directions around the transmitter microphone equally; (2) Zoom, which provides reduced amplification to signals arriving from the rear (cardioid); and (3) SuperZoom, which provides reduced amplification to signals originating from the rear and the sides (hypercardioid). The

Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 11 *5. Telecoil use in church, theatre, or cinema (optional feature)* An increasing number of churches, theatres and public buildings have assistive listening devices installed, usually induction loops. These systems send out wireless sound to be intercepted by the telecoil in your hearing instruments. Ask your hearing care professional for details. Oticon – DigiFocus White Paper (1996) at Page 11 Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses that its earpiece is configured to receive sounds from the ambient environment from a wireless device (e.g., input signals), to be wirelessly transmitted to the earpiece (e.g., broadcast), after the signals are up–converted by the RPU. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system

Claims	Prior Art
	operation. Anderson ’783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson '783 at FIG. 2  FIG. 2 Anderson '783 at FIG. 4  FIG. 4

Claims	Prior Art
	Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design.

Claims	Prior Art
	Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 6:50–52 For widespread application, it is preferred that the system allow operation of many units in close proximity without mutual interference. Anderson ’783 at 10:21–24 Replies from the earpiece 10 transponder 13 to the RPU 16 reply processor contain a synchronizing pulse, audio data from the earpiece 10 to the RPU 16, an auxiliary bit and a parity bit.

Claims	Prior Art
	Anderson ’783 at 12:20–32 During the reply interval 52, a modulated (via modulator 830) low-power 60 MHz oscillator 835 is applied to voltage point V1, causing the diode 43 to turn on and off at a 60 MHz rate and act as a mixer. The mixer diode 43 generates frequency components centered at the difference frequency of 5700 MHz and the sum frequency of 5820 MHz. The 5820 MHz sum component passes through the resonator 42, and forms the reply which is wirelessly transmitted from the earpiece transponder antenna 40 to the RPU reply processor circuitry. The earpiece 60 MHz oscillator 835, which is only turned on during the reply interval, changes phase at specified points in time to generate the DPSK reply data. Anderson ’783 at 14:2–13 When the RPU interrogator must communicate with more than one earpiece transponder, the time slot and antenna selection information is stored in the RPU DSP 948 separately for each transponder. The time slot selection procedure may or may not force other interrogators to change their time slot selections due to interference, depending on relative geometry considerations described later in this section. For all cases, however, the procedure just described allows large numbers of similar units to operate in close proximity even under conditions of worst-case mutual RF interference geometry. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as

Claims	Prior Art
	optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. A POSITA would have been motivated to combine DHA Systems and the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a wireless receiver configured to wirelessly receive the up-converted signals;	DHA Systems and Anderson '783 expressly or inherently disclose "a wireless receiver configured to wirelessly receive the up-converted signals." DHA Systems include Receivers and/or Digital Hearing Aids (e.g., the claimed "wireless receiver") which receive audio signals from the Transmitters. The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 15

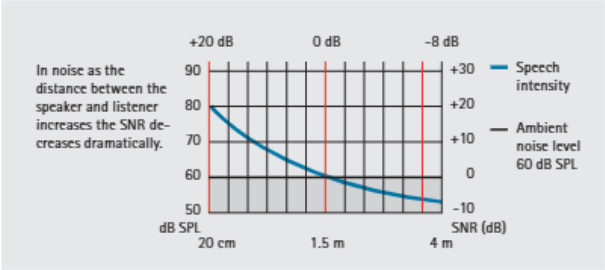
The perfectly integrated communication system

FM MicroLink

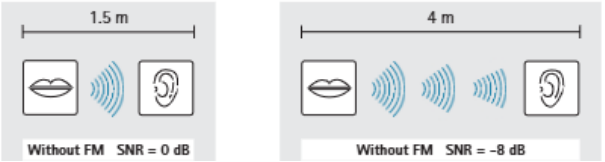
FM technology has allowed thousands of children to participate in standard education settings and to be actively involved in social activities. Phonak pioneered this development and the integration of FM into hearing instruments to produce communication systems that are effective in even the most demanding situations. Since the innovation of miniaturized Phonak **MicroLink** systems, FM has become an important solution also for adults with a high communication need in work and leisure environments.

All Perseo BTEs have been designed to incorporate MicroLink with its fully integrated appearance and operation. This integrated system is unique to Phonak.

Speech-to-Noise Ratio (SNR) as a function of distance between speaker and listener



Speech-to-Noise Ratio without FM is distance dependent



Claims	Prior Art
	Phonak – Perseo Brochure at Page 20 

Claims	Prior Art
	Phonak – Perseo Brochure at Page 28

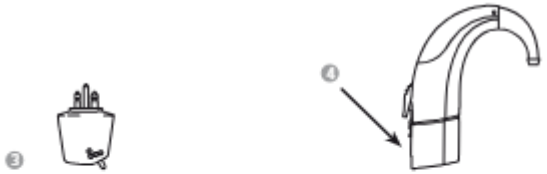


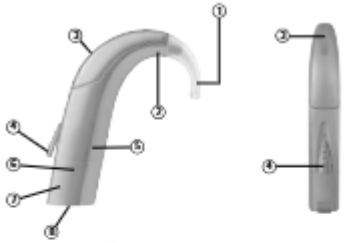
Claims	Prior Art
	Phonak – BTE Elite Article at Page 1 **Perseo – the outstanding features place Perseo in a class of its own** • **Personal*Logic*** makes Perseo the first digital hearing system with personalized automatic operation. **Personal*Logic*** selects the appropriate base program and continually adapts its parameters to suit the needs of the wearer. • **Dual-base automatic** allows processing and features to be separately adjusted for quiet and noisy situations for optimum automatic performance. Adjustments for noise never disrupt adjustments for quiet and vice versa. • **Digital Perception Processing (DPP)** with Clarity Component Enhancement: Increased clarity and sound quality also in loud environments. Processing in 20 critical bands. • **Personal System Managers**: Experience Manager, Dynamic Feedback Manager, Occlusion Manager, and Listening Situation Manager for easy and individual adjustment of Personal*Logic*. • **Multi-programs** • **Fast tracking Adaptive digital AudioZoom (dAZ)** to separate actively speech from background noise. • **Fine-scale Noise Canceler** in 20 channels. • **TacTronic program switch** • **Optional remote control** • **FM compatible** • **Wind and weather protection** • **Fashion Color Line** (choice among 12 attractive colors)

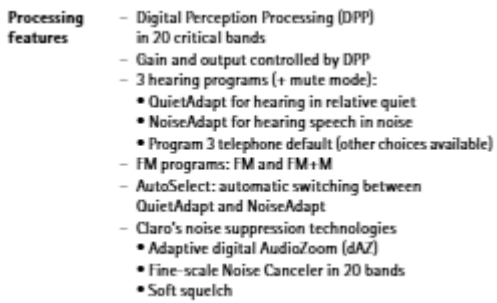
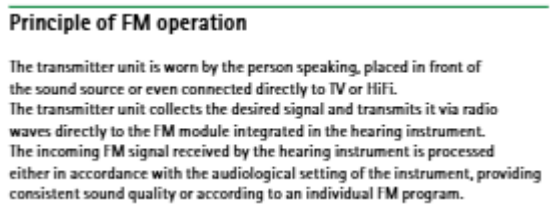
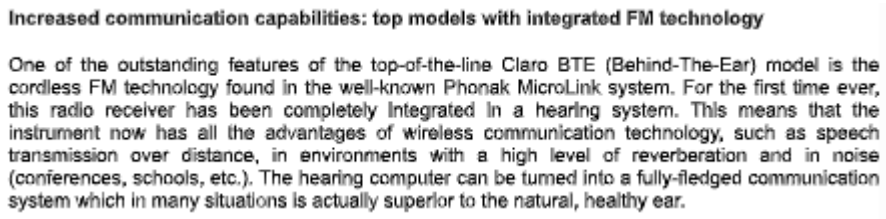
Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 2 People with sensorineural hearing loss need a more favorable signal-to-noise ratio to understand speech than do normal hearing listeners. Research has shown that hearing impaired listeners may require signal-to-noise improvements of 4 dB to 18 dB, depending on the magnitude of their hearing loss to achieve word-recognition scores equivalent to those with normal hearing. FM systems are able to improve the signal-to-noise ratio. FM systems improve the user's ability to understand speech in the presence of noise. Since the sound is delivered by FM radio waves, the strength and quality of the sound remains constant (across the operational distance) from the speaker to the hearing impaired individual. FM systems consist of a microphone usually placed four to six inches from the sound source, and a transmitter, which sends the signal via radio waves directly to the miniature FM receiver, which is connected to the personal hearing instrument. In other words, the entire FM system is a complete broadcasting and receiving system. Importantly, when using FM systems, the effects of background noise and reverberation are minimal. These factors help reduce background noise while enhancing and stabilizing the main sound source. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4 Phonak FM systems operate on an FM radio signal in the 216-217 MHz bands. These bands have been assigned by the FCC for use with equipment by the hard of hearing. There are 23 narrow band channels available from Phonak in this frequency range. In order for the transmitter and receiver to operate as a system, they must be on the same frequency or 'channel'. All Phonak FM transmitters and receivers are compatible with every other model of transmitter and receiver in the Phonak product line. Each transmitter and receiver channel 'frequency' is identified with a number. The number of the transmitter and FM receiver must be the same for these units to function together correctly. FM Transmitters and FM Receivers are available in many sizes and shapes to offer increased functionality. We will detail some of the Phonak equipment below:

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 7 **1- MicroLink ML3-7**  MicroLink is the smallest FM receiver available on the market today. It is integrated in an audio shoe that simply clips on to the hearing instrument. It can remain locked in place or removed again in seconds. AFC (automatic frequency control) effectively prevents distortion. The soft-squelch system suppresses noise. The ML7 FM receiver features the ability to easily switch between numerous frequency channels. The MicroLink receivers are compatible with all Phonak BTE instruments. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 7 **2- MicroLink MLx**  This miniature FM receiver is compatible with all Phonak BTE instruments and has a standardized Euro connector that allows it to be used with most other makes of BTE hearing aids on the market today. Many leading hearing aid manufacturers such as Oticon, GN Resound, Siemens, Sonic Innovations, Unitron, and Widex have developed mechanical interfaces that allow users to combine their BTEs with MicroLink MLx. This close cooperation with other major hearing instrument manufacturers has dramatically expanded FM benefits for hearing-impaired children and adults. The small, cubed-shaped MicroLink MLx attaches directly to the base of the audio shoe and receives FM signals from all Phonak wireless transmitters. The MLx 'Universal' FM receiver has a three-position switch. The three-position switch allows the MLx user to change the function of the wireless receiver as listening conditions change.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 8 **3- MicroVox RX2 COM-1**  The MicroVox RX2 COM-1 is a small and lightweight FM receiver. With the COM-1 audio interface, the connection of an induction loop is very simple. The loop is worn around the neck, and the hearing aids receive the signal inductively via the telephone coil. A special feature of the MicroVox RX2 COM-1 is that it can also be connected to the audio input of the speech processor in a cochlea implant. Most implant manufacturers use compatible audio inputs. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 8 **4- MicroVox RX2 PFM-1**  This FM receiver has a direct output for hearing instruments so it can be connected to the audio shoes of Phonak BTEs and other BTE instrument makes. Like the COM-1, this FM receiver has easily interchangeable plug-in frequency modules. The color-coded

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 9 **5- Claro dAZ FM**  Claro dAZ FM combines two highly advanced systems for signal processing and signal reception. The Signal-to-Noise Ratio is dramatically improved with Digital Perception Processing, Adaptive digital AudioΣoom, the Fine-scale Noise Canceler, and Phonak's FM technology. The FM functions can be controlled directly at the instrument with the TacTronic switch or with the SoundPilot FM or WatchPilot remote controls. Phonak Campus-S-User-Manual at Page 4  ③ MLxS: Miniaturized multi-frequency FM receiver for BTE instruments from Phonak and most other manufacterers. ④ Perseo/Claro dAZ FM: Miniaturized multi-frequency FM receiver with the same functionality as the MLxS, integrated with the shell design.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 1 Digital, automatic, BTE hearing instrument with FM module integrated into the streamlined housing. Featuring Phonak's Digital Perception Processing (DPP), three hearing programs and automatic program selection for quiet and for environments with speech in broadband noise. Includes Adaptive digital AudioZoom for optimization of Speech in noise and the Fine-scale Noise Canceler. Manual control via the TacTronic switch or the optional mini remote control SoundPilot FM or the remote control WatchPilot. Phonak – Claro 211 Product Information at Page 1 **FM features** – World's smallest FM microchip – Compatible with all Phonak FM transmitters – Cordless TV and Radio link up – FM performance corresponding to audiological fitting – Soft Squelch system – Built in antenna – Band H (173–185 MHz); band J (186–201 MHz); band N (207–217 MHz) Phonak – Claro 211 Product Information at Page 1  ① Ear hook HE4 330 ② Broadband receiver ③ Miniature electret dual microphones (protected inputs) ④ TacTronic switch ⑤ FM socket with BTE serial number and integrated programming socket ⑥ FM module ⑦ Battery compartment with FM module serial number ⑧ Battery cover combined with optional L/R identification and/or tamperproof system

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 1  **Processing features** – Digital Perception Processing (DPP) in 20 critical bands – Gain and output controlled by DPP – 3 hearing programs (+ mute mode): • QuietAdapt for hearing in relative quiet • NoiseAdapt for hearing speech in noise • Program 3 telephone default (other choices available) – FM programs: FM and FM+M – AutoSelect: automatic switching between QuietAdapt and NoiseAdapt – Claro's noise suppression technologies • Adaptive digital AudioZoom (dAZ) • Fine-scale Noise Canceler in 20 bands • Soft squelch Phonak – Claro 211 Product Information at Page 2  **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program. Phonak Claro – A World First from Phonak at Page 1  **Increased communication capabilities: top models with integrated FM technology** One of the outstanding features of the top-of-the-line Claro BTE (Behind-The-Ear) model is the cordless FM technology found in the well-known Phonak MicroLink system. For the first time ever, this radio receiver has been completely integrated in a hearing system. This means that the instrument now has all the advantages of wireless communication technology, such as speech transmission over distance, in environments with a high level of reverberation and in noise (conferences, schools, etc.). The hearing computer can be turned into a fully-fledged communication system which in many situations is actually superior to the natural, healthy ear. Phonak Claro – Remote control WatchPilot and Claro dAZ at Page 1  **Claro from Phonak, the first bionic, fully digital hearing computer, sets new standards in hearing instrument technology. At the 45th International Congress of Hearing Aid Acousticians in Cologne (October 5 – 7) the Swiss company, whose name is synonymous with high-tech innovation, presents two more world-firsts: WatchPilot, a wristwatch with an integrated hearing system remote control, and Claro dAZ FM hearing computers, a fully digital hearing system with an integrated miniature radio receiver. At the same time, Phonak will be unveiling Claro 311 dAZ, the most powerful behind-the-ear instrument in the Claro line to date. "The new products represent major advances in hearing instrument technology," says Peter Pfluger, CEO of the Phonak Group. "We are giving hearing impaired individuals an improved quality of life and helping to turn the hearing instrument into a modern communication system."**

Claims	Prior Art
	Phonak Claro - Technology of the Digital Future at Page 2  Claro - integrated FM receiver FM technology The first hearing computer with an integrated FM receiver. Interference-free communication, even with high levels of noise or echo, or at a distance, are the advantages offered by the design of the Claro series - integrating the smallest and most highly-developed FM system in the world. Phonak Claro – World Premiere at Page 1 **Cutting-edge chip technology points the way forward** This phenomenal technical breakthrough is based on six years of intense research and development work during which it was possible for the first time ever to fully integrate psychoacoustic perception models of the ear. As a result, it has been possible to simulate the function of the so-called "20 critical bands" in the inner ear and to achieve an unprecedented natural hearing experience. This sophisticated, highly complex system goes by the name *Digital Perception Processing (DPP)* and is based on the most advanced chip generation currently available. The chip architecture is built around 0.25µm technology, which permits *Fast Fourier Transformation (FFT)* processes combined with very low power consumption. According to Andreas Rihs, it means there is still a great deal of potential for extending the chip's performance and this opens the door to some highly interesting developments on the same chip basis in the future. **The advent of a genuine communication/hearing computer** The impressive, state-of-the-art technology is combined with an exclusive, all-round communication concept based on the components *Digital Perception Processing (DPP), AutoSelect, Adaptive digital AudioZoom und Fine-scale Noise Canceler.* It provides a decisive boost to the power of the audiological solution and, with it, the benefits to the user. The Adaptive digital AudioZoom automatically locates and suppresses the main source of noise and at the same time clearly separates the voice of the person speaking within the listener's field of vision. The result of this is a positive signal-to-noise ratio on a scale that has never been achieved before. To round it off, the top model in the new Claro range is the first ever to feature the wireless FM technology found in the well-known MicroLink system and thus has all the advantages of wireless communication technology, such as speech transmission over distance in noisy surroundings (conferences, schools, etc.). As a result, the hearing computer has undergone a definitive transition to a communication/hearing computer, which in many situations is indisputably superior to the human ear.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

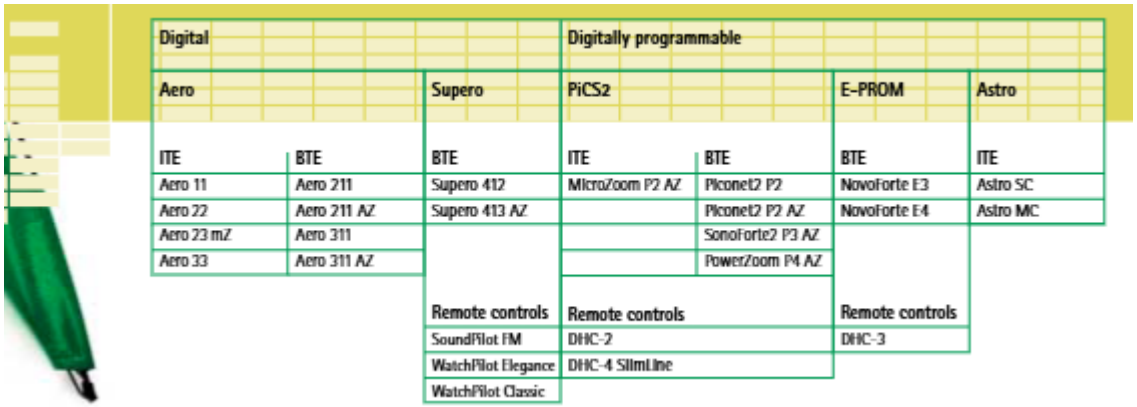
Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 9

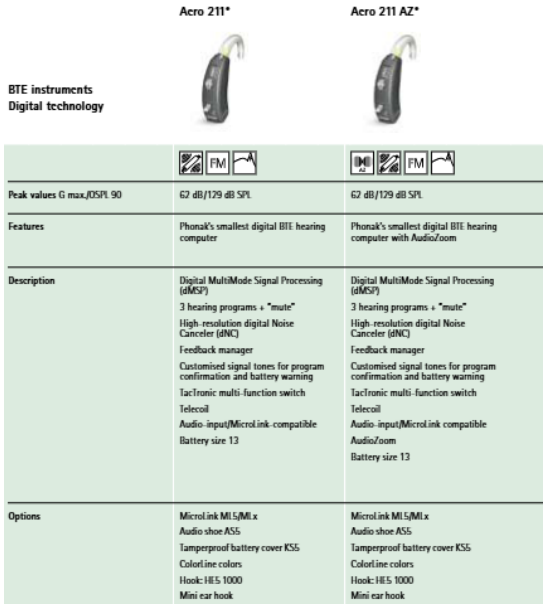
	Claro 111 dAZ Claro 111 dAZ FM	Claro 211 dAZ Claro 211 dAZ FM	Claro 311 dAZ Claro 311 dAZ FM
BTE instruments			
	FM	FM	FM
Peak values G max./OSPL 90	52 dB/126 dB SPL	62 dB/135 dB SPL	72 dB/135 dB SPL
Features	Specially designed for steep high-frequency and mild hearing losses	Digital speech transparency	Digital speech transparency and higher gain
Description	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (111 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (211 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (311 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection
Options	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)
Programming	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital, Phonak Digital Ski Slope and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)

Phonak – Collections 2002 Product List at Page 11



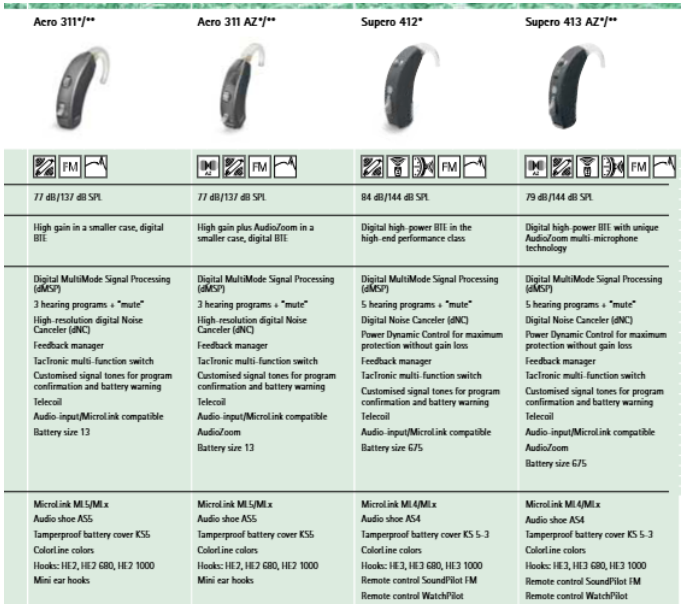
Digital			Digitally programmable			
Aero		Supero	PiCS2		E-PROM	Astro
ITE	BTE	BTE	ITE	BTE	BTE	ITE
Aero 11	Aero 211	Supero 412	MicroZoom P2 AZ	Piconet2 P2	NovoForte E3	Astro SC
Aero 22	Aero 211 AZ	Supero 413 AZ		Piconet2 P2 AZ	NovoForte E4	Astro MC
Aero 23 mZ	Aero 311			SonoForte2 P3 AZ		
Aero 33	Aero 311 AZ			PowerZoom P4 AZ		
		Remote controls	Remote controls		Remote controls	
		SoundPilot FM	DHC-2		DHC-3	
		WatchPilot Elegance	DHC-4 SlimLine			
		WatchPilot Classic				

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



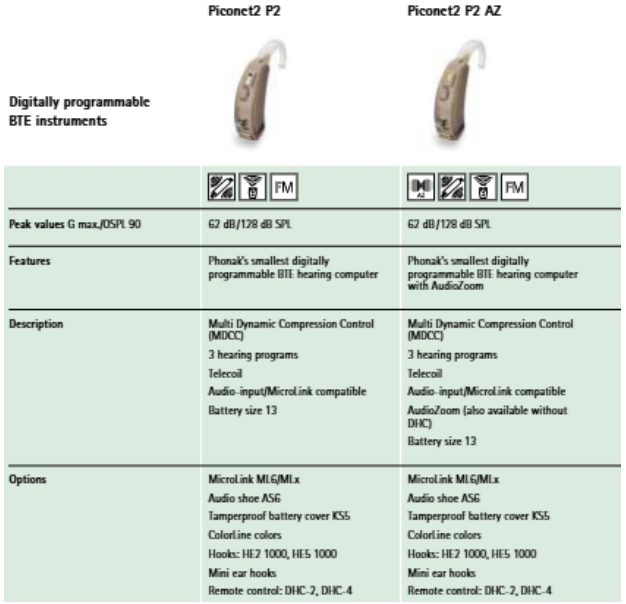
BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 17



Aero 311*/**	Aero 311 AZ*/**	Supero 412*	Supero 413 AZ*/**
77 dB/137 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL	79 dB/144 dB SPL
High gain in a smaller case, digital BTE	High gain plus Audio/zoom in a smaller case, digital BTE	Digital high-power BTE in the high-end performance class	Digital high-power BTE with unique Audio/zoom multi-microphone technology
Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 13	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 675
MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18



Digitally programmable BTE instruments	Piconet2 P2	Piconet2 P2 AZ
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 19

	SonoForte2 P3 AZ	PowerZoom P4 AZ	NovoForte E3	NovoForte E4
				
	FM	FM	FM	FM
	77 dB/137 dB SPL	79 dB/144 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL
	High gain plus AudioZoom in a smaller case	High gain and AudioZoom	2 switch-selectable programs	Phonak's most powerful digitally programmable BTE instrument
	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675
	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS6 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 21

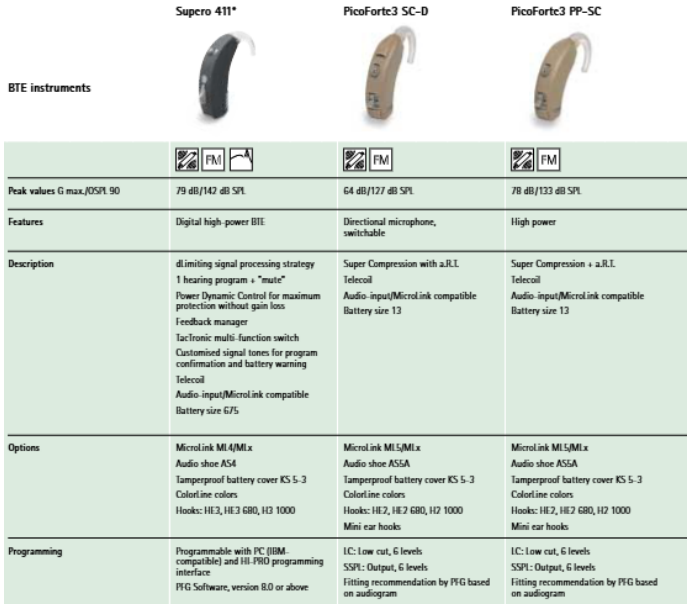
Value Line features:

- Digital technology as well as proven, modern analog technology, full FM compatibility
- Calibrated settings of the AudioProgrammer switch reproducible at all times
- Superior amplifier power with excellent acoustic quality
- Reliable, easy-to-service instruments



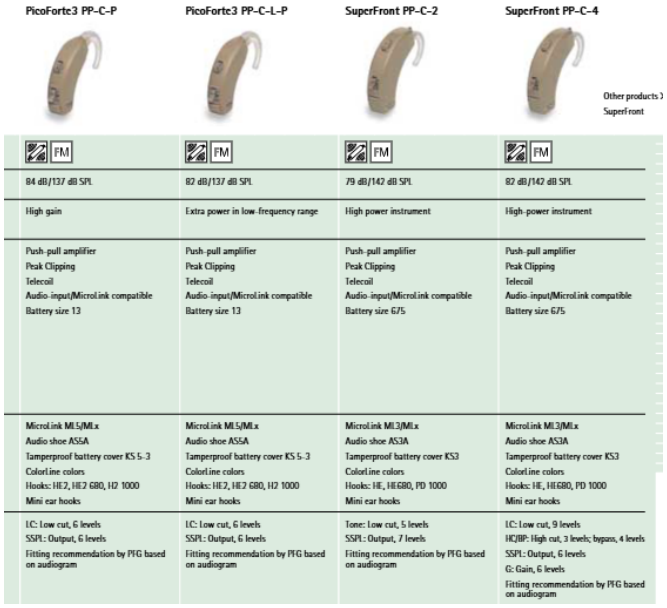
Classica Classica C-D SuperFront

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 24



BTE instruments	Supero 411*	PicoForte3 SC-D	PicoForte3 PP-SC
	FM	FM	FM
Peak values G max./OSPL 90	79 dB/142 dB SPL	64 dB/127 dB SPL	78 dB/133 dB SPL
Features	Digital high-power BTE	Directional microphone, switchable	High power
Description	dLimiting signal processing strategy 1 hearing program + "mute" Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 13	Super Compression + a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 13
Options	MicroLink MLA/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, H3 1000	MicroLink MLS/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink MLS/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks
Programming	Programmable with PC (IBM-compatible) and HI-PRO programming interface PFG Software, version 8.0 or above	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 25

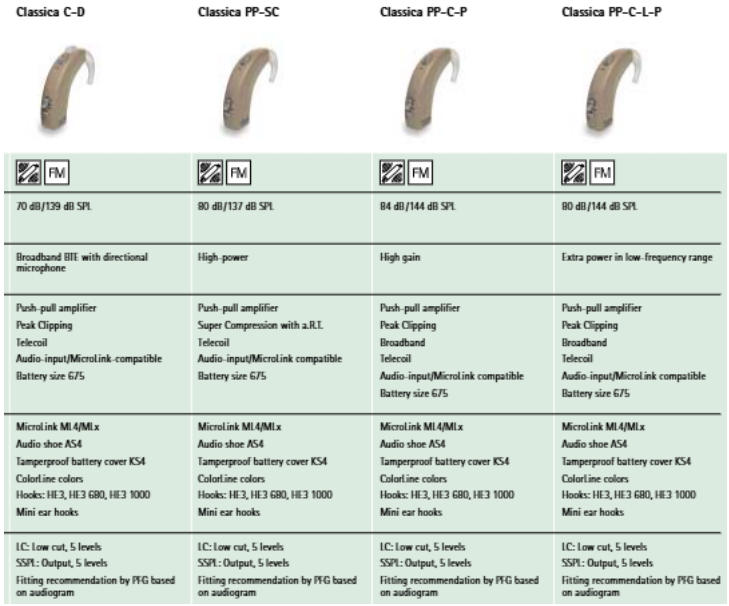


PicoForte3 PP-C-P	PicoForte3 PP-C-L-P	SuperFront PP-C-2	SuperFront PP-C-4
			Other products) Superl·ront
FM	FM	FM	FM
84 dB/137 dB SPL	82 dB/137 dB SPL	79 dB/142 dB SPL	82 dB/142 dB SPL
High gain	Extra power in low-frequency range	High power instrument	High-power instrument
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks
LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	Tone: Low cut, 5 levels SSPL: Output, 7 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels HC/BP: High cut, 3 levels; bypass, 4 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 26

BTE instruments	SuperFront PP-C-L-4 SuperFront PP-C-L-4+	SuperFront PP-SC	Classica AGC
			
	FM	FM	FM
Peak values G max./OSPL 90	82 dB/142 dB SPL (PP-C-L-4) 81 dB/142 dB SPL (PP-C-L-4+)	82 dB/140 dB SPL	65 dB/133 dB SPL
Features	High-power low-freq. range (PP-C-L-4) Super low-freq. instrument (PP-C-L-4+)	High-power	AGC-O with a.R.T.
Description	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Broadband response Telecoil Audio-input/MicroLink compatible Battery size 675
Options	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
Programming	LC: Low cut, 9 levels HC: High cut, 6 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels BP/HC: Bypass, 6 levels; high cut, 3 levels SSPL: Output, 9 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 27



Classica C-D	Classica PP-SC	Classica PP-C-P	Classica PP-C-L-P
FM	FM	FM	FM
70 dB/139 dB SPL	80 dB/137 dB SPL	84 dB/144 dB SPL	80 dB/144 dB SPL
Broadband BTE with directional microphone	High-power	High gain	Extra power in low-frequency range
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink-compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Phonak – Collections 2002 Product List at Page 29



Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 30

MLx, the most flexible FM receiver ever made, can be used not only with Phonak BTEs but also with most third-party hearing instruments available on the market today. This is possible thanks to the standard Euro connector which simply plugs into the audio shoe of the hearing instrument.

Once again, Phonak demonstrates its commitment to innovative developments that serve hearing-impaired adults and children.

MLx compatible BTE makes:

- Argosy
- Audifon
- Beltone
- Danavox
- GN ReSound
- Hansaton
- Interton
- Oticon
- Philips
- Phonak
- Rexton
- Siemens
- Sonic Innovations
- Unitron
- Widex







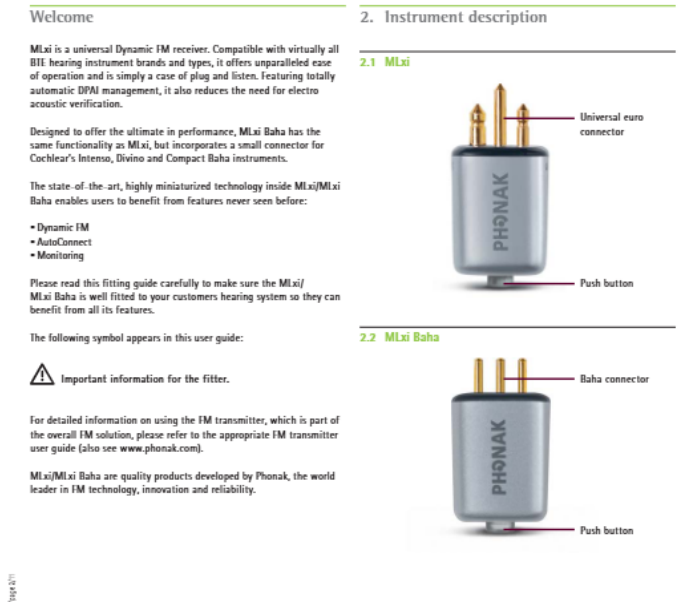


Detailed, up-to-date compatibility lists of Phonak's MLx MicroLink receiver are available online at:

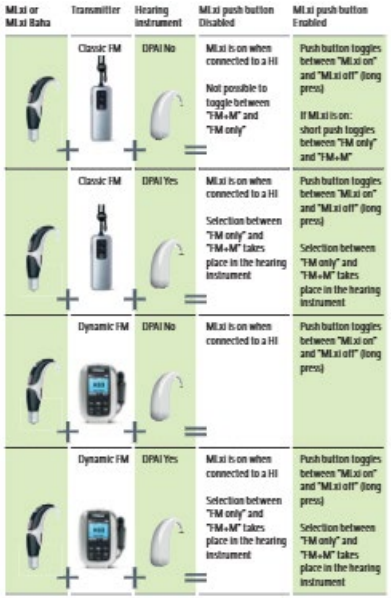
www.phonak.com/mlx

Phonak – Collections 2002 Product List at Page 31

Phonak FM provides a dramatic improvement of speech intelligibility because the signal is picked up directly at the source (the speaker's voice, the television's audio channel, or the telephone receiver) and is then transmitted without wires to the miniaturised receiver. The receiver (Phonak MicroLink MLx or MicroVox RX2) supplies a high-quality signal directly to the speech processor of the user's cochlear implant.

Claims	Prior Art
	Phonak – Fitting Guide for MLxi and MLxi Baha at Page 2  Welcome MLxi is a universal Dynamic FM receiver. Compatible with virtually all BTE hearing instrument brands and types, it offers unparalleled ease of operation and is simply a case of plug and listen. Featuring totally automatic DPAI management, it also reduces the need for electro acoustic verification. Designed to offer the ultimate in performance, MLxi Baha has the same functionality as MLxi, but incorporates a small connector for Cochlear's Intenso, Divino and Compact Baha instruments. The state-of-the-art, highly miniaturized technology inside MLxi/MLxi Baha enables users to benefit from features never seen before: • Dynamic FM • AutoConnect • Monitoring Please read this fitting guide carefully to make sure the MLxi/ MLxi Baha is well fitted to your customers hearing system so they can benefit from all its features. The following symbol appears in this user guide: Important information for the fitter. For detailed information on using the FM transmitter, which is part of the overall FM solution, please refer to the appropriate FM transmitter user guide (also see www.phonak.com). MLxi/MLxi Baha are quality products developed by Phonak, the world leader in FM technology, innovation and reliability. 2. Instrument description 2.1 MLxi Universal euro connector PHONAK Push button 2.2 MLxi Baha Baha connector PHONAK Push button Phonak – Fitting Guide for MLxi and MLxi Baha at Page 5 However, MLxi can also be used with the following Classic FM transmitters: Campus SX, EasyLink, ZoomLink, SmartLink and Classic FM inspiro. For these combinations, there is no Adaptive FM Advantage feature, which automatically adjusts the FM Advantage in noisy environments, and no Voice Activity Detection, which automatically reduces the FM level when no voice is present at the transmitter microphone. In those cases the user needs to have the chance to select between "Off", "FM only" and "FM+M", as with a Classic FM receiver. For DPAI Yes hearing instruments this selection takes place by toggling between different HI programs such as "no FM", "FM only" and "FM+M". For DPAI No hearing instruments this selection takes place on the receiver.

Claims	Prior Art
	Phonak – Fitting Guide for MLxi and MLxi Baha at Page 6



Phonak – History of Various Hearing Aid Manufacturers at Page 5

MLxS – The breakthrough in miniaturized multi-frequency FM

The digital frequency synthesizer is the heart of the revolutionary multi-frequency MLxS. This technology breakthrough, the result of years of meticulous development work, offers totally new communication possibilities.

2002

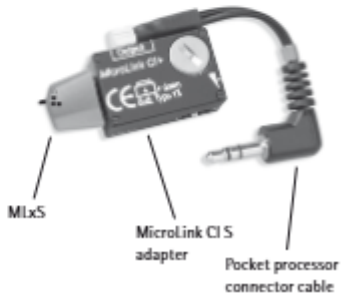
CEO Peter Pfluger leaves Phonak. New CEO Dr. Valentin Chapero Rueda joins the company on October 1, 2002.

Phonak – History of Various Hearing Aid Manufacturers at Page 6

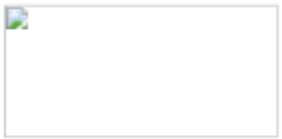
Claro dAZ FM

Claro dAZ FM is the world's first digital hearing computer with design integrated FM receiver. The two most advanced systems for signal processing and FM signal reception now form a perfect combination of function and design. The result is optimized speech understanding in all adverse conditions involving distance, reverberation and noise.

Claims	Prior Art
	Phonak – History of Various Hearing Aid Manufacturers at Page 6 **MicroLink MLx – The open platform for Phonak and other brands** The first self-contained receiver with a standard interface enabling connection to all Phonak instruments and most other behind-the-ear hearing instruments. Phonak – Lewis Article re ML8 Improving Speech Perception in Noise with Directional Microphones and Frequency Modulation (FM) Technology (2002) at Page 2 Personal FM systems have also been shown to improve speech intelligibility in noise (Hawkins, 1984; Fabry, 1994; Crandell & Smaldino, 2000). Past investigations have demonstrated that the utilization of FM technology can improve speech intelligibility in noise by as much as 20-25 dB (see Crandell and Smaldino, 2000). With a personal FM system, the speaker's voice is picked-up via FM wireless microphone located near the speaker's mouth - where the effects of reverberation, distance, and noise are minimal. The FM system converts the acoustic signal to an electrical waveform at the microphone, and the signal is transmitted via FM signal, from the transmitter to the receiver. Both the transmitter and the receiver are tuned to the same transmitting and receiving frequency. At the receiver end, the electrical signal is amplified, converted back to an acoustical waveform and conveyed to the listener. Phonak – Media Release re Product Offerings in F2003/2004 at Page 3 **Phonak Communications introduces the new MicroLink receivers with frequency synthesizer** Phonak Communications will introduce its new multi frequency MLx S and ML8 S receivers in the next few months. MLx S and ML8 S are the counterpart of Campus S transmitters, already introduced early 2002. Together, they comprise the new synthesized FM system generation, a system that transmits, without wires, speech to the hearing instrument in difficult listening situations. The key technology of the new system is its easy frequency adaptation. Given the extreme design constraints (low voltage, low power, miniature dimensions), the development of this technology represents an unprecedented breakthrough in wireless communication technology.

Claims	Prior Art
	Phonak MicroLink MLxS Product Information at Page 1 The MicroLink MLxS is the first miniaturized FM receiver with a digital frequency synthesizer for full multi-frequency flexibility. The receiver features fully automatic, non-contact frequency synchronization with either a WallPilot or the Campus S. The MicroLink MLxS is compatible with all Phonak FM transmitters and the WallPilot, and is recommended for use with this equipment. **MLxS with BTE instrument**  **MLxS with adapter for CI pocket processor**  Phonak – Microlink User Guide at Page 2 The desired signal – for example, a speaker's voice or the sound from a TV – is picked up by the microphone which is placed near to the source of the sound. The transmitter sends an FM signal to the receiver, which immediately relays this to the hearing instrument for you to hear – crystal clear! Phonak – Microlink User Guide at Page 2 

Claims	Prior Art
	Phonak – Microlink User Guide at Page 6 **The direct-input technique** Using the audio cable supplied with the system, the HandyMic can be connected directly to any sound system, including a TV, radio, walkman, movie projector, amplifier, cassette-player etc.  Phonak – Microlink User Guide at Page 25 **Two versions of MicroLink MLx** MicroLink MLx is available in two versions which are differentiated by the position of the plugs. The correct version for your needs is defined by the appropriate Audio-shoe.  MLx with plugs oriented lengthways MLx with plugs oriented transversely **Important:** Place the hearing instrument with audio-shoe and MicroLink MLx in front of you as shown in the sketch. The green dots must be visible at the top and bottom of the MicroLink MLx unit. If this is not the case please contact your hearing care professional. Correct MLx version fitted to hearing instrument  Wrong MLx version fitted to hearing instrument 25

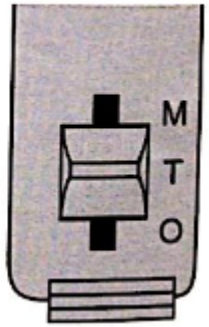
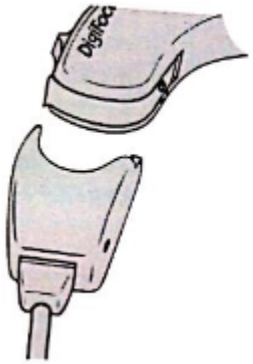
Claims	Prior Art
	Phonak – Microlink User Guide at Page 28 **Description of the MicroLink models** ① Audio-shoe ② Frequency identification code Number and color codes for exact frequency channel identification. To ensure proper reception, check that the channel and transmitter numbers are identical. ③ MicroLink receiver FM receiver with integrated antenna ④ Socket for optional external antenna (available for ML3S/ML4S/ML5S and ML6). The threaded socket accepts a screw-in antenna to extend the MicroLink reception range. ⑤ Mute switch to reduce the sensitivity of the hearing instrument microphone by 20 dB, so enhancing the effect of the FM system (only applies to ML3S/ML4S and ML5S). With the ML6, the mute function is activated via the remote control. ⑥ Frequency module with integrated antenna. This module is locked in place. For special applications the frequency module may be replaced. Your hearing care professional will explain in detail this special feature. ⑦ Release button Phonak – Microlink User Guide at p. 52 The HandyMic and MicroVox TX2 are used by hearing impaired people. To operate the HandyMic and MicroVox TX2, hearing instruments with FM receivers (e.g., MicroLink) are required. The user benefit of FM is an improved signal-to-noise ratio which leads to an optimized speech understanding even in very difficult listening situations. Phonak – Online Interview re Perseo (April 7, 2003) at Page 9 **Liz Brassine/Phonak:** It is a digital microphone on the CIC. There are several advantages of a digital microphone over analog mics. First, increased dynamic range is provided. Additionally, with a digital mic, the analog-to-digital converter is housed within the microphone itself. This eliminates the wire between the AD-converter and the microphone. The wire is the source for ultra-high frequency interference, such as Bluetooth. Phonak – Product Lines with Claro at Page 1 Elite  Complete Claro product line Claro is the first hearing instrument that analyzes and responds to auditory stimuli virtually like the healthy human ear. Thanks to the further optimization of Phonak's exclusive signal processing strategies, Claro provide a very high degree of hearing comfort and optimized speech intelligibility, particularly in difficult hearing situations. More about Elite ITE, BTE or BTE with integrated FM receiver instruments

Claims	Prior Art
	Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 2 An Example of an FM System for Adults The FM system used in this study was the MicroLink system by Phonak. This system has a receiver that is placed in an audio shoe or "boot," and the boot is snapped onto the hearing instrument over the battery door (Figure 1). Each manufacturer has its own boot, and the FM receiver (called MLx) is attached with three prongs that snap into the three holes of the boot. A switch on the bottom of the receiver offers control with the options "off," "FM-only," and "FM plus hearing aid."  *Figure 1. The MicroLink FM system snaps onto the hearing instrument over the battery door. Many manufacturers have their own boot. A switch on the bottom of the receiver allows "off," "FM only," and "FM plus hearing aid" modes.* The receiver is called the "universal receiver" because it can be used by different hearing instruments from different manufacturers. It can also be switched to a different hearing instrument from another manufacturer with a boot for that device. Therefore, if a patient is using "Hearing Aid A" with a MicroLink system, and the patient changes to "Hearing Aid B" from a different manufacturer, the MicroLink system can be used with the new aid. In this study, five different manufacturers' products were used, demonstrating the versatility of the system. (Author's Note: Many programmable or digital BTEs produced during the past six years are MicroLink compatible. Analog BTEs are usually compatible if they have direct audio input (DAI) capability.) Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 4 **Study Method** The study's 28 participants were all experienced users with behind-the-ear (BTE) hearing instruments. Of the 28 participants in the study, one patient was wearing analog aids, eight wore programmable, and 19 wore digital hearing aids. BTE devices used by the participants included: one Phonak analog power device; four Phonak 332 power AudioZoom; two Phonak 232 AudioZoom; two Phonak E-4s; three Siemens Prismas; three Siemens Signias; five Widex Senso's; four Resound BZ5s; one Oticon Digifocus; and three Phonak Claros. Twenty-two of the participants were binaural hearing instrument users and six were monaural hearing instrument users. Twenty participants were wearing devices with directional microphones. The majority of these patients utilized high-end technology devices with optimal SNR capabilities. They were already using exceptional devices that improved their hearing ability, but all were willing to try an FM system if there was the potential of improving their current benefit from the aids.

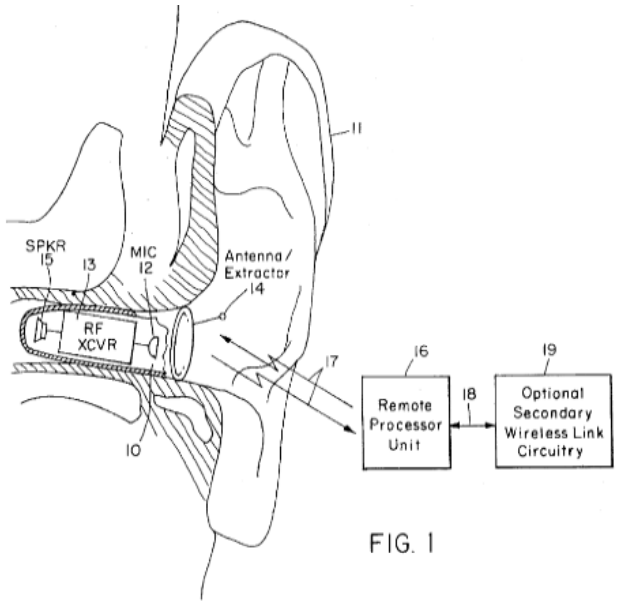
Claims	Prior Art
	Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 7 • A patient who uses 332 Power AudioZooms with 8% and 20% discrimination had not been able to use the phone for the past few years. After using the TX4, he has been able to communicate on the phone and he feels that his understanding on the phone is now about 95%. • A patient with a severe-to-profound unilateral hearing loss with 28% discrimination has been struggling to use the phone. He tried the TX4 and this allowed him to hear well on the phone for the first time in many years. TelCom User Guide at Page 3 What is TelCom • TelCom is a stationary FM transmitter. • It boosts the sound from television or any other audio equipment (e.g., Personal Computer, CD-player, radio) without disturbing others. • It allows you to hear the telephone ringing at any time. • The television sound is switched off automatically when the telephone is answered. • The person calling can be heard loud and clear. • When the telephone receiver is replaced, the television sound will return automatically. • To use this system hearing instruments fitted with FM receivers are required. TelCom User Guide at Page 12 Summarized benefits: • Clear sound while watching television without disturbing noise • Sound from audio equipment, speech over telephone, and even the telephone ringing signal heard through FM • The audio signal level – is automatically switched off when the telephone is picked up – automatically comes back if the telephone is hung-up • Fully automatic operation once the system is installed • Ready to operate 24 hours a day, 7 days a week • No cabling between the TelCom and the FM receivers • High-quality Swiss made equipment with high-tech design

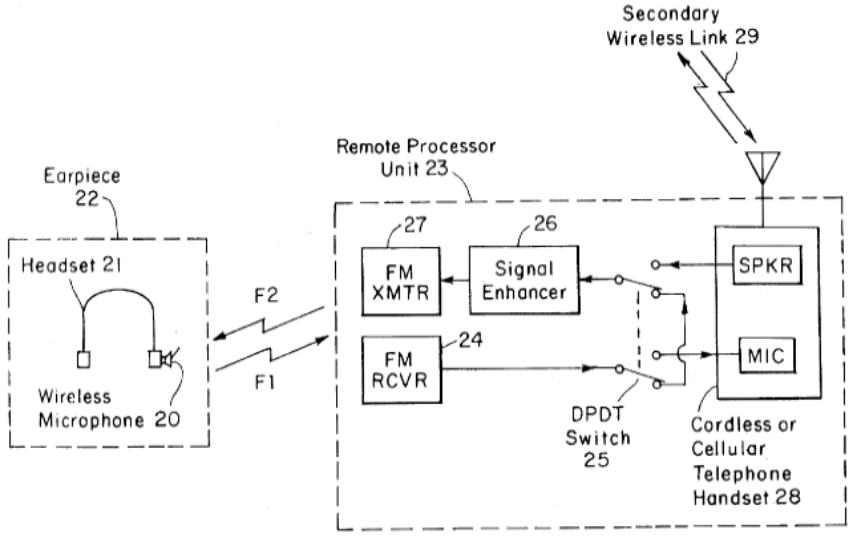
Claims	Prior Art
	Lewis – Speech perception in noise: directional microphones (2004) at Page 428 study participants. These subjects used a Phonic Ear 805 CD BTE hearing instrument that had the capability to switch between omnidirectional and directional microphone modes. The Phonic Ear 441T microphone transmitter and the Phonic Ear 445R FM receiver served as the FM system. Speech Lewis – Speech perception in noise: directional microphones (2004) at Page 429 (2) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the omnidirectional microphone mode; (3) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the directional (adaptive) microphone mode; (4) monaural digital Phonak Claro 311 dAZ BTE HA utilized with one Phonak Microlink FM receiver with the EM attenuated (FM-only mode) and one Phonak Claro 311 dAZ BTE HA in the omnidirectional microphone mode worn on the opposite ear; and (5) binaural digital Phonak Claro 311 dAZ BTE hearing aids utilized with binaural Phonak Microlink FM receivers with the EM attenuated (FM-only mode).

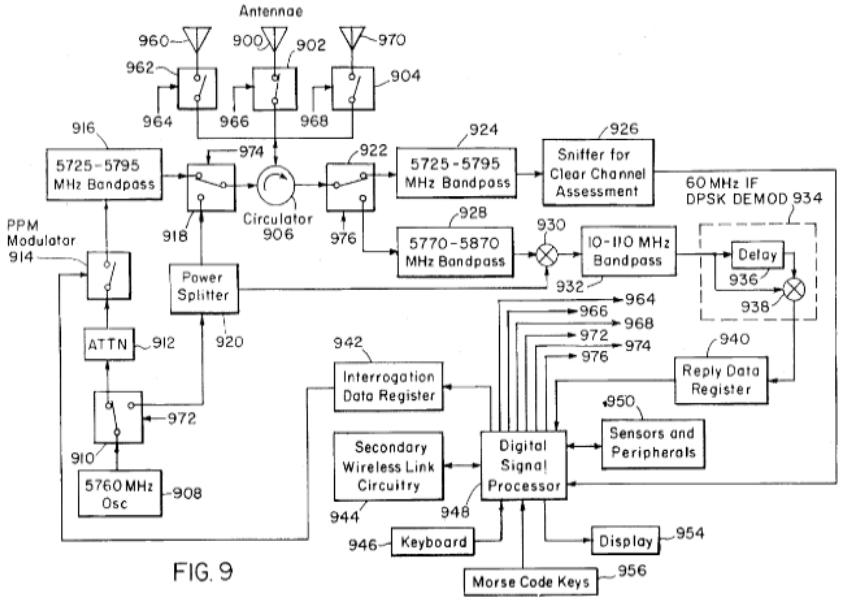
Claims	Prior Art
	Lewis – Speech perception in noise: directional microphones (2004) at Page 431 All subjects were fit with digital Phonak Claro 311 dAZ BTE hearing aids bilaterally. All earmolds had select-a-vent (SAV) venting and #13 or 3 mm horn tubing. In addition to the hearing aids, subjects were fit with Phonak Microlink ML8 FM receivers bilaterally. These FM receivers attach to the bottom of a BTE hearing aid and may be utilized in either the "FM only" mode, which attenuates the hearing aid microphone by 20 dB, or in the FM plus hearing aid mode, which allows for FM input and input of environmental sounds via the hearing aid microphones simultaneously at the same output level. The Phonak TX3 HandyMic FM transmitter served as the FM transmitter. This transmitter has three microphone options: (1) Wide Angle, which picks up sounds arriving from all directions around the transmitter microphone equally; (2) Zoom, which provides reduced amplification to signals arriving from the rear (cardioid); and (3) SuperZoom, which provides reduced amplification to signals originating from the rear and the sides (hypercardioid). The Lewis – Speech perception in noise: directional microphones (2004) at Page 437 Finally, this investigation was conducted with just one particular model of hearing aid and one model FM system. Currently, a number of other companies manufacture FM system technology that is compatible with hearing aid technology, including Phonic Ear and AVR Communications Ltd. Additionally, the Phonak Microlink is compatible with hearing aids manufactured by 16 other companies. Since several studies have reported a wide degree of electroacoustic variability with the use of various FM components, it should not be assumed that all brands and models of these devices would produce the same speech perception results obtained in this study (Freeman et al, 1980; Bess et al, 1984; Thibodeau and Saucedo, 1991).

Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 4 **Function switch** **M:** Hearing instrument switched **on** and microphone connected. **Normal use.** **T:** Hearing instrument switched **on** and telecoil connected. Where a telemagnetic loop system has been installed or when you talk on the phone (in many countries), you may then be able to use your hearing instruments with minimum disturbance from background noise. **O:** Hearing instrument switched **off.**  Oticon – DigiFocus Compact User Instructional Brochure at Page 6  **Direct Audio Input socket** (optional) Your hearing instruments may have a Direct Audio Input socket (shoe). This facility allows signals from external sound sources to be recieved directly by your hearing instruments. These sources include radio, cassette player, TV, auditory training equipment and assistive listening devices. You will hear the external signal when the function switch is set to the "M" position. Oticon – DigiFocus Compact User Instructional Brochure at Page 11 *5. Telecoil use in church, theatre, or cinema (optional feature)* An increasing number of churches, theatres and public buildings have assistive listening devices installed, usually induction loops. These systems send out wireless sound to be intercepted by the telecoil in your hearing instruments. Ask your hearing care professional for details.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 4 The input signal from the microphone or the telecoil is digitized and fed to a filterbank, which divides the signal into seven band-pass filters with centre frequencies at: 250, 700, 1200, 2000, 3000, 4000 and 5000 Hz. The filterbank covers the frequency range from 125 to about 6000 Hz. The output from each band-pass filter is equipped with an attenuator by which each filtered signal can be weighted. This allows for a very precise fitting in accordance with the audiometric profile of the hearing impaired. Oticon – DigiFocus White Paper (1996) at Page 11 Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson ’783’s RPU includes antennas and processing components, and Anderson ’783’s earpiece includes a receiver (e.g., wireless receiver) to wirelessly receive the transmitted signals (e.g., up–converted signals) from the wireless device and RPU. The following citations show examples of where Anderson ’783 discloses this limitation. Anderson ’783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system

Claims	Prior Art
	operation. Anderson ’783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson ’783 at FIG. 2  FIG. 2

Claims	Prior Art
	Anderson ’783 at FIG. 9  FIG. 9 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as

Claims	Prior Art
	in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 3:52–4:14 One preferred embodiment of the invention herein described is shown in block diagram form in FIG. 1. In this figure, the earpiece 10 shown worn in the ear 11 uses a standard completely-in-the-canal (CIC) housing, well known in the art, although many other earpiece housing types known in the art (e.g., behind-the-ear, or BTE) can be used. The earpiece shown in FIG. 1 comprises a microphone 12, RF transceiver 13 with an antenna that doubles as an earpiece extractor 14, and speaker 15. Although the dual-use antenna/extractor arrangement shown in FIG. 1 is often desirable, a separate antenna or antennae can be used in conjunction with many different types of earpiece extractors as appropriate for a particular application. Antennae and extractors can be disguised as ear hair or jewelry (e.g., earrings), or conductive filaments can be permanently implanted in the ear cartilage to act as antennae using a process similar to ear piercing. The earpiece 10 communicates with a remote processor unit (RPU) 16 via a primary two-way RF link 17, although many other wireless link media (e.g., ultrasonic or infrared) may be used instead. The RPU is typically worn under clothing (e.g., carried in a pocket or purse), but may also be worn in plain sight (e.g., on a belt) if desired. The RPU 16 may be connected (via wired or wireless means 18) to optional secondary wireless link circuitry 19 that allows wireless communication between the RPU and other sources of information (e.g., the general subscriber telephone network) via a secondary wireless link. Note that the optional secondary wireless link circuitry 19 may or may not be contained within the

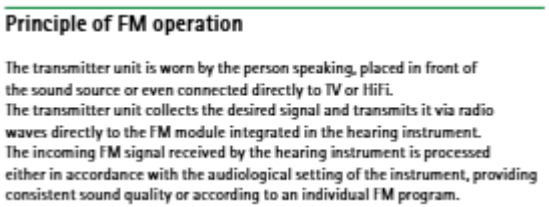
Claims	Prior Art
	RPU case 70 of FIG. 7. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 12:20–32 During the reply interval 52, a modulated (via modulator 830) low-power 60 MHz oscillator 835 is applied to voltage point V1, causing the diode 43 to turn on and off at a 60 MHz rate and act as a mixer. The mixer diode 43 generates frequency components centered at the difference frequency of 5700 MHz and the sum frequency of 5820 MHz. The 5820 MHz sum component passes through the resonator 42, and forms the reply which is wirelessly transmitted from the earpiece transponder antenna 40 to the RPU reply processor circuitry. The earpiece 60 MHz oscillator 835, which is only turned on during the reply

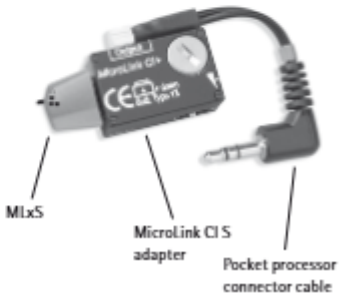
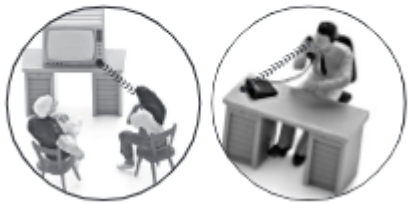
Claims	Prior Art
	interval, changes phase at specified points in time to generate the DPSK reply data. Anderson ’783 at 12:47–13:22 Remote processor unit interrogator and reply processor: The RPU, shown in FIG. 9, may use any of a wide variety of components well known in the art. The DSP 948 may contain several integrated circuits, e.g., the Motorola DSP56L002 single-chip digital signal processor, a Motorola DSP56200 cascadable-adaptive digital filter chip and supporting memory devices well known in the art. Miniature components such as dielectric resonance oscillators are available for the microwave oscillator 908, and the DPSK replies can be decoded using surface acoustic wave (SAW) or glass bulk acoustic wave (BAW) delay lines 936 in a standard delay-and-multiply demodulator circuit 934. An alternative demodulator that achieves superior noise immunity can be implemented using a phase-locked loop in a squaring loop configuration for carrier recovery instead of delay-and-multiply circuitry 934. Decoding of a DPSK waveform using such coherent detection techniques is known in the art as differentially encoded coherent phase shift keying, or DECPSK. Amplifiers using low noise pseudomorphic high electron mobility transistors (e.g., the HP ATF-36077) may be used as needed (e.g., between the circulator 906 and routing switch 922), and such amplifiers are not individually identified in FIG. 9. All switches shown in FIG. 9 are RF switches that can be implemented using, e.g., PIN diodes. Switch control connections from the DSP 948 to the RF switches are shown in FIG. 9 for clarity, and all switches remain set as shown until changed as noted. The system shown in FIG. 9 demodulates a received reply when the RF reply travels through a selected antenna 900, antenna selection switch 902, circulator 906, routing switch 922 (set to the position opposite that shown in FIG. 9 during the reply interval by DSP 948 via control signal 976), bandpass filter 928 and IF mixer 930. The IF mixer 930 downconverts the reply by mixing it with a small amount of RF power from the 5760 MHz oscillator 908 via switch 910 (which is set to the position opposite that shown in FIG. 9 during the reply interval by DSP 948 via control signal 972) and power splitter 920. The resulting DPSK reply has a center frequency of 60 MHz, a bandwidth of 100 MHz, and is passed through the bandpass filter 932 to the DPSK demodulator 934 which, in this example, consists of a 50 nsec delay line 936 and multiplier 938. The resulting bits are stored in the reply data register 940 for processing by the DSP 948. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many

Claims	Prior Art
	successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets.

Claims	Prior Art
	Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] a down-converter configured to down-convert the received up-converted signals into down-converted signals;	DHA Systems and Anderson ’783 expressly or inherently disclose “a down-converter configured to down-convert the received up-converted signals into down-converted signals.” DHA Systems include Digital Hearing Aids which down–convert the received signals from the Transmitters from the higher frequency to a lower frequency signal (e.g., audio). The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4 Phonak FM systems operate on an FM radio signal in the 216-217 MHz bands. These bands have been assigned by the FCC for use with equipment by the hard of hearing. There are 23 narrow band channels available from Phonak in this frequency range. In order for the transmitter and receiver to operate as a system, they must be on the same frequency or 'channel'. All Phonak FM transmitters and receivers are compatible with every other model of transmitter and receiver in the Phonak product line. Each transmitter and receiver channel 'frequency' is identified with a number. The number of the transmitter and FM receiver must be the same for these units to function together correctly. FM Transmitters and FM Receivers are available in many sizes and shapes to offer increased functionality. We will detail some of the Phonak equipment below: Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 9 **5- Claro dAZ FM**  Claro dAΖ FM combines two highly advanced systems for signal processing and signal reception. The Signal-to-Noise Ratio is dramatically improved with Digital Perception Processing, Adaptive digital AudioΖoom, the Fine-scale Noise Canceler, and Phonak's FM technology. The FM functions can be controlled directly at the instrument with the TacTronic switch or with the SoundPilot FM or WatchPilot remote controls.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 2  **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program. Phonak – Lewis Article re ML8 Improving Speech Perception in Noise with Directional Microphones and Frequency Modulation (FM) Technology (2002) at Page 2 Personal FM systems have also been shown to improve speech intelligibility in noise (Hawkins, 1984; Fabry, 1994; Crandell & Smaldino, 2000). Past investigations have demonstrated that the utilization of FM technology can improve speech intelligibility in noise by as much as 20-25 dB (see Crandell and Smaldino, 2000). With a personal FM system, the speaker's voice is picked-up via FM wireless microphone located near the speaker's mouth - where the effects of reverberation, distance, and noise are minimal. The FM system converts the acoustic signal to an electrical waveform at the microphone, and the signal is transmitted via FM signal, from the transmitter to the receiver. Both the transmitter and the receiver are tuned to the same transmitting and receiving frequency. At the receiver end, the electrical signal is amplified, converted back to an acoustical waveform and conveyed to the listener.

Claims	Prior Art
	Phonak MicroLink MLxS Product Information at Page 1 The MicroLink MLxS is the first miniaturized FM receiver with a digital frequency synthesizer for full multi-frequency flexibility. The receiver features fully automatic, non-contact frequency synchronization with either a WallPilot or the Campus S. The MicroLink MLxS is compatible with all Phonak FM transmitters and the WallPilot, and is recommended for use with this equipment. **MLxS with BTE instrument**  **MLxS with adapter for CI pocket processor**  Phonak – Microlink User Guide at Page 2 The desired signal – for example, a speaker's voice or the sound from a TV – is picked up by the microphone which is placed near to the source of the sound. The transmitter sends an FM signal to the receiver, which immediately relays this to the hearing instrument for you to hear – crystal clear! Phonak – Microlink User Guide at Page 6 **The direct-input technique** Using the audio cable supplied with the system, the HandyMic can be connected directly to any sound system, including a TV, radio, walkman, movie projector, amplifier, cassette-player etc. 

Claims	Prior Art
	Phonak – Microlink User Guide at Page 25

Two versions of MicroLink MLx
MicroLink MLx is available in two versions which are differentiated by the position of the plugs. The correct version for your needs is defined by the appropriate Audio-shoe.



MLx with plugs oriented lengthways

MLx with plugs oriented transversely

Important: Place the hearing instrument with audio-shoe and MicroLink MLx in front of you as shown in the sketch. The green dots must be visible at the top and bottom of the MicroLink MLx unit. If this is not the case please contact your hearing care professional.

Correct MLx version fitted to hearing instrument



Wrong MLx version fitted to hearing instrument

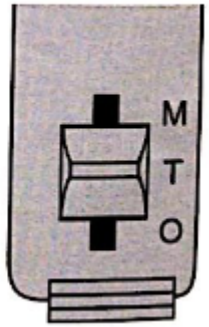


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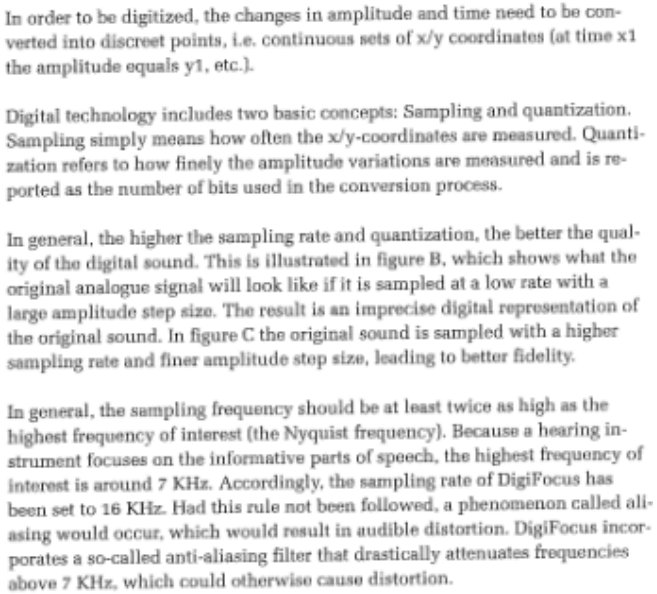
Phonak – Microlink User Guide at Page 28

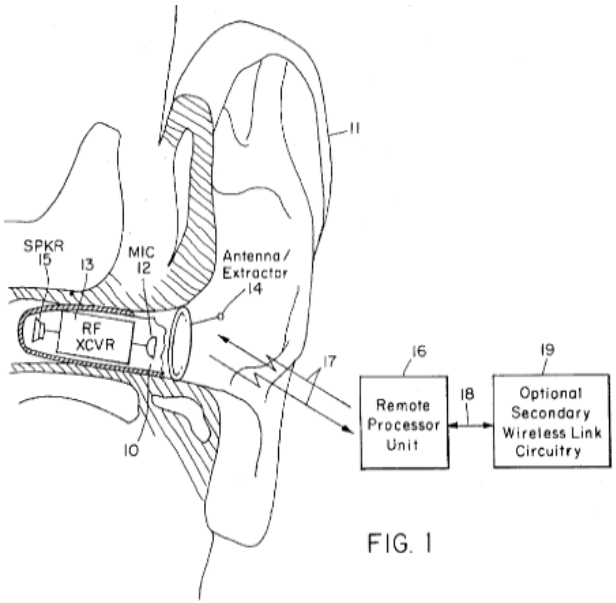
Description of the MicroLink models

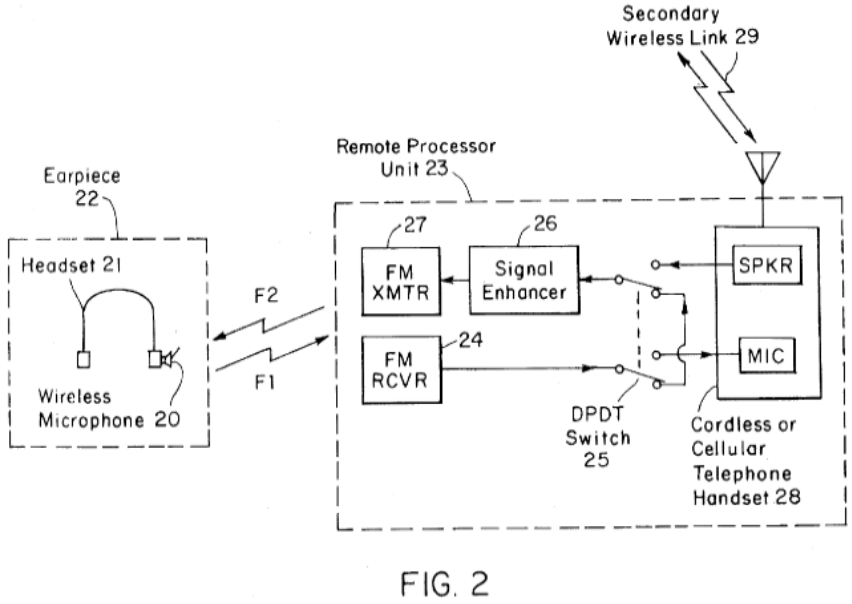
① Audio-shoe
② Frequency identification code
Number and color codes for exact frequency channel identification. To ensure proper reception, check that the channel and transmitter numbers are identical.
③ MicroLink receiver
FM receiver with integrated antenna
④ Socket for optional external antenna (available for ML3S/ML4S/ML5S and ML6). The threaded socket accepts a screw-in antenna to extend the MicroLink reception range.
⑤ Mute switch to reduce the sensitivity of the hearing instrument microphone by 20 dB, so enhancing the effect of the FM system (only applies to ML3S/ML4S and ML5S). With the ML6, the mute function is activated via the remote control.
⑥ Frequency module with integrated antenna. This module is locked in place.
For special applications the frequency module may be replaced. Your hearing care professional will explain in detail this special feature.
⑦ Release button

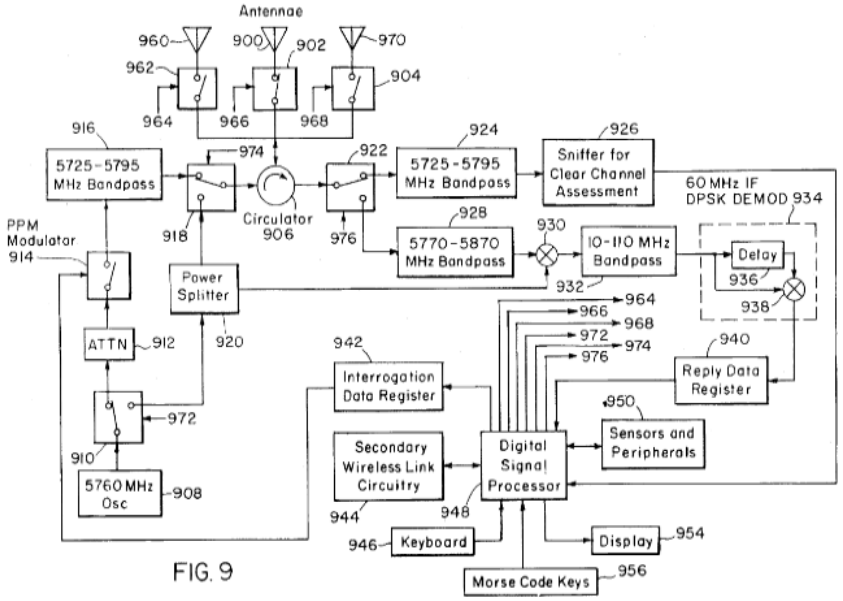
Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. Phonak – Online Interview re Perseo (April 7, 2003) at Page 9 **Liz Brassine/Phonak:** It is a digital microphone on the CIC. There are several advantages of a digital microphone over analog mics. First, increased dynamic range is provided. Additionally, with a digital mic, the analog-to-digital converter is housed within the microphone itself. This eliminates the wire between the AD-converter and the microphone. The wire is the source for ultra-high frequency interference, such as Bluetooth. Oticon – DigiFocus Compact User Instructional Brochure at Page 4 Function switch **M:** Hearing instrument switched **on** and microphone connected. **Normal use.** **T:** Hearing instrument switched **on** and telecoil connected. Where a telemagnetic loop system has been installed or when you talk on the phone (in many countries), you may then be able to use your hearing instruments with minimum disturbance from background noise. **O:** Hearing instrument switched **off.** 

Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 11 *5. Telecoil use in church, theatre, or cinema (optional feature)* An increasing number of churches, theatres and public buildings have assistive listening devices installed, usually induction loops. These systems send out wireless sound to be intercepted by the telecoil in your hearing instruments. Ask your hearing care professional for details. Oticon – DigiFocus White Paper (1996) at Page 2 Analogue basically means that the movements in the air that constitute sound are translated into one unified, but complex, electrical current. You may think of analogue sound as making a photocopy: the sound is depicted and you get an overall picture. Processing or recopying can be done only to a certain extent because it causes a deterioration of the original imprint. Digital means that sound is described mathematically. This makes it much more precise to actually process the sound, bit by bit. Descriptions of certain details can be changed without affecting the general picture. Descriptions can be repeated accurately and endlessly without deterioration of the quality. Oticon – DigiFocus White Paper (1996) at Page 3 After the A/D-conversion, the resulting digital code can be mathematically manipulated, or processed (as it is normally expressed when talking about sound). This is where the real benefits of digital technology come in. The amount and types of processing that are possible with digital technology far surpass the capabilities of analogue processing. Once the processing is complete, the digital signal is converted back to analogue form by the D/A-converter. It is now ready for transmission to the small receiver inside the hearing instrument, which makes the sound audible. □

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 3  In order to be digitized, the changes in amplitude and time need to be converted into discreet points, i.e. continuous sets of x/y coordinates (at time x1 the amplitude equals y1, etc.). Digital technology includes two basic concepts: Sampling and quantization. Sampling simply means how often the x/y-coordinates are measured. Quantization refers to how finely the amplitude variations are measured and is reported as the number of bits used in the conversion process. In general, the higher the sampling rate and quantization, the better the quality of the digital sound. This is illustrated in figure B, which shows what the original analogue signal will look like if it is sampled at a low rate with a large amplitude step size. The result is an imprecise digital representation of the original sound. In figure C the original sound is sampled with a higher sampling rate and finer amplitude step size, leading to better fidelity. In general, the sampling frequency should be at least twice as high as the highest frequency of interest (the Nyquist frequency). Because a hearing instrument focuses on the informative parts of speech, the highest frequency of interest is around 7 KHz. Accordingly, the sampling rate of DigiFocus has been set to 16 KHz. Had this rule not been followed, a phenomenon called aliasing would occur, which would result in audible distortion. DigiFocus incorporates a so-called anti-aliasing filter that drastically attenuates frequencies above 7 KHz, which could otherwise cause distortion. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson ’783 discloses that its RPU includes an IF mixer that down–converts the received up–converted signals. The following citations show examples of where Anderson ’783 discloses this limitation. Anderson ’783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system

Claims	Prior Art
	operation. Anderson ’783 at FIG. 1  FIG. 1

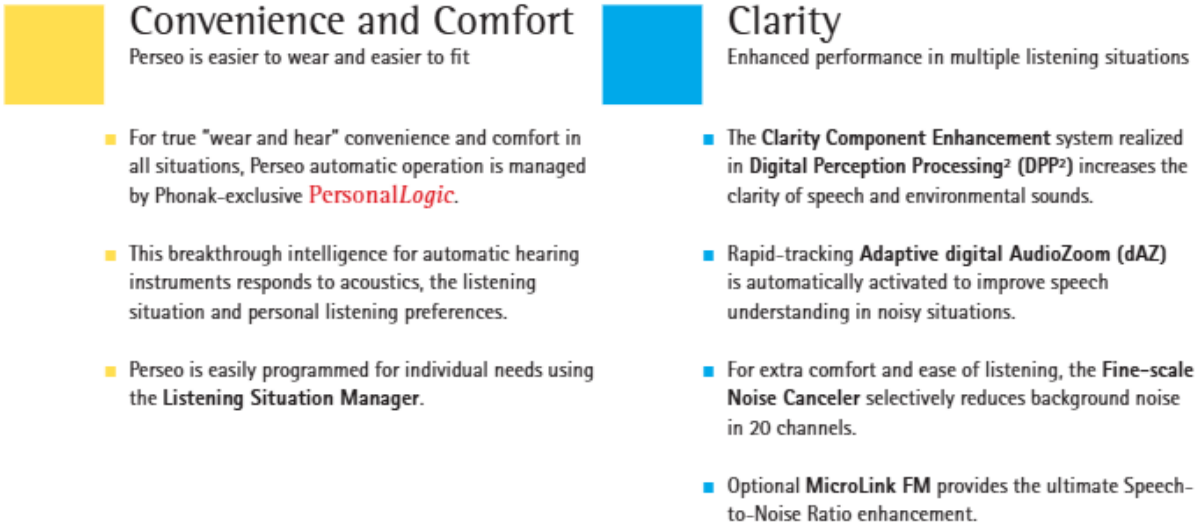
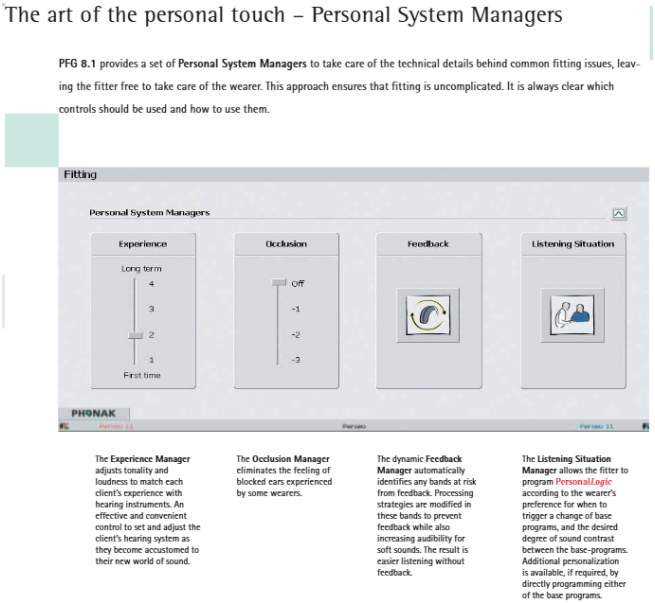
Claims	Prior Art
	Anderson ’783 at FIG. 2  FIG. 2

Claims	Prior Art
	Anderson ’783 at FIG. 9  FIG. 9 Anderson ’783 at 1:21–28 In the prior art, a basic hearing aid without remote control is a self-contained earpiece comprising a microphone, speaker and associated processor electronics. In such hearing aids, the earpiece microphone converts acoustic waves into electrical representations of the acoustic waves, the electrical signals are amplified by the earpiece processor electronics and converted back into acoustic waves by the earpiece speaker. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative

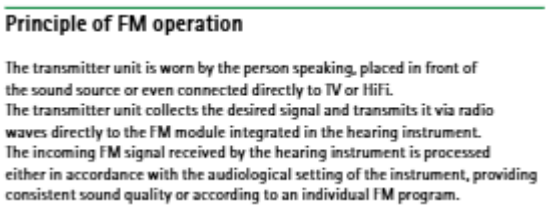
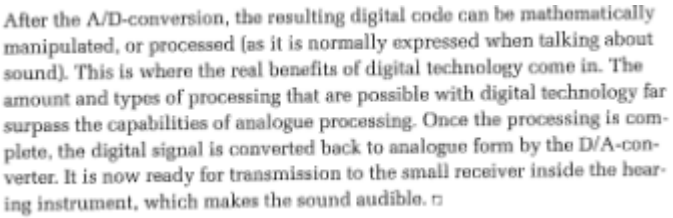
Claims	Prior Art
	to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 12:47–13:22 Remote processor unit interrogator and reply processor: The RPU, shown in FIG. 9, may use any of a wide variety of components well known in the art. The DSP 948 may contain several integrated circuits, e.g., the Motorola DSP56L002 single-chip digital signal processor, a Motorola DSP56200 cascadable-adaptive digital filter chip and supporting memory devices well known in the art. Miniature components such as dielectric resonance oscillators are available for the microwave oscillator 908, and the DPSK replies can be decoded using surface acoustic wave (SAW) or glass bulk acoustic wave (BAW) delay lines 936 in a standard delay-and-multiply demodulator circuit 934. An alternative demodulator that achieves superior noise immunity can be implemented using a phase-locked loop in a squaring loop configuration for carrier recovery instead of delay-and-multiply circuitry 934. Decoding of a DPSK waveform using such coherent detection techniques is known in the art as differentially encoded coherent phase shift keying, or DECPSK. Amplifiers using low noise pseudomorphic high electron mobility transistors (e.g., the HP ATF-36077) may be used as needed (e.g., between the circulator 906 and routing switch 922), and such amplifiers are not individually identified in FIG. 9. All switches shown in FIG. 9 are RF switches that can be implemented using, e.g., PIN diodes. Switch control connections from the DSP 948 to the RF switches are shown in FIG. 9 for clarity, and all switches remain set as shown until changed as noted. The system shown in FIG. 9 demodulates a received reply when the RF reply travels through a selected antenna 900, antenna selection switch 902, circulator 906, routing switch 922 (set to

Claims	Prior Art
	the position opposite that shown in FIG. 9 during the reply interval by DSP 948 via control signal 976), bandpass filter 928 and IF mixer 930. The IF mixer 930 downconverts the reply by mixing it with a small amount of RF power from the 5760 MHz oscillator 908 via switch 910 (which is set to the position opposite that shown in FIG. 9 during the reply interval by DSP 948 via control signal 972) and power splitter 920. The resulting DPSK reply has a center frequency of 60 MHz, a bandwidth of 100 MHz, and is passed through the bandpass filter 932 to the DPSK demodulator 934 which, in this example, consists of a 50 nsec delay line 936 and multiplier 938. The resulting bits are stored in the reply data register 940 for processing by the DSP 948. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired.

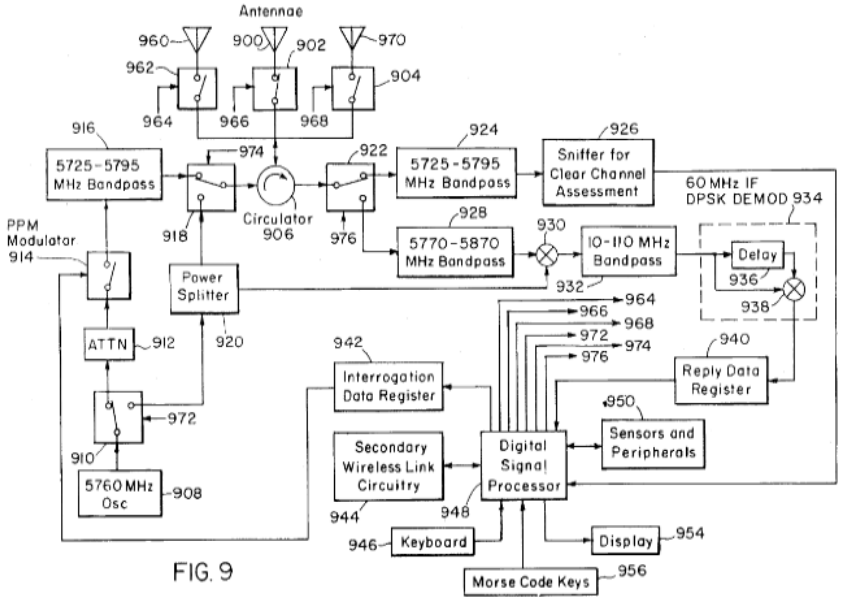
Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems , those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] a modifier configured to modify the down-converted signals into modified signals based on at least one hearing characteristic of the user to enhance the hearing of the user; and	DHA Systems and Anderson '783 expressly or inherently disclose "a modifier configured to modify the down-converted signals into modified signals based on at least one hearing characteristic of the user to enhance the hearing of the user." DHA Systems include Digital Hearing Aids, which modify the audio signals based on a user's hearing. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 5 The Science of PersonalLogic™ Phonak has applied knowledge from new research and past experience to add a new dimension of individualized logic to automatic hearing systems – PersonalLogic. Combining new and proven features, PersonalLogic optimizes the functioning, operation and fitting of hearing systems for each individual user. Thanks to PersonalLogic, Perseo takes customization to a level beyond "custom-fitted" related to individual hearing loss. The new digital system from Phonak is the first hearing system with customized automatic operation, as opposed to operation based on factory set, unchangeable rules. Now, Perseo gives hearing professionals control over automatic operation, allowing them to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 7  Convenience and Comfort Perseo is easier to wear and easier to fit ■ For true "wear and hear" convenience and comfort in all situations, Perseo automatic operation is managed by Phonak-exclusive PersonalLogic. ■ This breakthrough intelligence for automatic hearing instruments responds to acoustics, the listening situation and personal listening preferences. ■ Perseo is easily programmed for individual needs using the **Listening Situation Manager**. Clarity Enhanced performance in multiple listening situations ■ The **Clarity Component Enhancement** system realized in **Digital Perception Processing² (DPP²)** increases the clarity of speech and environmental sounds. ■ Rapid-tracking **Adaptive digital AudioZoom (dAZ)** is automatically activated to improve speech understanding in noisy situations. ■ For extra comfort and ease of listening, the **Fine-scale Noise Canceler** selectively reduces background noise in 20 channels. ■ Optional **MicroLink FM** provides the ultimate Speech-to-Noise Ratio enhancement. Phonak – Perseo Brochure at Page 18  The art of the personal touch – Personal System Managers **PFG 8.1** provides a set of **Personal System Managers** to take care of the technical details behind common fitting issues, leaving the fitter free to take care of the wearer. This approach ensures that fitting is uncomplicated. It is always clear which controls should be used and how to use them. Fitting Personal System Managers Experience Occlusion Feedback Listening Situation Long term First time Off PHONAK The **Experience Manager** adjusts tonality and loudness to match each client's experience with hearing instruments. An effective and convenient control to set and adjust the client's hearing system as they become accustomed to their new world of sound. The **Occlusion Manager** eliminates the feeling of blocked ears experienced by some wearers. The dynamic **Feedback Manager** automatically identifies any bands at risk from feedback. Processing strategies are modified in these bands to prevent feedback while also increasing audibility for soft sounds. The result is easier listening without feedback. The **Listening Situation Manager** allows the fitter to program PersonalLogic according to the wearer's preference for when to trigger a change of base programs, and the desired degree of sound contrast between the base-programs. Additional personalization is available, if required, by directly programming either of the base programs.

Claims	Prior Art
	Phonak – BTE Elite Article at Page 1 **Perseo – the outstanding features place Perseo in a class of its own** • **Personal*Logic*** makes Perseo the first digital hearing system with personalized automatic operation. **Personal*Logic*** selects the appropriate base program and continually adapts its parameters to suit the needs of the wearer. • **Dual-base automatic** allows processing and features to be separately adjusted for quiet and noisy situations for optimum automatic performance. Adjustments for noise never disrupt adjustments for quiet and vice versa. • **Digital Perception Processing (DPP)** with Clarity Component Enhancement: Increased clarity and sound quality also in loud environments. Processing in 20 critical bands. • **Personal System Managers**: Experience Manager, Dynamic Feedback Manager, Occlusion Manager, and Listening Situation Manager for easy and individual adjustment of Personal*Logic*. • **Multi-programs** • **Fast tracking Adaptive digital AudioZoom (dAZ)** to separate actively speech from background noise. • **Fine-scale Noise Canceler** in 20 channels. • **TacTronic program switch** • **Optional remote control** • **FM compatible** • **Wind and weather protection** • **Fashion Color Line** (choice among 12 attractive colors) Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 9 **5- Claro dAZ FM**  Claro dAZ FM combines two highly advanced systems for signal processing and signal reception. The Signal-to-Noise Ratio is dramatically improved with Digital Perception Processing, Adaptive digital AudioΣoom, the Fine-scale Noise Canceler, and Phonak's FM technology. The FM functions can be controlled directly at the instrument with the TacTronic switch or with the SoundPilot FM or WatchPilot remote controls.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 2  **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program. Phonak – Lewis Article re ML8 Improving Speech Perception in Noise with Directional Microphones and Frequency Modulation (FM) Technology (2002) at Page 2 Personal FM systems have also been shown to improve speech intelligibility in noise (Hawkins, 1984; Fabry, 1994; Crandell & Smaldino, 2000). Past investigations have demonstrated that the utilization of FM technology can improve speech intelligibility in noise by as much as 20–25 dB (see Crandell and Smaldino, 2000). With a personal FM system, the speaker's voice is picked-up via FM wireless microphone located near the speaker's mouth – where the effects of reverberation, distance, and noise are minimal. The FM system converts the acoustic signal to an electrical waveform at the microphone, and the signal is transmitted via FM signal, from the transmitter to the receiver. Both the transmitter and the receiver are tuned to the same transmitting and receiving frequency. At the receiver end, the electrical signal is amplified, converted back to an acoustical waveform and conveyed to the listener. Oticon – DigiFocus White Paper (1996) at Page 3  After the A/D-conversion, the resulting digital code can be mathematically manipulated, or processed (as it is normally expressed when talking about sound). This is where the real benefits of digital technology come in. The amount and types of processing that are possible with digital technology far surpass the capabilities of analogue processing. Once the processing is complete, the digital signal is converted back to analogue form by the D/A-converter. It is now ready for transmission to the small receiver inside the hearing instrument, which makes the sound audible. □

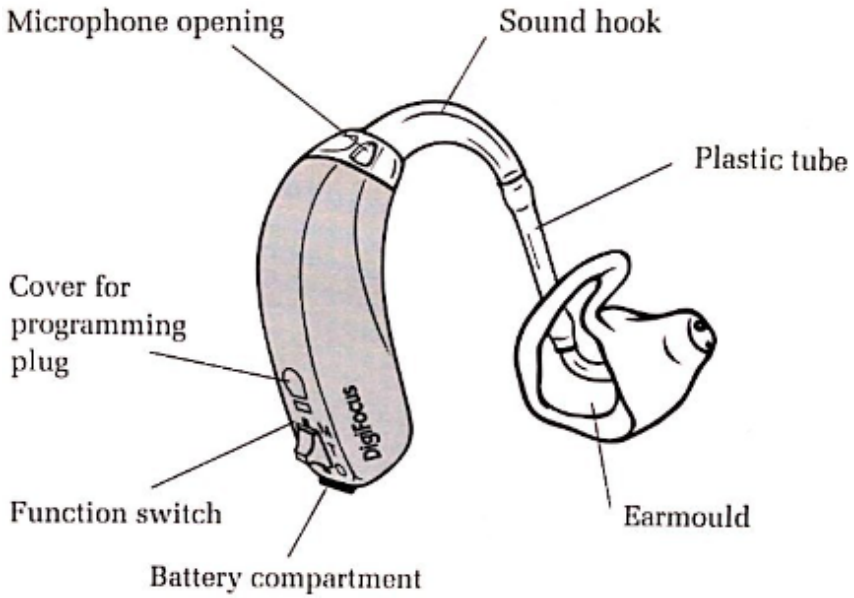
Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 4 The weighted band-pass signals are summed with two summators which create the low-pass and the high-pass channel of the hearing aid. The cut off frequency between the two channels corresponds to 1500 Hz, i.e. the three lower bands constitute the low-frequency channel and the four higher bands the high-frequency channel. The signals from the two channels are processed individually in two compressors operating independently of each other. Finally the two modified signals are summed into the output signal and sent to the receiver. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 Audiologists at the Grunewald-Blitz Children's Clinic at The University of Arizona in Tucson are testing what promises to be a long-awaited breakthrough in hearing care -- a fully automatic compact hearing aid that digitally processes sound. It adjusts automatically to different noise levels. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 What makes the new digital hearing instrument a true breakthrough is its flexibility in processing sound, he added. "Think of the difference between a radio with only bass and treble controls and a fully-featured studio mixer, which adjusts sounds in many different frequency bands. Because of the miniature computer in DigiFocus, sound can be split into seven frequency bands, each of which can be adjusted in several ways. These bands are then processed through two channels to automatically adjust for loudness levels and speech." To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson ’783 discloses that its RPU includes a digital signal processor that performs amplification and signal enhancement on the down–converted signals to compensate for the user’s hearing loss using a stored program. The following citations show examples of where Anderson ’783 discloses this limitation.

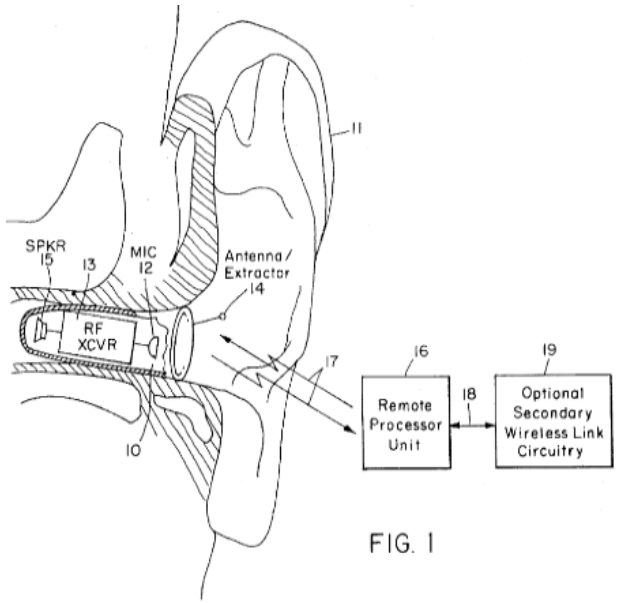
Claims	Prior Art
	Anderson ’783 at FIG. 9  FIG. 9 Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece

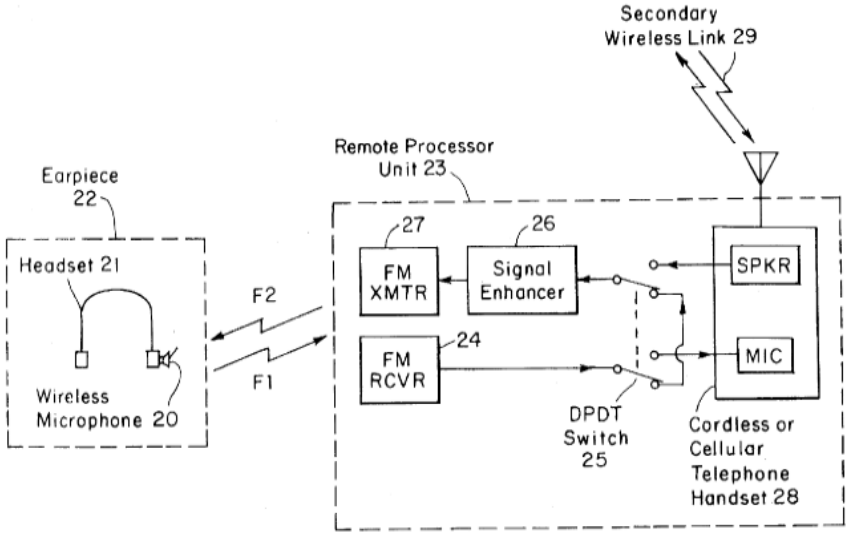
Claims	Prior Art
	design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user.

Claims	Prior Art
	Anderson ’783 at 12:47–13:22 Remote processor unit interrogator and reply processor: The RPU, shown in FIG. 9, may use any of a wide variety of components well known in the art. The DSP 948 may contain several integrated circuits, e.g., the Motorola DSP56L002 single-chip digital signal processor, a Motorola DSP56200 cascadable-adaptive digital filter chip and supporting memory devices well known in the art. Miniature components such as dielectric resonance oscillators are available for the microwave oscillator 908, and the DPSK replies can be decoded using surface acoustic wave (SAW) or glass bulk acoustic wave (BAW) delay lines 936 in a standard delay-and-multiply demodulator circuit 934. An alternative demodulator that achieves superior noise immunity can be implemented using a phase-locked loop in a squaring loop configuration for carrier recovery instead of delay-and-multiply circuitry 934. Decoding of a DPSK waveform using such coherent detection techniques is known in the art as differentially encoded coherent phase shift keying, or DECPSK. Amplifiers using low noise pseudomorphic high electron mobility transistors (e.g., the HP ATF-36077) may be used as needed (e.g., between the circulator 906 and routing switch 922), and such amplifiers are not individually identified in FIG. 9. All switches shown in FIG. 9 are RF switches that can be implemented using, e.g., PIN diodes. Switch control connections from the DSP 948 to the RF switches are shown in FIG. 9 for clarity, and all switches remain set as shown until changed as noted. The system shown in FIG. 9 demodulates a received reply when the RF reply travels through a selected antenna 900, antenna selection switch 902, circulator 906, routing switch 922 (set to the position opposite that shown in FIG. 9 during the reply interval by DSP 948 via control signal 976), bandpass filter 928 and IF mixer 930. The IF mixer 930 downconverts the reply by mixing it with a small amount of RF power from the 5760 MHz oscillator 908 via switch 910 (which is set to the position opposite that shown in FIG. 9 during the reply interval by DSP 948 via control signal 972) and power splitter 920. The resulting DPSK reply has a center frequency of 60 MHz, a bandwidth of 100 MHz, and is passed through the bandpass filter 932 to the DPSK demodulator 934 which, in this example, consists of a 50 nsec delay line 936 and multiplier 938. The resulting bits are stored in the reply data register 940 for processing by the DSP 948. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities

Claims	Prior Art
	of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950.

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1e] a speaker configured to generate audio output signals from the modified signals for the user.	DHA Systems and Anderson '783 expressly or inherently disclose "a speaker configured to generate audio output signals from the modified signals for the user." The Digital Hearing Aids of the DHA Systems include speakers. The following citations show examples of where DHA Systems practice this limitation. Oticon – DigiFocus Compact User Instructional Brochure at Page 4  To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses that the modified signals are transmitted to its ear piece where they are converted by a speaker into sounds that can be heard by the user. The following citations show examples of where Anderson '783 discloses this limitation.

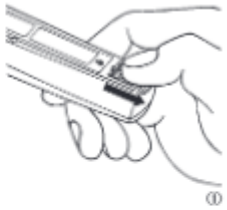
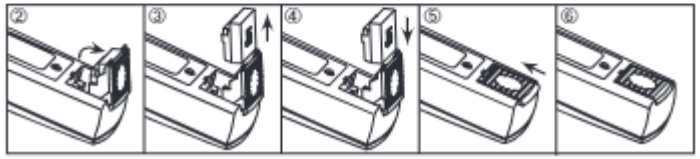
Claims	Prior Art
	Anderson ’783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson ’783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson ’783 at FIG. 2  FIG. 2 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:21–28 In the prior art, a basic hearing aid without remote control is a self-contained earpiece comprising a microphone, speaker and associated processor electronics. In such hearing aids, the earpiece microphone converts acoustic waves into electrical representations of the acoustic waves, the electrical signals are amplified by the earpiece processor electronics and converted back into acoustic waves by the earpiece speaker.

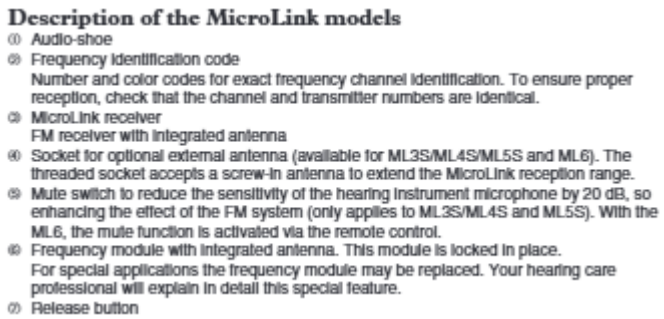
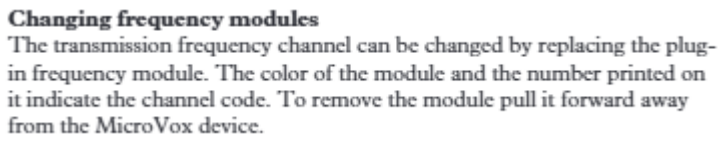
Claims	Prior Art
	Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output

Claims	Prior Art
	and not shown in FIG. 2. Anderson ’783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU

Claims	Prior Art
	DSP 948) in a manner that can be made imperceptible to a casual observer if desired. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. A hearing enhancement system as recited in claim 1, wherein the up-converted signals are in the WiFi frequency band.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement system as recited in claim 1, wherein the up-converted signals are in the WiFi frequency band." DHA Systems utilize several frequency bands for transmission, which at least suggests that DHA Systems can transmit in the WiFi frequency band. The following citations show examples of where DHA Systems practice this limitation. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4 Phonak FM systems operate on an FM radio signal in the 216-217 MHz bands. These bands have been assigned by the FCC for use with equipment by the hard of hearing. There are 23 narrow band channels available from Phonak in this frequency range. In order for the transmitter and receiver to operate as a system, they must be on the same frequency or 'channel'. All Phonak FM transmitters and receivers are compatible with every other model of transmitter and receiver in the Phonak product line. Each transmitter and receiver channel 'frequency' is identified with a number. The number of the transmitter and FM receiver must be the same for these units to function together correctly. FM Transmitters and FM Receivers are available in many sizes and shapes to offer increased functionality. We will detail some of the Phonak equipment below: Phonak Campus-S-User-Manual at Page 19 • Frequency synchronization The Campus S can remotely re-tune your FM receiver to an alternative frequency (see page 8). This provides a quick and simple way to change the frequency, for example when there are nearby FM users on the same channel, or to avoid interference from a mobile phone antenna.

Claims	Prior Art
	Phonak – Media Release re Product Offerings in F2003/2004 at Page 3 **Phonak Communications introduces the new MicroLink receivers with frequency synthesizer** Phonak Communications will introduce its new multi frequency MLx S and ML8 S receivers in the next few months. MLx S and ML8 S are the counterpart of Campus S transmitters, already introduced early 2002. Together, they comprise the new synthesized FM system generation, a system that transmits, without wires, speech to the hearing instrument in difficult listening situations. The key technology of the new system is its easy frequency adaptation. Given the extreme design constraints (low voltage, low power, miniature dimensions), the development of this technology represents an unprecedented breakthrough in wireless communication technology. Phonak – Microlink User Guide at Page 12 **Frequency Module** The repaceable plug-in frequency modules are numbered and color-coded. They provide a simple and convenient way of changing the operating frequency. To work correctly, however, the number and color of the module must be the same as the MicroVox and MicroLink receiver. The frequency module is already installed when you receive your HandyMic. If you need to change the operating frequency or channel, proceed as follows: Phonak – Microlink User Guide at Page 13 **Exchanging the Frequency Module** ① Press firmly on the cover of the compartment holding the frequency module and slide it in the direction of the arrow. ② Flip up the holder as shown. ③ Pull out the frequency module. ④ Insert a new module. ⑤ Close the holder. ⑥ Slide it back into place.  ①  ② ③ ④ ⑤ ⑥

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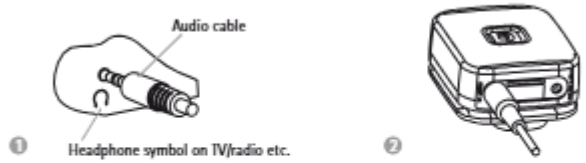
Claims	Prior Art
	Phonak – Microlink User Guide at Page 28  **Description of the MicroLink models** ① Audio-shoe ② Frequency identification code Number and color codes for exact frequency channel identification. To ensure proper reception, check that the channel and transmitter numbers are identical. ③ MicroLink receiver FM receiver with integrated antenna ④ Socket for optional external antenna (available for ML3S/ML4S/ML5S and ML6). The threaded socket accepts a screw-in antenna to extend the MicroLink reception range. ⑤ Mute switch to reduce the sensitivity of the hearing instrument microphone by 20 dB, so enhancing the effect of the FM system (only applies to ML3S/ML4S and ML5S). With the ML6, the mute function is activated via the remote control. ⑥ Frequency module with integrated antenna. This module is locked in place. For special applications the frequency module may be replaced. Your hearing care professional will explain in detail this special feature. ⑦ Release button Phonak – Microlink User Guide at Page 42  **Changing frequency modules** The transmission frequency channel can be changed by replacing the plug-in frequency module. The color of the module and the number printed on it indicate the channel code. To remove the module pull it forward away from the MicroVox device. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses that the up–converted signals can be transmitted at a frequency between 900MHz and 6GHz, which includes the WiFi frequency bands that range between 2.4GHz and 6GHz. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 7:39–8:3 Choice of radio frequency: Operating frequencies in the 900 MHz to 6 GHz range have long been used for electronic article surveillance (EAS) anti-theft systems and RF identification tags (see the Hewlett Packard "Communications Components Catalog" for a description of such systems and the associated components). EAS technology has a proven ability to penetrate clothing and provide a short-range wireless communication link. Operation of the full-featured preferred embodiment of the invention within this frequency range is desirable due to the availability of low-cost components. In EAS and other systems, a simple approach to RF antenna design is to provide a conductor which is one-quarter of the wavelength at the RF operating frequency (see the discussion of antenna fundamentals in "The ARRL Handbook for the Radio Amateur" for a description of the Marconi antenna). Since a quarter-wavelength antenna at 6 GHz is 1.27 cm (one-half inch) long, an antenna at this frequency can easily be disguised as an ear hair and can also serve as a hearing aid earpiece extractor 14 (although it is not required that the

Claims	Prior Art
	antenna or antennae act as an extractor nor be disguised as an ear hair). Note that frequencies lower than 6 GHz can be used (e.g., as previously described for the limited-feature embodiment), but components and antennae generally become larger. Similarly, frequencies higher than 6 GHz can also be used for the present invention but components are not as readily available. The range of frequencies near 6 GHz is therefore chosen for the present description of the preferred embodiment due to the fact that 6 GHz is the lowest frequency for which the antenna length is the same as that of a typical extractor or ear hair, and miniature components that operate in the vicinity of 6 GHz are readily available. Anderson ’783 at 9:3–30 Operating power limitations: Operation in many frequency bands is possible as long as the applicable requirements are met. A frequency band slightly below 6 GHz, the 5725 to 5875 MHz ISM (industrial, scientific and medical) band, is used here to illustrate the operation of a full-featured preferred embodiment. Non-licensed operation in this band is governed in the United States by 47 CFR Ch. 1, Para. 15.249, and other restrictions may apply depending upon the country in which the invention is used. For the present discussion, only the constraints imposed on operation by the United States Federal Communications Commission are considered. In the 5725 MHz to 5875 MHz ISM band, the average field strength at three meters must be less than 50 mV/meter. For an isotropic radiator, the power in watts is expressed as 3.33% of the square of the product of the field strength in V/meter and the range in meters. See the section on antennas, especially with regard to field strength and radiated power from antennas in free space, in "Reference Data for Radio Engineers," as well as Annex K of the "Manual of Regulations and Procedures for Federal Radio Frequency Management" for derivations. For the stated range of three meters and field strength of 50 mV/meter, the average power limit is 0.75 mW (-1.25 dBm). A peak field strength value 20 dB (a factor of 10) higher is allowed (500 mV/meter), which leads to a peak power limit of 75 mW (+18.75 dBm). Other restrictions also apply, but these restrictions are easily met by standard design practices (see 47 CFR Part 15, Subpart C-Intentional Radiators). Similarly, Enzmann ’555 at least suggests the signals sent from the wireless phone to the hearing aid/ear bud device is in the WiFi frequency band because Enzmann ‘555 discloses that its connection between its ear bud and cell phone can be “any kind of wireless connection.” The following citation shows an example of where Enzmann ‘555 discloses this limitation. Enzmann ’555 at [0034] The connection shown between the TX/RX unit 260 and the wireless phone 270 is preferably a wireless

Claims	Prior Art
	digital connection, such as Bluetooth, etc. However, it should be appreciated that the connection between the TX/RX unit 260 and the wireless phone 270 can be any kind of wireless or wired connection, and may be digital or analog, infrared (IR) or transmitted radio frequencies (RF) without, departing from the scope of the invention. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitation. Enzmann '555 discloses a system that includes a hearing aid device and a wireless phone. Enzmann '555 at [0001]. DHA Systems similarly include Digital Hearing Aids (with or without Receivers) and Transmitters in wireless communication, including Transmitters that can connect to phones. Phonak – Fitting Guide for MLxi and MLxi Baha at Page 6. A POSITA would have understood that Enzmann '555's wireless phone is analogous to DHA Systems' Transmitters, and Enzmann '555's hearing aid device is analogous to DHA Systems' Digital Hearing Aids and/or Receivers. Combining or substituting one or more of the teachings of Enzmann '555 with those of DHA Systems would have been nothing more than the combination or substitution of known elements to obtain predictable results. Moreover, such combinations or substitutions would have improved similar devices (those in Enzmann '555 and DHA systems) in the same or similar ways. Thus, a POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 . A POSITA would have had a reasonable expectation of success in combining DHA Systems with the teachings of Enzmann '555. Enzmann '555 discloses using manners of digital connection such as Bluetooth and RF. Enzmann '555 at [0034]. DHA Systems are designed to use radio signals to transmit information between the Transmitters and the Digital Hearing Aids. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4. DHA Systems and Enzmann '555 are thus easily combined based on familiar components to allow wireless connections through up-converting into the WiFi frequency band. The modifications made to combine Enzmann '555 and DHA Systems would have been routine and well within the level of a POSITA, who would have reasonably expected success in doing so. A POSITA would have further been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to Enzmann '555 and to claim 1[pre]. Specifically, Anderson '783 discloses transmission between the RPU and hearing aid device using frequencies between 900MHz and 6GHz. Anderson '783 at 9:3-30. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the

Claims	Prior Art
	teachings of DHA Systems, Anderson ’783, and Enzmann ’555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
3. A hearing enhancement system as recited in claim 1, wherein the audio system is selected from the list consisting a television, a stereo system, a CD player and a radio.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement system as recited in claim 1, wherein the audio system is selected from the list consisting a television, a stereo system, a CD player and a radio.” The Transmitters of the DHA Systems can be connected to, for example, televisions and CD players. The following citations show examples of where DHA Systems practice this limitation. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5 **2- HandyMic TX3**  The microphone with a built-in transmitter, used primarily for adults. The multi-microphone technology of the HandyMic combines omni directional, directional, and super directional microphones with an FM transmitter. The compact HandyMic transmits the speaker's voice directly to the hearing instrument user's FM receiver. The HandyMic can be set up directly in front of the sound source, slipped into the speaker's shirt pocket, or aimed at the speaker manually. With an audio cable, the HandyMic can also be connected to a sound system. As with all other Phonak FM products, the HandyMic has a range of 7 to 15 meters (23 to 50 feet). For business meetings, round table discussions, family gatherings, in a car, on a noisy street, at home

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5  The Phonak Campus **S** is a new addition to the Phonak product line - this multi-channel FM transmitter is developed for use in schools, universities and speech therapy. It is fully compatible with current Phonak FM products, and ready for operation with future generations of Phonak FM receivers. Campus **S** special features include a channel selector with digital display, an ergonomic user interface, a microphone with switchable directional / omni directional characteristics, handy storage for the microphone cable, connection to televisions, video recorders and radios, and an easily exchanged rechargeable battery.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 6 **4- TelCom**  Phonak's TelCom is a stationary FM transmitter that allows optimized television, telephone, and audio system usage. While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice to the FM receiver. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is returned to the previous volume setting. TelCom is equipped with a frequency synthesizer for convenient setting of FM frequencies; it has a range of 7 to 15 meters (23 to 50 feet). For television, telephone, CD player, radio, personal computer and other equipment with audio output Phonak Campus-S-User-Manual at Page 12 Connecting the Campus S to a TV set, video recorder, radio or CD player  You can use the Campus S also for high quality wireless transmission of sound from audio equipment like TV sets, video recorders, radios and CD players. 1 Plug the audio cable into the headphone output of your audio equipment. 2 Plug the other end of the cable into the audio input underneath your Campus S. Since the Campus S uses the microphone cable as an antenna, unroll the microphone cable.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 2 **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program. Phonak – Collections 2002 Product List at Page 28 FM transmitters:  **HandyMic** The universal transmitter designed especially for adults **TelCom** Optimises the use of the telephone, TV, radio, and other audio sources **Campus S** Superb frequency flexibility – ideal for educational environments

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 29



Phonak's FM solutions:
For maximum speech intelligibility

Whenever even latest-generation hearing instruments approach their physical limits – noise, reverberation, or distance – count on Phonak's FM solutions to deliver maximum speech intelligibility.

The frequent difficulties encountered by hearing instrument users when watching TV and making phone calls can be overcome with Phonak's FM technology.

Phonak FM solutions improve the SNR by 12 to 20 dB.

The FM systems by Phonak can be used with the majority of commercially available BTE instruments and cochlear implants.

Recommended applications:

Dialog:
For example at home, on a busy street, at the shopping mall or in a restaurant.

Group discussions:
For example at a family get-together, in a very noisy restaurant, at business meetings or conferences.

Making telephone calls:
The Phonak FM system provides access to the many capabilities of modern telecommunications devices.

Watching TV and listening to music:
Phonak FM provides access to the entire spectrum of today's information and entertainment technologies.

Schools and continuing education:
For example in classes at schools and universities, on outings and excursions, in lectures or on museum tours.

Transportation:
For example in cars, trains, trams and buses.

Sports of all kinds:
For example when cycling, playing golf, skiing, jogging or hiking.

Events:
For example at the theater, in concerts, at the movies, in church services or at community meetings.

Phonak – FM Transmitters including Campus S and TelCom at Page 1

TelCom

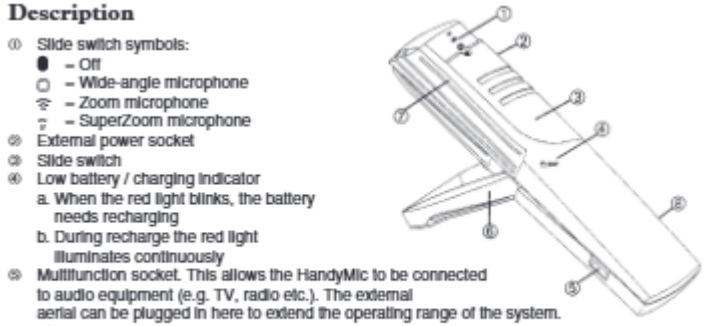
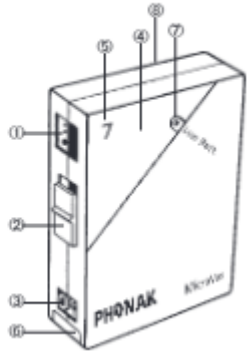


TelCom
(click to enlarge)

Phonak's TelCom is the first stationary FM transmitter that **allows optimized television, telephone, and audio system usage**.
While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice clearly and crisply. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is turned back up to the previous volume setting. The TelCom has an operating range of 7 to 15 meters (23 to 50 feet).

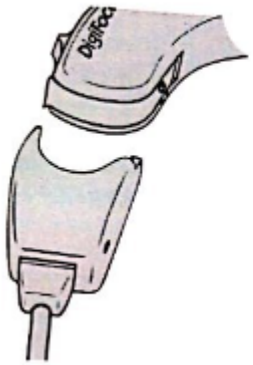
For television, telephone, CD player, radio, personal computer and other equipment with audio output.

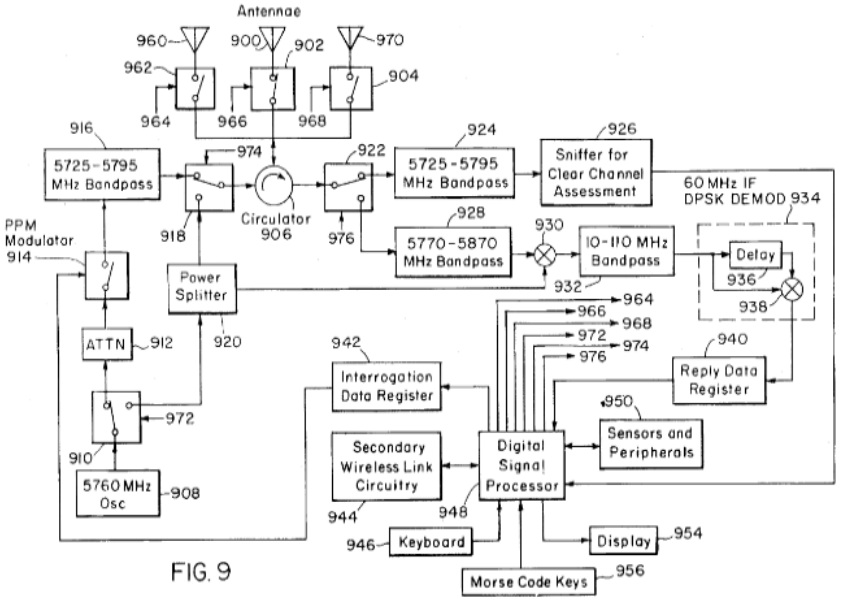
Claims	Prior Art
	Phonak – Microlink User Guide at Page 2 The desired signal – for example, a speaker's voice or the sound from a TV – is picked up by the microphone which is placed near to the source of the sound. The transmitter sends an FM signal to the receiver, which immediately relays this to the hearing instrument for you to hear – crystal clear! Phonak – Microlink User Guide at Page 2  Phonak – Microlink User Guide at Page 6 **The direct-input technique** Using the audio cable supplied with the system, the HandyMic can be connected directly to any sound system, including a TV, radio, walkman, movie projector, amplifier, cassette-player etc. 

Claims	Prior Art
	Phonak – Microlink User Guide at Page 9  **Description** ① Slide switch symbols: ● – Off ○ – Wide-angle microphone – Zoom microphone – SuperZoom microphone ② External power socket ③ Slide switch ④ Low battery / charging indicator a. When the red light blinks, the battery needs recharging b. During recharge the red light illuminates continuously ⑤ Multifunction socket. This allows the HandyMic to be connected to audio equipment (e.g. TV, radio etc.). The external aerial can be plugged in here to extend the operating range of the system. ⑥ Stand ⑦ Microphone ports ⑧ Plug-in frequency module Phonak – Microlink User Guide at Page 17 ***TX2*** **Description** ① Microphone socket ② On/Off switch ③ Audio input socket for connecting TX2 directly to external audio equipment (e.g. TV, radio, tape recorder etc.) ④ Color code for channel identification ⑤ Number code for exact channel identification ⑥ Battery compartment ⑦ Low battery warning light ⑧ Clip with name and address label 

Claims	Prior Art
	Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 3 The transmitter can be worn around the neck, in a pocket, or set on a table. There is a coated wire antenna approximately 12" long attached to the transmitter. The authors found it beneficial to tape the antenna to the neck loop cord provided with the system. This keeps the antenna from moving around where it is prone to getting caught on clothing or other objects. We have had several patients who returned with the antenna broken or who had the protective tip come off. The TX3 can be plugged into external sources such as television, radio, CD players, etc. Judging from anecdotal reports, this feature has increased our study participants' enjoyment of TV and music substantially. They have been amazed at how they can walk out of a room and still hear the music or TV program. It has added a lot of flexibility to their lives. Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 3 There is also a new phone transmitter called the TX4 or Tel-Com (Figure 2). It is a conical space-age-looking device that attaches to the phone. It can also be used as an external sound source for television, radio, CD players, etc. This can serve as more of a permanent system than the TX3, which has to be hooked/unhooked from an external source. Therefore, a patient Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 4 The TX4 can be used for television, radio, stereo, or CD player, making it flexible for external sound sources. It also allows for binaural hearing on the telephone. Or, if the patient has good dexterity, he/she can have one ear listening to the phone and one to the room conversation, if needed.

Claims	Prior Art
	TelCom User Guide at Page 3 What is TelCom • TelCom is a stationary FM transmitter. • It boosts the sound from television or any other audio equipment (e.g., Personal Computer, CD-player, radio) without disturbing others. • It allows you to hear the telephone ringing at any time. • The television sound is switched off automatically when the telephone is answered. • The person calling can be heard loud and clear. • When the telephone receiver is replaced, the television sound will return automatically. • To use this system hearing instruments fitted with FM receivers are required. TelCom User Guide at Page 8  F G 4. Plug the audio cable into the television headphone socket* F. Plug the other end of the audio cable into the TelCom audio socket G. When you switch on the television, the Status Indicator will change to yellow. Please note that it can take up to 45 seconds until the color changes. Your TelCom is now ready to operate. *or any other equipment having an audio output, e.g., radio, CD player, personal computer TelCom User Guide at Page 12 Summarized benefits: • Clear sound while watching television without disturbing noise • Sound from audio equipment, speech over telephone, and even the telephone ringing signal heard through FM • The audio signal level – is automatically switched off when the telephone is picked up – automatically comes back if the telephone is hung-up • Fully automatic operation once the system is installed • Ready to operate 24 hours a day, 7 days a week • No cabling between the TelCom and the FM receivers • High-quality Swiss made equipment with high-tech design

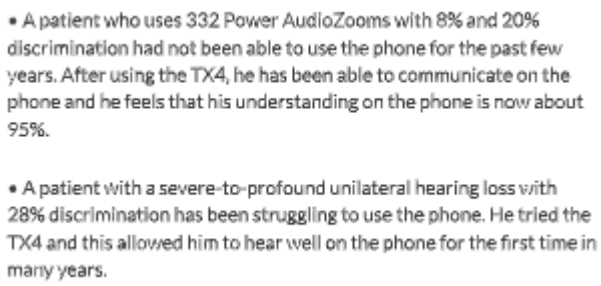
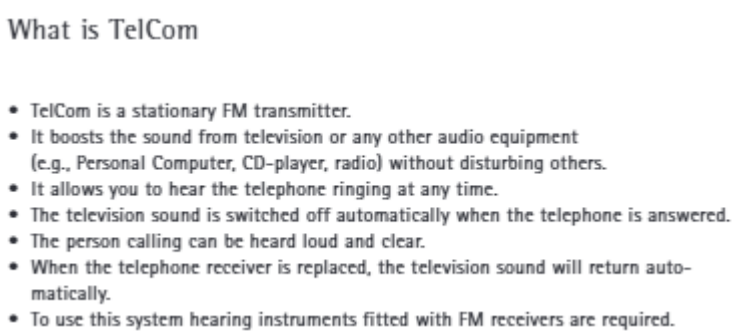
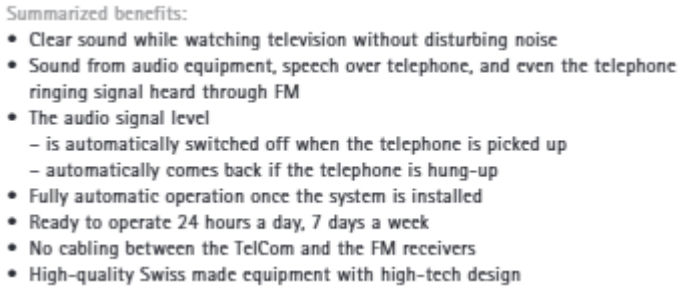
Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 6  **Direct Audio Input socket (optional)** Your hearing instruments may have a Direct Audio Input socket (shoe). This facility allows signals from external sound sources to be recieved directly by your hearing instruments. These sources include radio, cassette player, TV, auditory training equipment and assistive listening devices. You will hear the external signal when the function switch is set to the "M" position. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses that the RPU can include various devices and sensors, including CD players and radios. The following citations show examples of where Anderson '783 discloses this limitation.

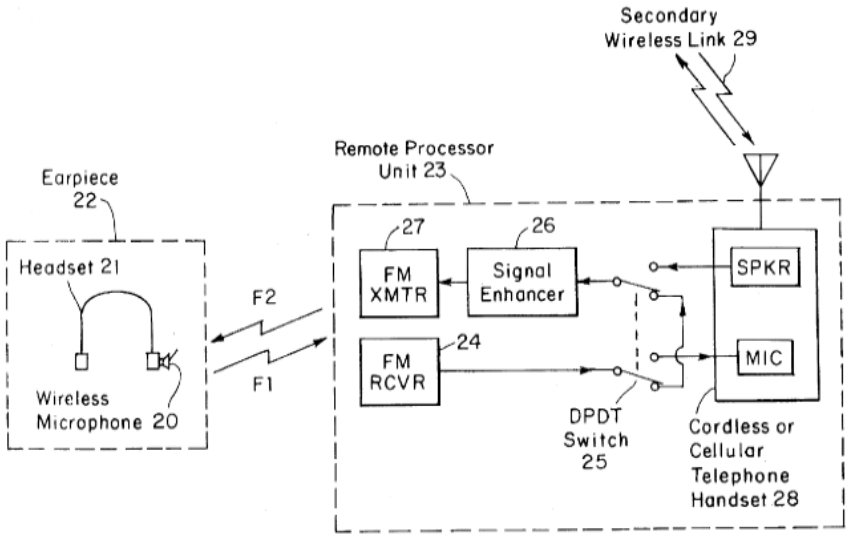
Claims	Prior Art
	Anderson ’783 at FIG. 9  FIG. 9 Anderson ’783 at 4:26–29 The limited-feature hearing aid embodiment shown in FIG. 2 can be fabricated using low-cost commercial off-the-shelf RF system elements operating in the standard 88 MHz to 108 MHz FM (frequency modulation) broadcast band. Anderson ’783 at 25:50–26:5 Sensors and peripheral devices: Many sensors and peripheral devices 950 can reside in or be attached to the RPU by wired or wireless means, and controlled by the user (via inputs to the RPU DSP 948 through the keyboard 946, Morse code keys 956 or voice recognition) to provide both solicited and unsolicited information. Music can be provided from pre-stored information including tape, compact disc, over-the-telephone services via the secondary wireless link, or a commercial broadcast radio receiver. User location information can be provided to the RPU from special-purpose transmitters at specific locations in nursing home applications. Self-contained user-carried inertial navigation packages (with solid-state gyroscopes, accelerometers and a compass) or a Global Positioning System receiver can also be used. Sensors for a foot soldier RPU application may include many types of detectors such as RF detectors (e.g., radar detection capability), nuclear/biological/chemical weapon detectors, infrared or laser detectors

Claims	Prior Art
	and metal detectors. Appropriate verbal warnings or distinctive alerting tones generated by the RPU DSP 948 are sent from the RPU 16 to the earpiece 10 and ultimately received as audio signals by the user. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
4. A hearing enhancement system as recited in claim 1, wherein the audio system is a phone.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement system as recited in claim 1, wherein the audio system is a phone." The Transmitters of the DHA Systems' can be connected to phones. The following citations show examples of where DHA Systems practice this limitation. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 6 **4- TelCom**  Phonak's TelCom is a stationary FM transmitter that allows optimized television, telephone, and audio system usage. While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice to the FM receiver. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is returned to the previous volume setting. TelCom is equipped with a frequency synthesizer for convenient setting of FM frequencies; it has a range of 7 to 15 meters (23 to 50 feet). For television, telephone, CD player, radio, personal computer and other equipment with audio output

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 28  Phonak – Collections 2002 Product List at Page 29 

Claims	Prior Art
	Phonak – FM Transmitters including Campus S and TelCom at Page 1 TelCom  TelCom (click to enlarge) Phonak's TelCom is the first stationary FM transmitter that **allows optimized television, telephone, and audio system usage**. While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice clearly and crisply. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is turned back up to the previous volume setting. The TelCom has an operating range of 7 to 15 meters (23 to 50 feet). **For television, telephone, CD player, radio, personal computer and other equipment with audio output**. Phonak – Microlink User Guide at Page 7 You may even connect the system directly to your telephone, if it has an audio output socket. Alternatively, use the optional adapter available for your HandyMic. Switching off the microphone then allows you to hear the telephone signal without any background noise. Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 3 There is also a new phone transmitter called the TX4 or Tel-Com (Figure 2). It is a conical space-age-looking device that attaches to the phone. It can also be used as an external sound source for television, radio, CD players, etc. This can serve as more of a permanent system than the TX3, which has to be hooked/unhooked from an external source. Therefore, a patient Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 4 The TX4 can be used for television, radio, stereo, or CD player, making it flexible for external sound sources. It also allows for binaural hearing on the telephone. Or, if the patient has good dexterity, he/she can have one ear listening to the phone and one to the room conversation, if needed.

Claims	Prior Art
	Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 7  • A patient who uses 332 Power AudioZooms with 8% and 20% discrimination had not been able to use the phone for the past few years. After using the TX4, he has been able to communicate on the phone and he feels that his understanding on the phone is now about 95%. • A patient with a severe-to-profound unilateral hearing loss with 28% discrimination has been struggling to use the phone. He tried the TX4 and this allowed him to hear well on the phone for the first time in many years. TelCom User Guide at Page 3  What is TelCom • TelCom is a stationary FM transmitter. • It boosts the sound from television or any other audio equipment (e.g., Personal Computer, CD-player, radio) without disturbing others. • It allows you to hear the telephone ringing at any time. • The television sound is switched off automatically when the telephone is answered. • The person calling can be heard loud and clear. • When the telephone receiver is replaced, the television sound will return automatically. • To use this system hearing instruments fitted with FM receivers are required. TelCom User Guide at Page 12  Summarized benefits: • Clear sound while watching television without disturbing noise • Sound from audio equipment, speech over telephone, and even the telephone ringing signal heard through FM • The audio signal level – is automatically switched off when the telephone is picked up – automatically comes back if the telephone is hung-up • Fully automatic operation once the system is installed • Ready to operate 24 hours a day, 7 days a week • No cabling between the TelCom and the FM receivers • High-quality Swiss made equipment with high-tech design To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses a cordless or cellular telephone as the audio system that receives input signals. The following citations show examples of where Anderson '783 discloses this limitation.

Claims	Prior Art
	Anderson ’783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson ’783 at FIG. 2  FIG. 2 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that

Claims	Prior Art
	wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson ’783 at 5:61–6:3 The RPU 23 shown in FIG. 2 also includes, as an optional feature, a telephone handset 28 which may be a cordless handset (e.g. Panasonic model KX-T3710H), cellular handset (e.g., NEC model P120), or a cordless or cellular handset with voice-dialing capability, or any of a variety of other devices (e.g. a "walkie-talkie") capable of communication via any type of secondary wireless link 29 (e.g., RF or infrared). In this application, the handset 28 is not held in the user's hand, but instead forms a part of the RPU 23 carried on or located near the user's body. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26,

Claims	Prior Art
	FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications

Claims	Prior Art
	(although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. Enzmann '555 further discloses a wireless phone. The following citations show examples of where Enzmann '555 discloses this limitation. Enzmann '555 at Abstract An aided ear bud device is provided that operates as a hearing aid device as well as an ear bud device for a wireless phone. The aided ear bud normally operates as a hearing aid device. The aided ear bud state is changed by a verified input from a wireless phone. Upon the change in state, the microphone input from the aided ear bud is remotely output to the wireless phone while the incoming transmission from the wireless phone is combined with the microphone input and output to the user. The ear bud device can be modified to receive analog or digital inputs from other outside sources. Enzmann '555 at [0002] This invention relates to systems and methods for providing a hearing aid capable of communicating with a wireless phone. More particularly, this invention provides a hearing aid capable of simultaneously or alternatively performing the functions of an ear bud for the wireless phone. Enzmann '555 at [0009] Thus, the inventor has discerned that there is a need to address the above-mentioned problems by providing a hearing device that functions both as a hearing aid and as a wireless phone ear bud. Enzmann '555 at [0011] Therefore, this invention provides systems and methods for adapting a hearing aid to operate as an ear bud device in addition to providing conventional hearing aid functions. Using this method, this invention is able to address many of the issues hearing impaired wireless phone users encounter while addressing the

Claims	Prior Art
	inherent problems associated with the conventional solutions. Enzmann ’555 at [0015] In the various exemplary embodiments according to this invention, the ear bud device monitors the noise being received by its microphone and a transmit/receive unit. Once the transmit/receive unit accepts an input that is anything but ambient noise, the system determines if the input is coming from a valid source. The validity of the source is based on a preprogrammed indicator. Based on this determination the ear bud device will switch to the appropriate mode of operation. Enzmann ’555 at [0030] The embodiments of the present invention allow the user to hear the audio transmissions of the wireless phone in the speaker of the aided ear bud. This is achieved by transmitting the audio output to the aided ear bud. Using this approach, the interruption due to feedback from the antenna of the wireless phone is eliminated because the wireless phone can be placed considerable distances away from the hearing aid such that the spurious transmissions from the antenna do not interfere with the processing functions of the aided ear bud. In addition, the portability of the wireless phone is increased because the user's hearing device can now act as a wireless ear bud for the wireless phone. Enzmann ’555 at [0034] The connection shown between the TX/RX unit 260 and the wireless phone 270 is preferably a wireless digital connection, such as Bluetooth, etc. However, it should be appreciated that the connection between the TX/RX unit 260 and the wireless phone 270 can be any kind of wireless or wired connection, and may be digital or analog, infrared (IR) or transmitted radio frequencies (RF) without, departing from the scope of the invention. Enzmann ’555 at [0039] The signals received at the microphone 205 are passed to the user as background noise and must be passed to the wireless phone 270 as if the user was speaking directly into the wireless phone 270. Remotely transmitting this signal to the wireless phone from the aided-ear bud 200 also allows the user to be located in a remote location away from the wireless phone 270. Enzmann ’555 at [0040] The signal 226b-passed to the op amp 223 is representative of ambient noise in the aided ear bud 200.

Claims	Prior Art
	This signal 226b is typically reduced in volume and combined with the input from the signal-processing function 225 to produce a mixed signal. The signal processing function 225 processes signal 228 from the TX/RX unit 260 and provides a second processing step so that the timing of the incoming signals from the microphone and the wireless phone are in sync and can be effectively combined to create a true representation of sound to the user. The op amp 223 outputs the mixed signal to the D/A converter 240, and finally to the speaker 250. The signal processing functions 221 and 225, to be implemented are known to those skilled in the art. Enzmann '555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the "••" line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the "-••" line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the

Claims	Prior Art
	teachings of DHA Systems, Anderson ’783, and Enzmann ’555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
5. A hearing enhancement system as recited in claim 1, wherein the audio system receives the input signals from a microphone.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement system as recited in claim 1, wherein the audio system receives the input signals from a microphone.” DHA Systems’ Transmitters include microphones for receiving audio signals. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 23 

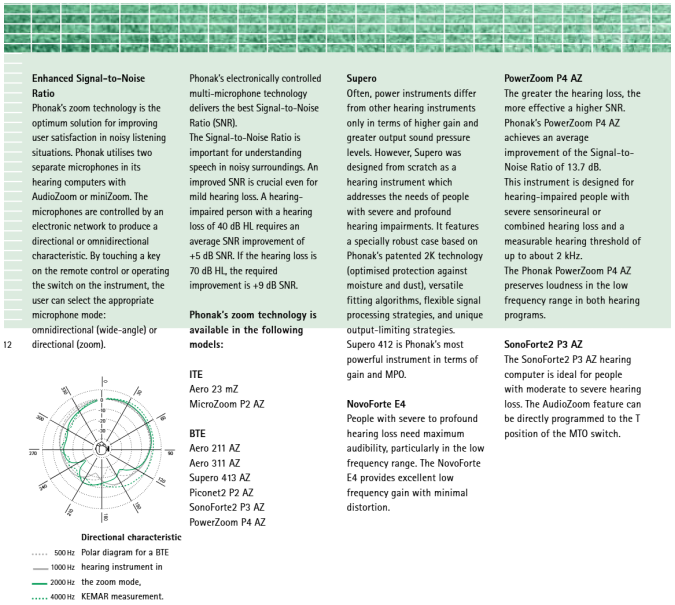
Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 2 People with sensorineural hearing loss need a more favorable signal-to-noise ratio to understand speech than do normal hearing listeners. Research has shown that hearing impaired listeners may require signal-to-noise improvements of 4 dB to 18 dB, depending on the magnitude of their hearing loss to achieve word-recognition scores equivalent to those with normal hearing. FM systems are able to improve the signal-to-noise ratio. FM systems improve the user's ability to understand speech in the presence of noise. Since the sound is delivered by FM radio waves, the strength and quality of the sound remains constant (across the operational distance) from the speaker to the hearing impaired individual. FM systems consist of a microphone usually placed four to six inches from the sound source, and a transmitter, which sends the signal via radio waves directly to the miniature FM receiver, which is connected to the personal hearing instrument. In other words, the entire FM system is a complete broadcasting and receiving system. Importantly, when using FM systems, the effects of background noise and reverberation are minimal. These factors help reduce background noise while enhancing and stabilizing the main sound source.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5 **2- HandyMic TX3**  The microphone with a built-in transmitter, used primarily for adults. The multi-microphone technology of the HandyMic combines omni directional, directional, and super directional microphones with an FM transmitter. The compact HandyMic transmits the speaker's voice directly to the hearing instrument user's FM receiver. The HandyMic can be set up directly in front of the sound source, slipped into the speaker's shirt pocket, or aimed at the speaker manually. With an audio cable, the HandyMic can also be connected to a sound system. As with all other Phonak FM products, the HandyMic has a range of 7 to 15 meters (23 to 50 feet). For business meetings, round table discussions, family gatherings, in a car, on a noisy street, at home

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5  The Phonak Campus **S** is a new addition to the Phonak product line - this multi-channel FM transmitter is developed for use in schools, universities and speech therapy. It is fully compatible with current Phonak FM products, and ready for operation with future generations of Phonak FM receivers. Campus **S** special features include a channel selector with digital display, an ergonomic user interface, a microphone with switchable directional / omni directional characteristics, handy storage for the microphone cable, connection to televisions, video recorders and radios, and an easily exchanged rechargeable battery. Phonak Campus-S-User-Manual at Page 1 Description  ❶ On/off button ❷ Channel selection buttons ❸ FM channel in use ❹ Battery status indicator ❺ Direct frequency synchronization ❻ There are different microphone options available (see page 6) ❼ Carrying clip ❽ Battery compartment ❾ Audio socket ❿ Battery charger socket ⓫ Label for your initials

Claims	Prior Art
	Phonak Campus-S-User-Manual at Page 7  ❶ To switch ON/OFF: Press the ⏻ button for 2 seconds. When the Campus S is switched ON, the LCD display shows the channel in use and the battery status. When the Campus S is switched off, the LCD display goes blank. ❷ For MiniMic MM8: Remove the windscreen from the microphone and ensure that the microphone switch is in either the ▼ (directional) or ▮ (omnidirectional) position. Phonak Campus-S-User-Manual at Page 13  ❸ Switch on your Campus S and the microphone, then the audio equipment. MiniMic MM8: This microphone allows you to talk directly to listeners while showing a video, for example. If you prefer not to speak, switch off (X) the microphone. Should your audio equipment not have a 3.5 mm connector please ask your hearing care professional for adapters for 6.3 mm jacks, RCA/Cinch or SCART connectors.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 12



Enhanced Signal-to-Noise Ratio
Phonak's zoom technology is the optimum solution for improving user satisfaction in noisy listening situations. Phonak utilises two separate microphones in its hearing computers with AudioZoom or miniZoom. The microphones are controlled by an electronic network to produce a directional or omnidirectional characteristic. By touching a key on the remote control or operating the switch on the instrument, the user can select the appropriate microphone mode: omnidirectional (wide-angle) or directional (zoom).

Phonak's electronically controlled multi-microphone technology delivers the best Signal-to-Noise Ratio (SNR).
The Signal-to-Noise Ratio is important for understanding speech in noisy surroundings. An improved SNR is crucial even for mild hearing loss. A hearing-impaired person with a hearing loss of 40 dB HL requires an average SNR improvement of +5 dB SNR. If the hearing loss is 70 dB HL, the required improvement is +9 dB SNR.

Phonak's zoom technology is available in the following models:

ITE
Aero 23 mZ
MicroZoom P2 AZ

BTE
Aero 211 AZ
Aero 311 AZ
Supero 413 AZ
Piconet2 P2 AZ
SonoForte2 P3 AZ
PowerZoom P4 AZ

Supero
Often, power instruments differ from other hearing instruments only in terms of higher gain and greater output sound pressure levels. However, Supero was designed from scratch as a hearing instrument which addresses the needs of people with severe and profound hearing impairments. It features a specially robust case based on Phonak's patented 2K technology (optimised protection against moisture and dust), versatile fitting algorithms, flexible signal processing strategies, and unique output-limiting strategies.
Supero 412 is Phonak's most powerful instrument in terms of gain and MPO.

NovoForte E4
People with severe to profound hearing loss need maximum audibility, particularly in the low frequency range. The NovoForte E4 provides excellent low frequency gain with minimal distortion.

PowerZoom P4 AZ
The greater the hearing loss, the more effective a higher SNR. Phonak's PowerZoom P4 AZ achieves an average improvement of the Signal-to-Noise Ratio of 13.7 dB.
This instrument is designed for hearing-impaired people with severe sensorineural or combined hearing loss and a measurable hearing threshold of up to about 2 kHz.
The Phonak PowerZoom P4 AZ preserves loudness in the low frequency range in both hearing programs.

SonoForte2 P3 AZ
The SonoForte2 P3 AZ hearing computer is ideal for people with moderate to severe hearing loss. The AudioZoom feature can be directly programmed to the T position of the MTO switch.

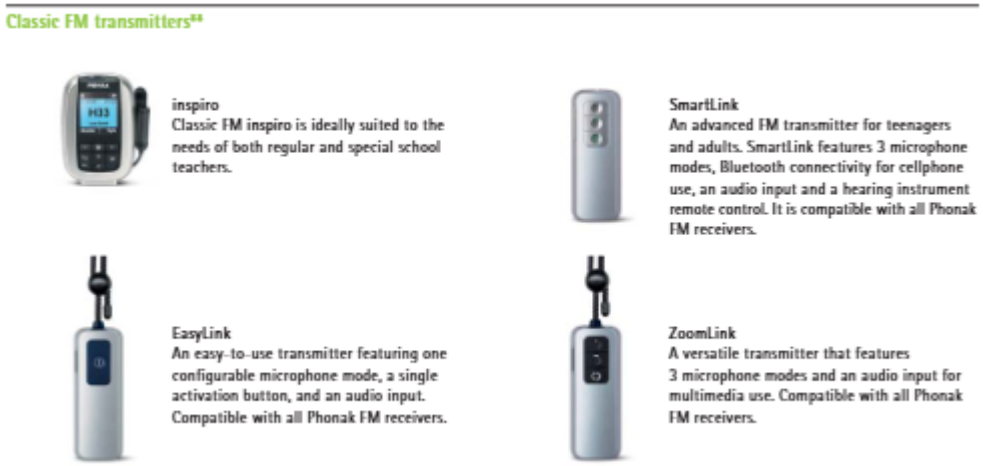
12

Directional characteristic
500 Hz
1000 Hz
2000 Hz
4000 Hz
Polar diagram for a BTE hearing instrument in the zoom mode, KEMAR measurement.

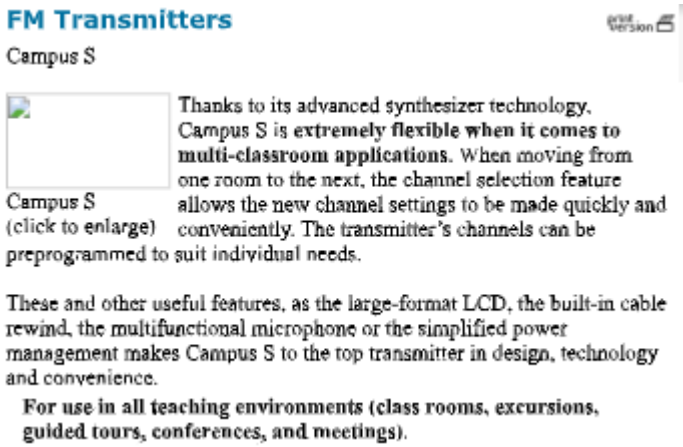
Phonak – Fitting Guide for MLxi and MLxi Baha at Page 9



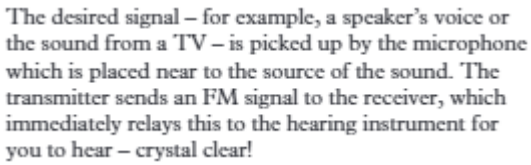
Claims	Prior Art
	Phonak – Fitting Guide for MLxi and MLxi Baha at Page 9

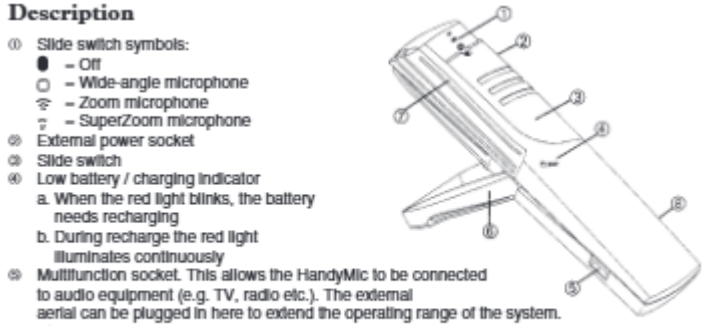


Phonak – FM Transmitters including Campus S and TelCom at Page 1

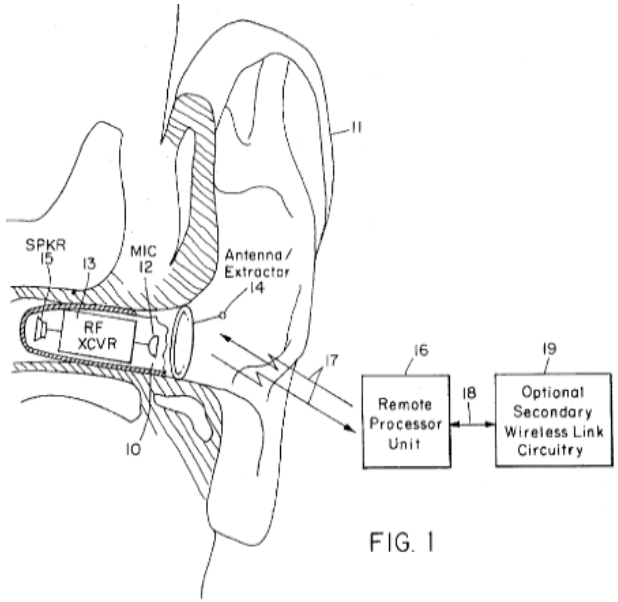


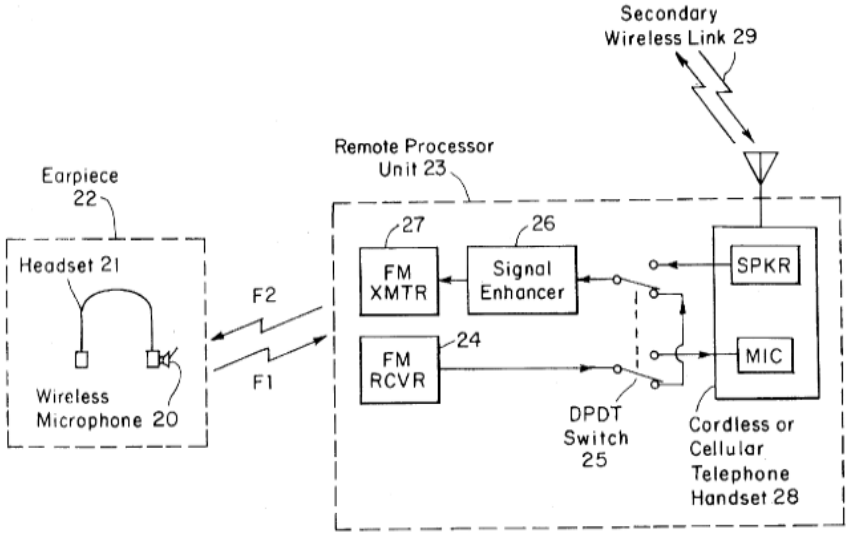
Phonak – Microlink User Guide at Page 2



Claims	Prior Art
	Phonak – Microlink User Guide at Page 9  **Description** ① Slide switch symbols: ● – Off ○ – Wide-angle microphone – Zoom microphone – SuperZoom microphone ② External power socket ③ Slide switch ④ Low battery / charging indicator a. When the red light blinks, the battery needs recharging b. During recharge the red light illuminates continuously ⑤ Multifunction socket. This allows the HandyMic to be connected to audio equipment (e.g. TV, radio etc.). The external aerial can be plugged in here to extend the operating range of the system. ⑥ Stand ⑦ Microphone ports ⑧ Plug-in frequency module Lewis – Speech perception in noise: directional microphones (2004) at Page 431 All subjects were fit with digital Phonak Claro 311 dAZ BTE hearing aids bilaterally. All earmolds had select-a-vent (SAV) venting and #13 or 3 mm horn tubing. In addition to the hearing aids, subjects were fit with Phonak Microlink ML8 FM receivers bilaterally. These FM receivers attach to the bottom of a BTE hearing aid and may be utilized in either the "FM only" mode, which attenuates the hearing aid microphone by 20 dB, or in the FM plus hearing aid mode, which allows for FM input and input of environmental sounds via the hearing aid microphones simultaneously at the same output level. The Phonak TX3 HandyMic FM transmitter served as the FM transmitter. This transmitter has three microphone options: (1) Wide Angle, which picks up sounds arriving from all directions around the transmitter microphone equally; (2) Zoom, which provides reduced amplification to signals arriving from the rear (cardioid); and (3) SuperZoom, which provides reduced amplification to signals originating from the rear and the sides (hypercardioid). The

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 4 The input signal from the microphone or the telecoil is digitized and fed to a filterbank, which divides the signal into seven band-pass filters with centre frequencies at: 250, 700, 1200, 2000, 3000, 4000 and 5000 Hz. The filterbank covers the frequency range from 125 to about 6000 Hz. The output from each band-pass filter is equipped with an attenuator by which each filtered signal can be weighted. This allows for a very precise fitting in accordance with the audiometric profile of the hearing impaired. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses receiving input signals from a microphone from the disclosed wireless device. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation.

Claims	Prior Art
	Anderson ’783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson ’783 at FIG. 2  FIG. 2 Anderson ’783 at 1:21–28 In the prior art, a basic hearing aid without remote control is a self-contained earpiece comprising a microphone, speaker and associated processor electronics. In such hearing aids, the earpiece microphone converts acoustic waves into electrical representations of the acoustic waves, the electrical signals are amplified by the earpiece processor electronics and converted back into acoustic waves by the earpiece speaker. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed

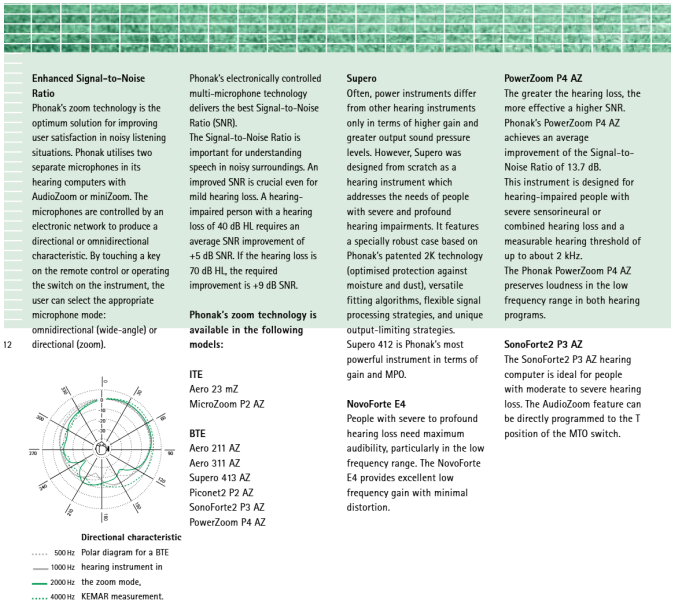
Claims	Prior Art
	in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 3:52–4:14 One preferred embodiment of the invention herein described is shown in block diagram form in FIG. 1. In this figure, the earpiece 10 shown worn in the ear 11 uses a standard completely-in-the-canal (CIC) housing, well known in the art, although many other earpiece housing types known in the art (e.g., behind-the-ear, or BTE) can be used. The earpiece shown in FIG. 1 comprises a microphone 12, RF transceiver 13 with an antenna that doubles as an earpiece extractor 14, and speaker 15. Although the dual-use antenna/extractor arrangement shown in FIG. 1 is often desirable, a separate antenna or antennae can be used in conjunction with many different types of earpiece extractors as appropriate for a particular application. Antennae and extractors can be disguised as ear hair or jewelry (e.g., earrings), or conductive filaments can be permanently implanted in the ear cartilage to act as antennae using a process similar to ear piercing. The earpiece 10 communicates with a remote processor unit (RPU) 16 via a primary two-way RF link 17, although many other wireless link media (e.g., ultrasonic or infrared) may be used instead. The RPU is typically worn under clothing (e.g., carried in a pocket or purse), but may also be worn in plain sight (e.g., on a belt) if desired. The RPU 16 may be connected (via wired or wireless means 18) to optional secondary wireless link circuitry 19 that allows wireless communication between the RPU and other sources of information (e.g., the general subscriber telephone network) via a secondary wireless link. Note that the optional secondary wireless link circuitry 19 may or may not be contained within the RPU case 70 of FIG. 7.

Claims	Prior Art
	Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other

Claims	Prior Art
	information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
6. A hearing enhancement system as recited in claim 1, wherein the down-converted signals are modified such that a portion of the audio output signals has an increased power to enhance the hearing of the user.	DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “[a] hearing enhancement system as recited in claim 1, wherein the down-converted signals are modified such that a portion of the audio output signals has an increased power to enhance the hearing of the user.” The Digital Hearing Aids of the DHA Systems increase the power of audio signals to help a user hear. The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art

Phonak – Collections 2002 Product List at Page 12



Enhanced Signal-to-Noise Ratio
Phonak's zoom technology is the optimum solution for improving user satisfaction in noisy listening situations. Phonak utilises two separate microphones in its hearing computers with AudioZoom or miniZoom. The microphones are controlled by an electronic network to produce a directional or omnidirectional characteristic. By touching a key on the remote control or operating the switch on the instrument, the user can select the appropriate microphone mode: omnidirectional (wide-angle) or directional (zoom).

Phonak's electronically controlled multi-microphone technology delivers the best Signal-to-Noise Ratio (SNR).
The Signal-to-Noise Ratio is important for understanding speech in noisy surroundings. An improved SNR is crucial even for mild hearing loss. A hearing-impaired person with a hearing loss of 40 dB HL requires an average SNR improvement of +5 dB SNR. If the hearing loss is 70 dB HL, the required improvement is +9 dB SNR.

Phonak's zoom technology is available in the following models:

ITE
Aero 23 mZ
MicroZoom P2 AZ

BTE
Aero 211 AZ
Aero 311 AZ
Supero 413 AZ
Piconet2 P2 AZ
SonoForte2 P3 AZ
PowerZoom P4 AZ

Supero
Often, power instruments differ from other hearing instruments only in terms of higher gain and greater output sound pressure levels. However, Supero was designed from scratch as a hearing instrument which addresses the needs of people with severe and profound hearing impairments. It features a specially robust case based on Phonak's patented 2K technology (optimised protection against moisture and dust), versatile fitting algorithms, flexible signal processing strategies, and unique output-limiting strategies.
Supero 412 is Phonak's most powerful instrument in terms of gain and MPO.

NovoForte E4
People with severe to profound hearing loss need maximum audibility, particularly in the low frequency range. The NovoForte E4 provides excellent low frequency gain with minimal distortion.

PowerZoom P4 AZ
The greater the hearing loss, the more effective a higher SNR. Phonak's PowerZoom P4 AZ achieves an average improvement of the Signal-to-Noise Ratio of 13.7 dB.
This instrument is designed for hearing-impaired people with severe sensorineural or combined hearing loss and a measurable hearing threshold of up to about 2 kHz.
The Phonak PowerZoom P4 AZ preserves loudness in the low frequency range in both hearing programs.

SonoForte2 P3 AZ
The SonoForte2 P3 AZ hearing computer is ideal for people with moderate to severe hearing loss. The AudioZoom feature can be directly programmed to the T position of the MTO switch.

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Directional characteristic
500 Hz
1000 Hz
2000 Hz
4000 Hz
Polar diagram for a BTE hearing instrument in the zoom mode, KEMAR measurement.

Phonak – Online Interview re Perseo (April 7, 2003) at Page 3

Dave Fabry/Phonak: Sure, Doug. Perseo is available in a full line of products:

Perseo 11 CIC, 35 gain/108 output

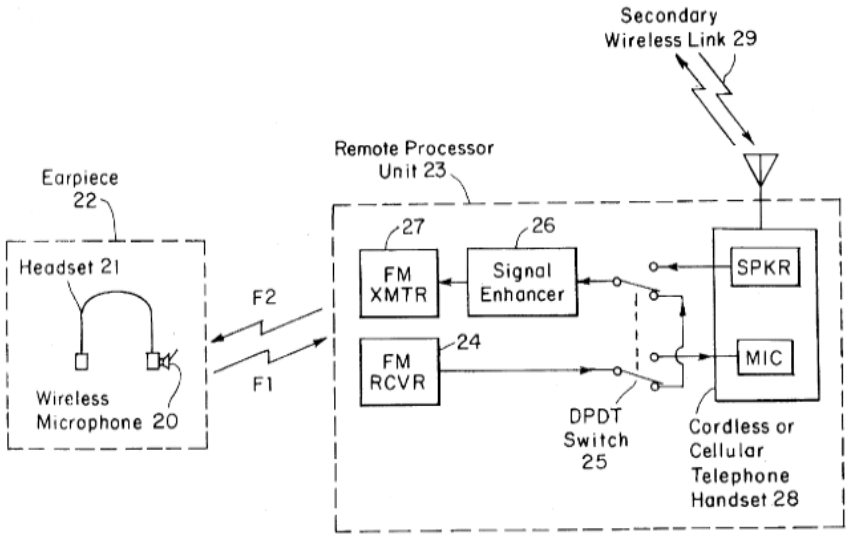
Perseo 23 dAZ half-shell/full shell, 48 gain/108 output

Perseo 111dAZ BTE for mild/sloping hearing losses, 45 gain/120 output

Perseo 211dAZ BTE for mild-moderate losses, 55 gain/125 output

Perseo 311dAZ Forte BTE for moderate-severe losses, 65 gain/130 output

Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 7 PersonalLogic may be personalized, via the Listening Situation Manager, to meet individual patient preferences for listening in noise. The clinician may select whether PersonalLogic adapts to noise on the basis of audibility or comfort. Audibility changes to Noisy situation processing only when speech in noise is detected, but not with speech alone or noise alone. Comfort adapts WHENEVER noise is present that exceeds a certain dB level. Are you with me? Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Liz Brassine/Phonak:** Yes, the Loudness Perception Profile is an optional, loudness scaling procedure that can be used with either Claro or Perseo to set gain and compression across all 20 critical bands. If you choose not to do this procedure during fitting, loudness growth information will be predicted based on your patient's audiometric information. We feel that LPP is yet another tool for personalizing Perseo gain settings after the initial fitting if the patient is experiencing loudness difficulties with pre-calculated gain values. Oticon – DigiFocus Description at Page 1 Inside each DigiFocus, the digital chips have the same processing power as a fast laptop computer. This power is used to analyse the incoming sound signal, and speech is extracted through a unique system called ASA - Adaptive Speech Alignment. ASA always makes speech audible, amplifying it as much as necessary without making it uncomfortably loud or distorted. Sounds are reproduced very naturally - making speech far easier to understand than with any other hearing instrument on the market.

Claims	Prior Art
	To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson ‘783 discloses increasing the power (e,g., amplifying the received signals) before presenting the modified signals to the user). The following citations show examples of where Anderson ’783 discloses this limitation. Anderson ’783 at FIG. 2  FIG. 2 Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement,

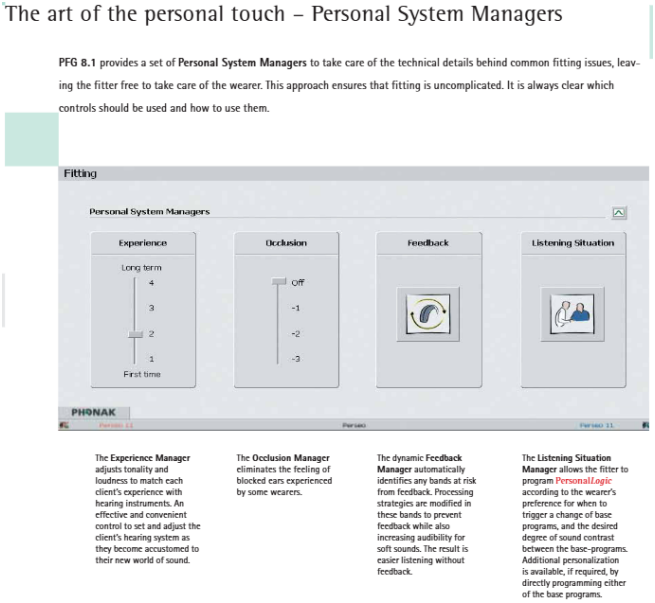
Claims	Prior Art
	takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-

Claims	Prior Art
	selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 23:49–58 In applications as aids for high risk of hearing loss groups such as firefighters, hunters and foot soldiers, the system may also provide hearing enhancement (e.g., amplification) for superior audio detection and direction-finding capabilities as well as hearing protection from loud equipment, shoulder-fired weapons or local artillery. The system is also capable of tinnitus masking and performing active noise cancellation to potentially enhance a user's mental concentration abilities using techniques well known in the art and

Claims	Prior Art
	implemented in the RPU DSP 948. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. Enzmann ’555 also discloses the additional limitation of claim 6. The following citations show examples of where Enzmann ‘555 discloses this limitation. Enzmann ’555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency mapping of the user's hearing characteristics. Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the “••” line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the “-••” line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann ’555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around

Claims	Prior Art
	the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann ’555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann ’555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the

Claims	Prior Art
	amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann '555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. Specifically, a POSITA would have been motivated to cause the Digital Hearing Aids from the DHA Systems to modify the down-converted signals such that a portion of the audio output signals has an increased power to enhance the hearing of the user. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
7[pre]. A hearing enhancement system as recited in claim 6,	To the extent the preamble is limiting, DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement system as recited in claim 6." *See* above at claim 6. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claims 2 and 6. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[7a] wherein the portion with increased power is selected based on frequency, and	DHA Systems and Enzmann '555 expressly or inherently disclose "wherein the portion with increased power is selected based on frequency." The Digital Hearing Aids of the DHA Systems increase power based on frequency. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 18 

Claims	Prior Art
	Phonak – BTE Elite Article at Page 1 **Perseo – the outstanding features place Perseo in a class of its own** • **Personal*Logic*** makes Perseo the first digital hearing system with personalized automatic operation. **Personal*Logic*** selects the appropriate base program and continually adapts its parameters to suit the needs of the wearer. • **Dual-base automatic** allows processing and features to be separately adjusted for quiet and noisy situations for optimum automatic performance. Adjustments for noise never disrupt adjustments for quiet and vice versa. • **Digital Perception Processing (DPP)** with Clarity Component Enhancement: Increased clarity and sound quality also in loud environments. Processing in 20 critical bands. • **Personal System Managers**: Experience Manager, Dynamic Feedback Manager, Occlusion Manager, and Listening Situation Manager for easy and individual adjustment of Personal*Logic*. • **Multi-programs** • **Fast tracking Adaptive digital AudioZoom (dAZ)** to separate actively speech from background noise. • **Fine-scale Noise Canceler** in 20 channels. • **TacTronic program switch** • **Optional remote control** • **FM compatible** • **Wind and weather protection** • **Fashion Color Line** (choice among 12 attractive colors) Phonak – Claro 211 Product Information at Page 1 **Processing features** – Digital Perception Processing (DPP) in 20 critical bands – Gain and output controlled by DPP – 3 hearing programs (+ mute mode): • QuietAdapt for hearing in relative quiet • NoiseAdapt for hearing speech in noise • Program 3 telephone default (other choices available) – FM programs: FM and FM+M – AutoSelect: automatic switching between QuietAdapt and NoiseAdapt – Claro's noise suppression technologies • Adaptive digital AudioZoom (dAZ) • Fine-scale Noise Canceler in 20 bands • Soft squelch

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 7



Adaptive digital AudioZoom (dAZ)

Fine-scale Noise Canceler (FNC)

Active and adaptive separation of speech from noise
The Speech-to-Noise Ratio (SNR) can only be optimised if the noise is spatially separated from the speech signal with directional microphone technology. As a pioneer in multi-microphone technologies, Phonak introduced AudioZoom, a feature which significantly improves listening and understanding in noisy situations, enhancing user satisfaction. Now, Phonak goes a step further in the refinement of multi-microphone technology with Adaptive digital AudioZoom: it seeks, finds, and suppresses noise automatically.

Fully automatic, fully adaptive
With its unique spatial processing system, Phonak's Adaptive digital AudioZoom can detect noise not only from directly behind, but anywhere in the rear plane. Whether the hearing-impaired person is moving or the location of the noise source changes, the directional characteristic is constantly adapted to the listening situation. In this manner, the Adaptive digital AudioZoom automatically establishes the best possible SNR.

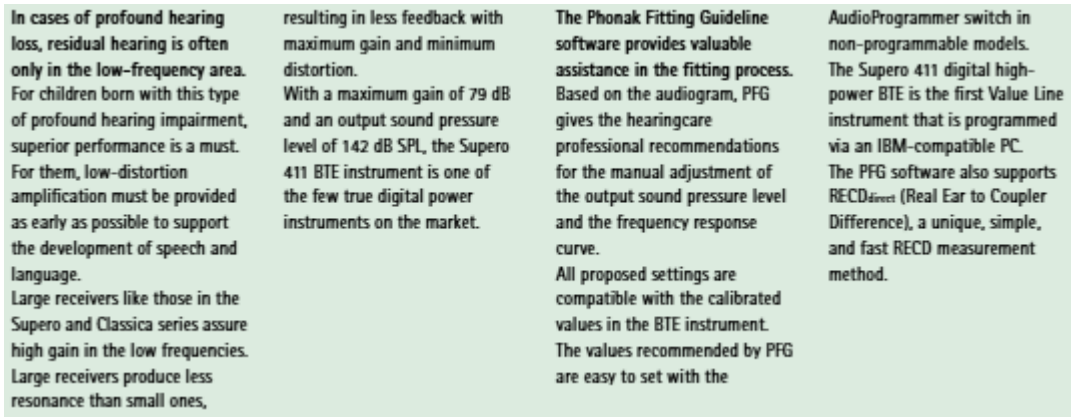
Twenty-band noise control
Claro constantly monitors the Speech-to-Noise Ratio (SNR) in all 20 bands. If a poor SNR is measured in certain bands, the Fine-scale Noise Canceler will reduce gain only in those bands. The result of this precision noise control is a selective and intelligent improvement of the SNR with only a marginal influence on the speech signal.

Precise and selective
All frequency bands are separately analysed and controlled. Gain is reduced selectively only in those bands where noise is present. This high-resolution analysis and gain control makes it possible to suppress noise with extremely high accuracy. Neighboring frequency bands without noise remain unaffected.

Intelligent
The magnitude of gain reduction is not constant. In frequency bands with higher SNRs and in bands which are important for speech intelligibility, gain is reduced only slightly. This intelligent control algorithm reduces the masking and distractive effects of background noise. Important speech information is preserved.

7

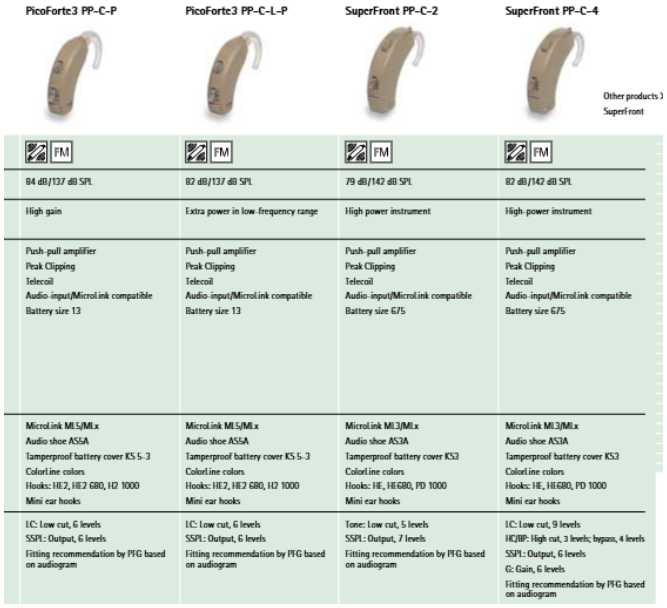
Phonak – Collections 2002 Product List at Page 22



In cases of profound hearing loss, residual hearing is often only in the low-frequency area. For children born with this type of profound hearing impairment, superior performance is a must. For them, low-distortion amplification must be provided as early as possible to support the development of speech and language.
Large receivers like those in the Supero and Classica series assure high gain in the low frequencies. Large receivers produce less resonance than small ones, resulting in less feedback with maximum gain and minimum distortion.
With a maximum gain of 79 dB and an output sound pressure level of 142 dB SPL, the Supero 411 BTE instrument is one of the few true digital power instruments on the market.

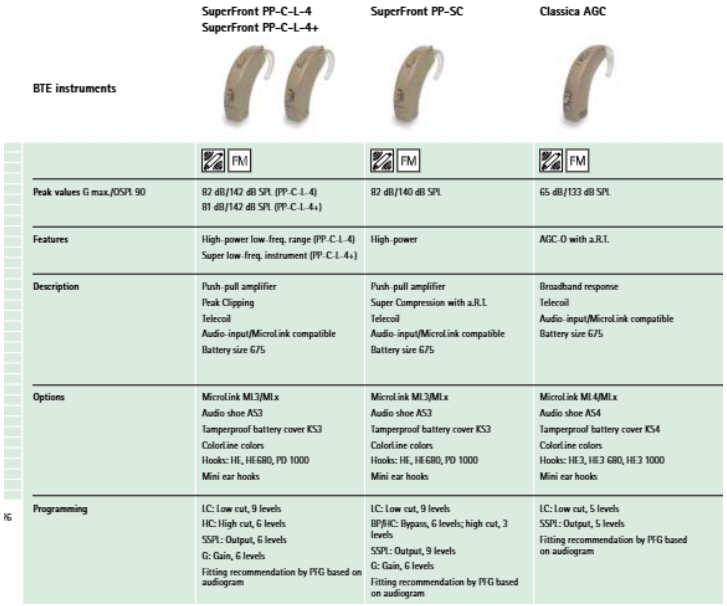
The Phonak Fitting Guideline software provides valuable assistance in the fitting process. Based on the audiogram, PFG gives the hearingcare professional recommendations for the manual adjustment of the output sound pressure level and the frequency response curve.
All proposed settings are compatible with the calibrated values in the BTE instrument. The values recommended by PFG are easy to set with the AudioProgrammer switch in non-programmable models.
The Supero 411 digital high-power BTE is the first Value Line instrument that is programmed via an IBM-compatible PC.
The PFG software also supports RECD$_{direct}$ (Real Ear to Coupler Difference), a unique, simple, and fast RECD measurement method.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 25



PicoForte3 PP-C-P	PicoForte3 PP-C-L-P	SuperFront PP-C-2	SuperFront PP-C-4
			Other products) Superl·ront
FM	FM	FM	FM
84 dB/137 dB SPL	82 dB/137 dB SPL	79 dB/142 dB SPL	82 dB/142 dB SPL
High gain	Extra power in low-frequency range	High power instrument	High-power instrument
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks
LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	Tone: Low cut, 5 levels SSPL: Output, 7 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels HC/BP: High cut, 3 levels; bypass, 4 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 26



	SuperFront PP-C-L-4 SuperFront PP-C-L-4+	SuperFront PP-SC	Classica AGC
BTE instruments			
	FM	FM	FM
Peak values G max./OSPL 90	82 dB/142 dB SPL (PP-C-L-4) 81 dB/142 dB SPL (PP-C-L-4+)	82 dB/140 dB SPL	65 dB/133 dB SPL
Features	High-power low-freq. range (PP-C-L-4) Super low-freq. instrument (PP-C-L-4+)	High-power	AGC-O with a.R.T.
Description	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Broadband response Telecoil Audio-input/MicroLink compatible Battery size 675
Options	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
Programming	LC: Low cut, 9 levels HC: High cut, 6 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels BP/HC: Bypass, 6 levels; high cut, 3 levels SSPL: Output, 9 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 27

Classica C-D	Classica PP-SC	Classica PP-C-P	Classica PP-C-L-P
			
FM	FM	FM	FM
70 dB/139 dB SPL	80 dB/137 dB SPL	84 dB/144 dB SPL	80 dB/144 dB SPL
Broadband BTE with directional microphone	High-power	High gain	Extra power in low-frequency range
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink-compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Phonak MicroLink MLxS Product Information at Page 1

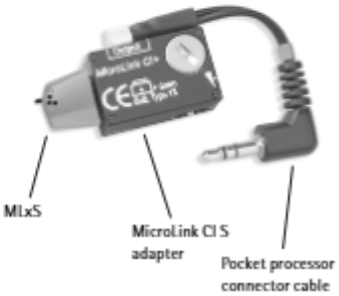
The MicroLink MLxS is the first miniaturized FM receiver with a digital frequency synthesizer for full multi-frequency flexibility. The receiver features fully automatic, non-contact frequency synchronization with either a WallPilot or the Campus S.

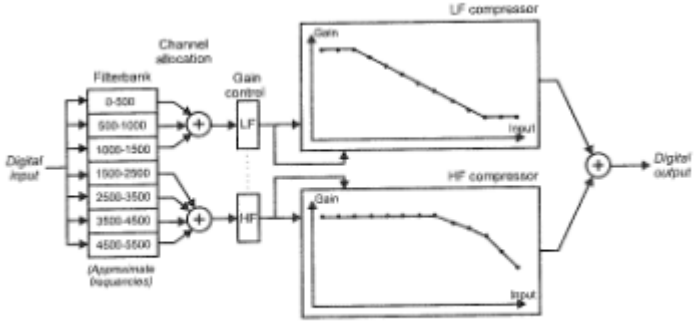
The MicroLink MLxS is compatible with all Phonak FM transmitters and the WallPilot, and is recommended for use with this equipment.

MLxS with BTE instrument



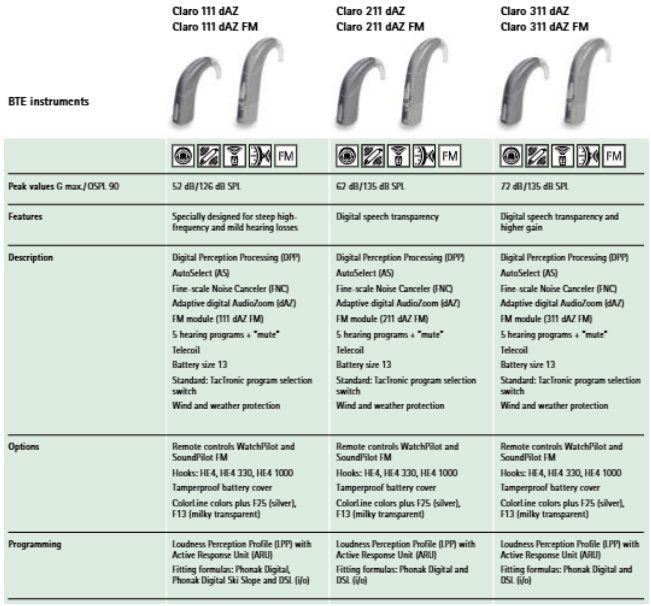
MLxS with adapter for CI pocket processor



Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. Oticon – DigiFocus White Paper (1996) at Fig. 1  *Fig.1. DigiFocus - block diagram of the digital audio processor, DAP.* To the extent DHA Systems do not explicitly disclose the claim limitation, Enzmann ’555 discloses modifying power based on frequency. The following citations show examples of where Enzmann ‘555 discloses this limitation. Enzmann ’555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency

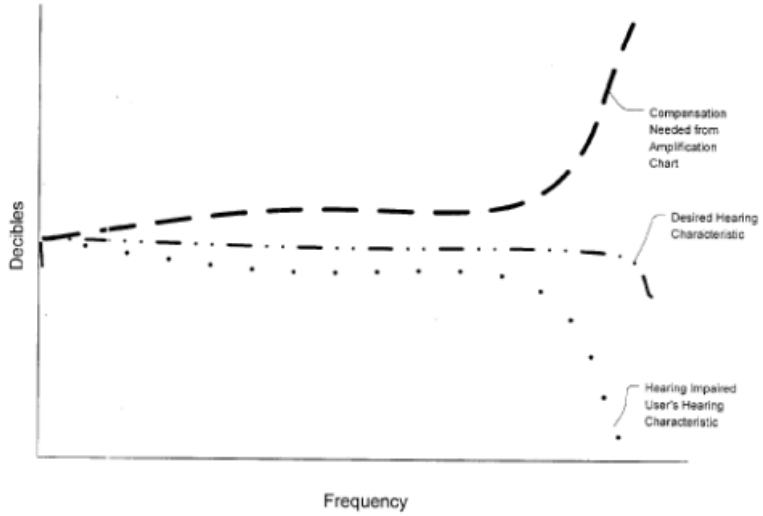
Claims	Prior Art
	mapping of the user's hearing characteristics. Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the “••” line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the “-••” line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann ’555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann ’555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann ’555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is

Claims	Prior Art
	received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect

Claims	Prior Art
	to claim 2. Specifically, a POSITA would have been motivated to cause the Digital Hearing Aids from the DHA Systems to perform signal amplification for individuals who suffer hearing loss at certain frequencies. To the extent that DHA Systems and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[7b] wherein a higher frequency portion has increased power.	DHA Systems and Enzmann '555 expressly or inherently disclose "wherein a higher frequency portion has increased power." The Digital Hearing Aids of the DHA Systems increase power at higher frequencies based on a user's hearing loss. The following citations show examples of where DHA Systems practice this limitation. Phonak – Collections 2002 Product List at Page 9 

	Claro 111 dAZ Claro 111 dAZ FM	Claro 211 dAZ Claro 211 dAZ FM	Claro 311 dAZ Claro 311 dAZ FM
BTE instruments			
	FM	FM	FM
Peak values G max./OSPL 90	52 dB/126 dB SPL	62 dB/135 dB SPL	72 dB/135 dB SPL
Features	Specially designed for steep high-frequency and mild hearing losses	Digital speech transparency	Digital speech transparency and higher gain
Description	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (111 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (211 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (311 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection
Options	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)
Programming	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital, Phonak Digital Ski Slope and DSL i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL i/o)

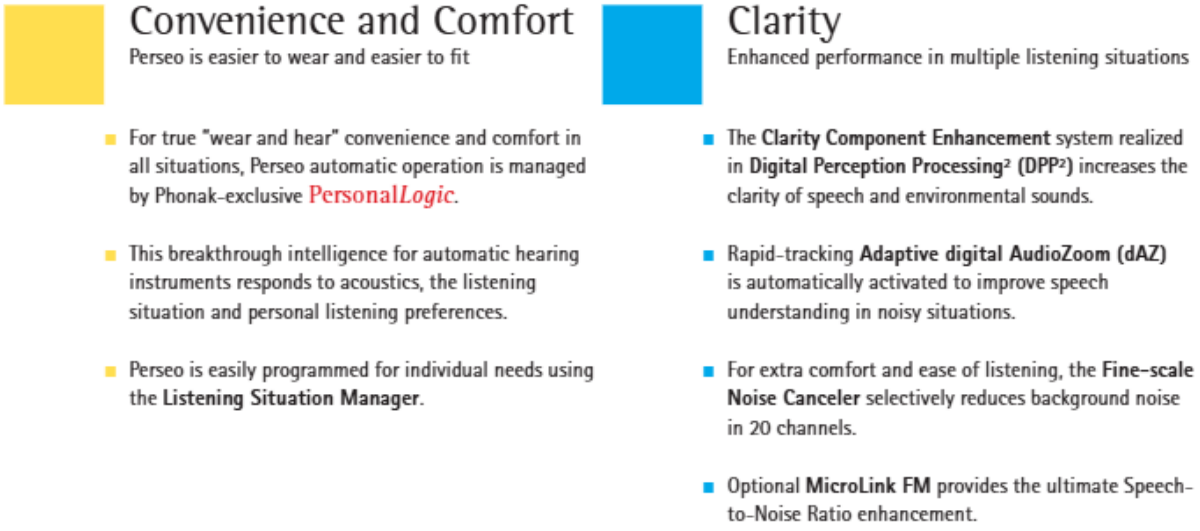
Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. To the extent DHA Systems do not explicitly disclose the claim limitation, Enzmann '555 discloses increasing the power of signals at higher frequencies to accommodate for hearing loss at such frequencies. The following citations show examples of where Enzmann '555 discloses this limitation.

Claims	Prior Art
	Enzmann ’555 at FIG. 5  FIG. 5 Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the “••” line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the “-••” line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5.

Claims	Prior Art
	Enzmann ’555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann ’555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann ’555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input

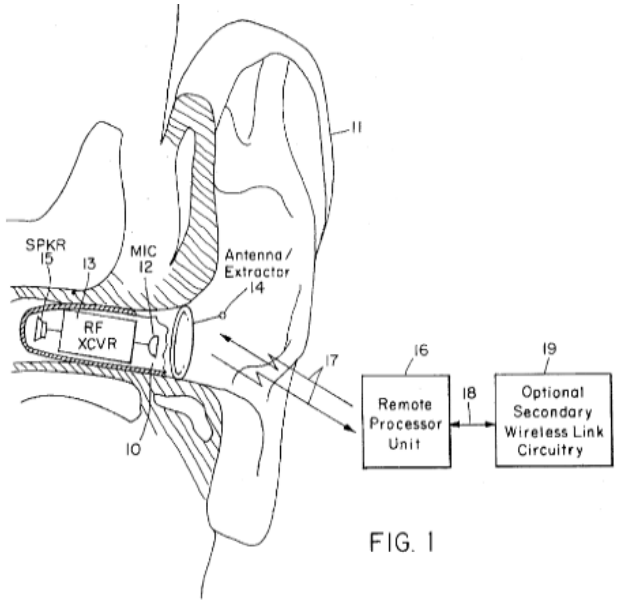
Claims	Prior Art
	signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann ’555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
8[pre]. A hearing enhancement system as recited in claim 1,	To the extent the preamble is limiting, DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement system as recited in claim 1.” *See* above at claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

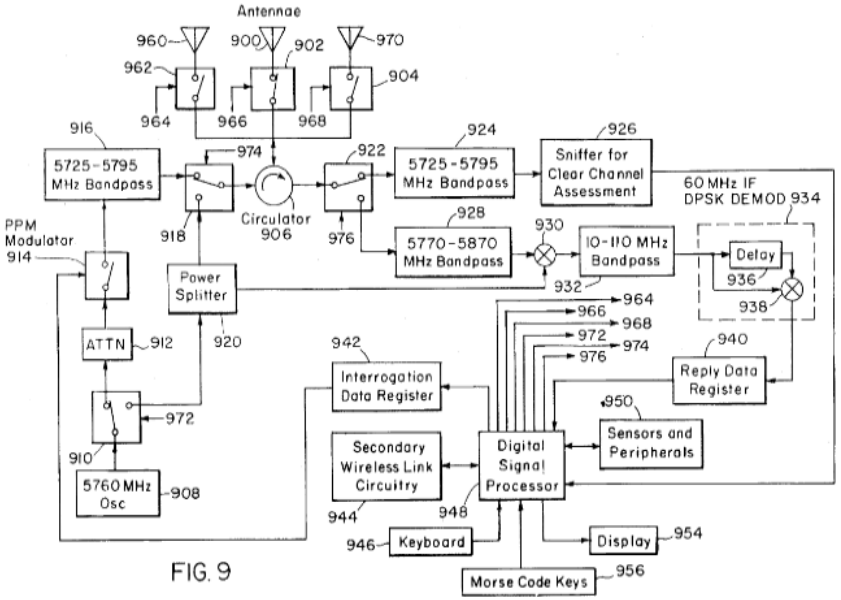
Claims	Prior Art
[8a] wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing,	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing." The Digital Hearing Aids of the DHA Systems determine a user's hearing loss through calibration. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 5 The Science of PersonalLogic™ Phonak has applied knowledge from new research and past experience to add a new dimension of individualized logic to automatic hearing systems – PersonalLogic. Combining new and proven features, PersonalLogic optimizes the functioning, operation and fitting of hearing systems for each individual user. Thanks to PersonalLogic, Perseo takes customization to a level beyond "custom-fitted" related to individual hearing loss. The new digital system from Phonak is the first hearing system with customized automatic operation, as opposed to operation based on factory set, unchangeable rules. Now, Perseo gives hearing professionals control over automatic operation, allowing them to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 7  Convenience and Comfort Perseo is easier to wear and easier to fit ■ For true "wear and hear" convenience and comfort in all situations, Perseo automatic operation is managed by Phonak-exclusive PersonalLogic. ■ This breakthrough intelligence for automatic hearing instruments responds to acoustics, the listening situation and personal listening preferences. ■ Perseo is easily programmed for individual needs using the **Listening Situation Manager**. Clarity Enhanced performance in multiple listening situations ■ The **Clarity Component Enhancement** system realized in **Digital Perception Processing² (DPP²)** increases the clarity of speech and environmental sounds. ■ Rapid-tracking **Adaptive digital AudioZoom (dAZ)** is automatically activated to improve speech understanding in noisy situations. ■ For extra comfort and ease of listening, the **Fine-scale Noise Canceler** selectively reduces background noise in 20 channels. ■ Optional **MicroLink FM** provides the ultimate Speech-to-Noise Ratio enhancement. Phonak – Perseo Brochure at p. 17 With the development of Perseo, **PFG** has become significantly easier to use, providing direct access to the benefits of high-tech hearing systems. **PFG** for Perseo pre-sets the instrument according to each wearer's hearing ability and needs. The experience gained over a decade of **PFG** fittings and extensive field trials is integrated automatically into initial settings. This ensures maximum spontaneous acceptance. The wearer immediately feels confident that Perseo is the right choice. This confidence continues even if additional adjustments are necessary, thanks to the flexibility of the three levels of professional control – Easy with **Personal System Managers**, Standard with clustered controls, and Detailed with access to each of the 20 channels.

Claims	Prior Art
	Phonak – Field Study News Article re PersonalLogic at Page 1 **Introduction** Hearing needs and preferences can be very individual, with marked differences from one person to the next in the same hearing situation. So, in addition to compensating for measured hearing loss, an advanced hearing system also must cater to specific personal requirements, and be customizable simply and effectively to individual client needs. The Perseo hearing system with its Personal*Logic* automatic function can be "tailored" to the client's needs as part of the fitting process. In Perseo, the default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. The automatic Phonak – Fitting Guide for MLxi and MLxi Baha at Page 8 7. Programming options 7.1 Programming interface  All receivers can be programmed using the FM programming interface: 1. Make sure all equipment is charged or a fresh battery is inserted in the hearing instrument. Turn all equipment on. 2. Connect the universal receiver to the hearing instrument and insert it into the programming interface. 3. Always select the option "via the programming interface" when FM SuccessWare requests communication with the receiver. 7.2 Using inspiro  MLxi, MLxi Baha can be programmed via inspiro: 1. Make sure a fresh battery is inserted in the hearing instrument. Turn all equipment on. 2. Connect the universal receiver to the hearing instrument, the CI speech processor, or MicroLink CI S, and place in front of the inspiro. 3. Always select the option "via inspiro" when the FM SuccessWare requests communication with the receiver.

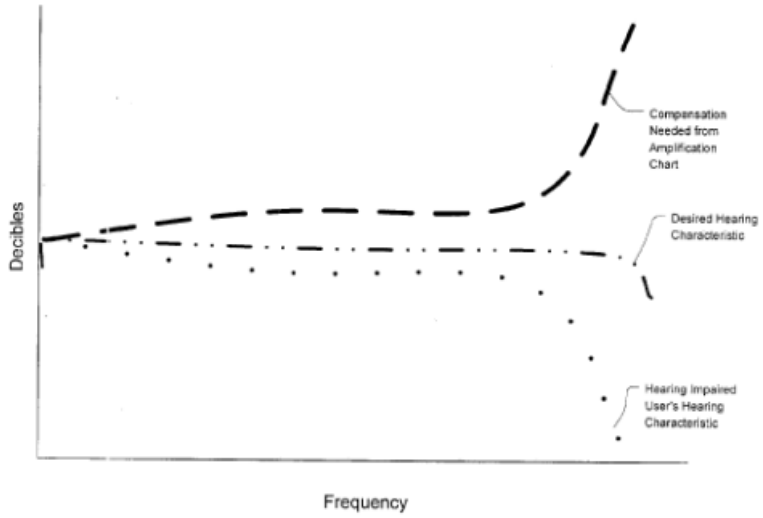
Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 7 PersonalLogic may be personalized, via the Listening Situation Manager, to meet individual patient preferences for listening in noise. The clinician may select whether PersonalLogic adapts to noise on the basis of audibility or comfort. Audibility changes to Noisy situation processing only when speech in noise is detected, but not with speech alone or noise alone. Comfort adapts WHENEVER noise is present that exceeds a certain dB level. Are you with me? Valente - Effect of type of noise and loudspeaker array on the performance at 402 The Phonak fitting software (Version 8.3) was used to program the hearing aids. First, hearing thresholds were entered into the NOAH software. The manufacturer's prescribed "First-Fit" was calculated from these hearing thresholds. The default settings in each of the software "personal system" menus (provides adjustments to the "First-Fit" for prior experience; occlusion effect and feedback) were utilized. If the patient reported occlusion, then this feature was activated. If feedback was noticed, the feedback manager was accessed. All hearing To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses setting the parameters of the RDU based on a hearing test to perform signal enhancements in accordance with the user's hearing capabilities resulting from the hearing test. The following citations show examples of where Anderson '783 discloses this limitation.

Claims	Prior Art
	Anderson ’783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson ’783 at FIG. 9  FIG. 9 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as

Claims	Prior Art
	in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal

Claims	Prior Art
	enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. Enzmann ’555 further discloses calibration to determine the hearing sensitivity of a user (e.g., the claimed “hearing characteristic”). The following citations show examples of where Enzmann ‘555 discloses this

Claims	Prior Art
	limitation. Enzmann ’555 at FIG. 5  FIG. 5 Enzmann ’555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency mapping of the user's hearing characteristics. Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For

Claims	Prior Art
	example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the "••" line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the "-••" line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann '555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann '555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann '555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270.

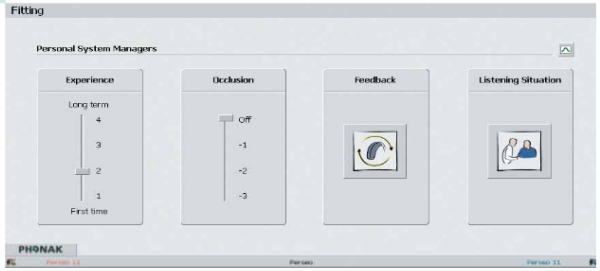
Claims	Prior Art
	Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. Specifically, a POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations because Anderson ’783’s RPU is configured “to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss.“ Anderson ’783 at 27:4-17. DHA Systems similarly recite a “PersonalLogic” system for calibrating a user’s hearing. Phonak – Perseo Brochure at Page 5. Thus, a POSITA would be motivated to incorporate Anderson ‘783’s teachings regarding hearing calibration with DHA Systems’ Digital Hearing Aids. A POSITA would have similarly been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. Enzmann ’555 similarly recites “reprogram[ing] to compensate for additional hearing loss or increase and different users.” Enzmann ’555, [0046]. A POSITA would have understood that such reprogramming, as disclosed in Enzmann ’555, is a manner of compensating for user’s hearing loss.

Claims	Prior Art
	Thus, a POSITA would be motivated to incorporate Enzmann ’555’s teachings regarding reprogramming with DHA Systems’ Digital Hearing Aids. A POSITA would have had a reasonable expectation of success in combining DHA Systems with Anderson ’783 and Enzmann ‘555. Anderson ’783’s techniques are broadly applicable to hearing aid devices and were “well-known” for use in hearing aids. Further, both Anderson ’783 and Enzmann ’555 discuss signal modification utilizing their respective hearing aid systems, similar to the disclosure of “PersonalLogic” in DHA Systems. To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson ’783, and Enzmann ’555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[8b] wherein the power of the audio output signals can be changed as a function of frequency, and	DHA Systems, Anderson ’555, and Enzmann ’555 expressly or inherently disclose “wherein the portion with increased power is selected based on frequency.” The Digital Hearing Aids of the DHA Systems change the power of the audio output signals based on frequency. The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 18

The art of the personal touch – Personal System Managers

PFG 8.1 provides a set of **Personal System Managers** to take care of the technical details behind common fitting issues, leaving the fitter free to take care of the wearer. This approach ensures that fitting is uncomplicated. It is always clear which controls should be used and how to use them.



The **Experience Manager** adjusts tonality and loudness to match each client's experience with hearing instruments. An effective and convenient control to set and adjust the client's hearing system as they become accustomed to their new world of sound.

The **Occlusion Manager** eliminates the feeling of blocked ears experienced by some wearers.

The dynamic **Feedback Manager** automatically identifies any bands at risk from feedback. Processing strategies are modified in these bands to prevent feedback while also increasing audibility for soft sounds. The result is easier listening without feedback.

The **Listening Situation Manager** allows the fitter to program *PersonalLogic* according to the wearer's preference for when to trigger a change of base programs, and the desired degree of sound contrast between the base-programs. Additional personalization is available, if required, by directly programming either of the base programs.

Claims	Prior Art
	Phonak – BTE Elite Article at Page 1 **Perseo – the outstanding features place Perseo in a class of its own** • **Personal*Logic*** makes Perseo the first digital hearing system with personalized automatic operation. **Personal*Logic*** selects the appropriate base program and continually adapts its parameters to suit the needs of the wearer. • **Dual-base automatic** allows processing and features to be separately adjusted for quiet and noisy situations for optimum automatic performance. Adjustments for noise never disrupt adjustments for quiet and vice versa. • **Digital Perception Processing (DPP)** with Clarity Component Enhancement: Increased clarity and sound quality also in loud environments. Processing in 20 critical bands. • **Personal System Managers**: Experience Manager, Dynamic Feedback Manager, Occlusion Manager, and Listening Situation Manager for easy and individual adjustment of Personal*Logic*. • **Multi-programs** • **Fast tracking Adaptive digital AudioZoom (dAZ)** to separate actively speech from background noise. • **Fine-scale Noise Canceler** in 20 channels. • **TacTronic program switch** • **Optional remote control** • **FM compatible** • **Wind and weather protection** • **Fashion Color Line** (choice among 12 attractive colors) Phonak – Claro 211 Product Information at Page 1 **Processing features** – Digital Perception Processing (DPP) in 20 critical bands – Gain and output controlled by DPP – 3 hearing programs (+ mute mode): • QuietAdapt for hearing in relative quiet • NoiseAdapt for hearing speech in noise • Program 3 telephone default (other choices available) – FM programs: FM and FM+M – AutoSelect: automatic switching between QuietAdapt and NoiseAdapt – Claro's noise suppression technologies • Adaptive digital AudioZoom (dAZ) • Fine-scale Noise Canceler in 20 bands • Soft squelch

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 7



Adaptive digital AudioZoom (dAZ)

Active and adaptive separation of speech from noise
The Speech-to-Noise Ratio (SNR) can only be optimised if the noise is spatially separated from the speech signal with directional microphone technology. As a pioneer in multi-microphone technologies, Phonak introduced AudioZoom, a feature which significantly improves listening and understanding in noisy situations, enhancing user satisfaction. Now, Phonak goes a step further in the refinement of multi-microphone technology with Adaptive digital AudioZoom: it seeks, finds, and suppresses noise automatically.

Fully automatic, fully adaptive
With its unique spatial processing system, Phonak's Adaptive digital AudioZoom can detect noise not only from directly behind, but anywhere in the rear plane. Whether the hearing-impaired person is moving or the location of the noise source changes, the directional characteristic is constantly adapted to the listening situation. In this manner, the Adaptive digital AudioZoom automatically establishes the best possible SNR.

Fine-scale Noise Canceler (FNC)

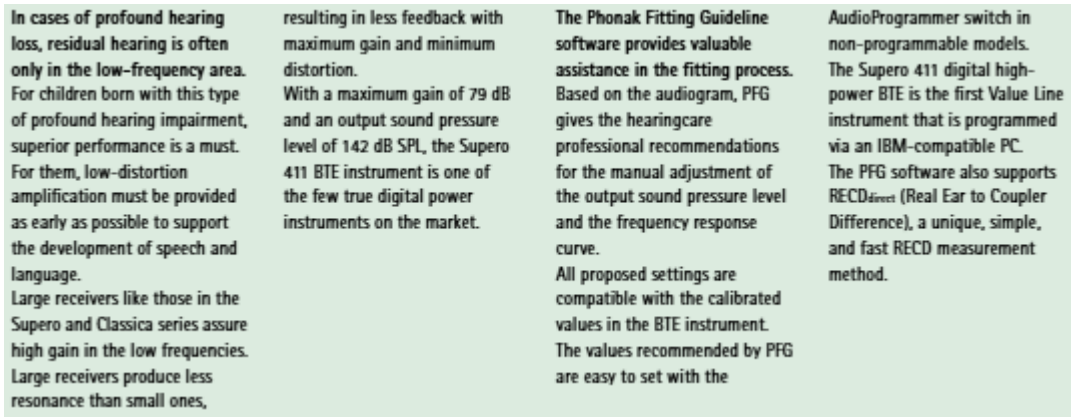
Twenty-band noise control
Claro constantly monitors the Speech-to-Noise Ratio (SNR) in all 20 bands. If a poor SNR is measured in certain bands, the Fine-scale Noise Canceler will reduce gain only in those bands. The result of this precision noise control is a selective and intelligent improvement of the SNR with only a marginal influence on the speech signal.

Precise and selective
All frequency bands are separately analysed and controlled. Gain is reduced selectively only in those bands where noise is present. This high-resolution analysis and gain control makes it possible to suppress noise with extremely high accuracy. Neighboring frequency bands without noise remain unaffected.

Intelligent
The magnitude of gain reduction is not constant. In frequency bands with higher SNRs and in bands which are important for speech intelligibility, gain is reduced only slightly. This intelligent control algorithm reduces the masking and distractive effects of background noise. Important speech information is preserved.

7

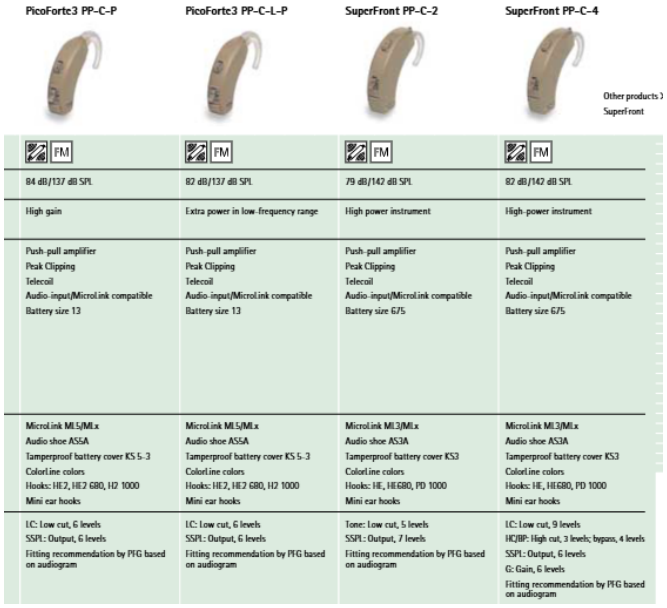
Phonak – Collections 2002 Product List at Page 22



In cases of profound hearing loss, residual hearing is often only in the low-frequency area.
For children born with this type of profound hearing impairment, superior performance is a must. For them, low-distortion amplification must be provided as early as possible to support the development of speech and language.
Large receivers like those in the Supero and Classica series assure high gain in the low frequencies. Large receivers produce less resonance than small ones, resulting in less feedback with maximum gain and minimum distortion.
With a maximum gain of 79 dB and an output sound pressure level of 142 dB SPL, the Supero 411 BTE instrument is one of the few true digital power instruments on the market.

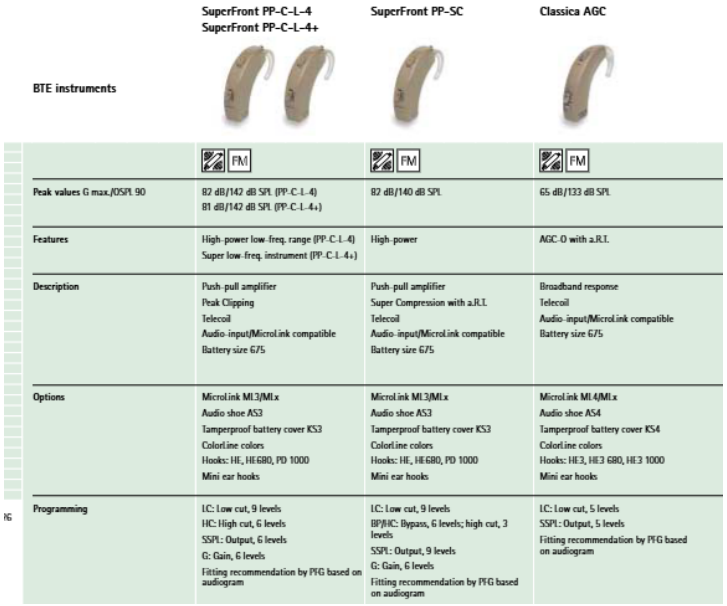
The Phonak Fitting Guideline software provides valuable assistance in the fitting process.
Based on the audiogram, PFG gives the hearingcare professional recommendations for the manual adjustment of the output sound pressure level and the frequency response curve.
All proposed settings are compatible with the calibrated values in the BTE instrument. The values recommended by PFG are easy to set with the AudioProgrammer switch in non-programmable models.
The Supero 411 digital high-power BTE is the first Value Line instrument that is programmed via an IBM-compatible PC.
The PFG software also supports RECD$_{direct}$ (Real Ear to Coupler Difference), a unique, simple, and fast RECD measurement method.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 25



PicoForte3 PP-C-P	PicoForte3 PP-C-L-P	SuperFront PP-C-2	SuperFront PP-C-4
			Other products) Superl·ront
FM	FM	FM	FM
84 dB/137 dB SPL	82 dB/137 dB SPL	79 dB/142 dB SPL	82 dB/142 dB SPL
High gain	Extra power in low-frequency range	High power instrument	High-power instrument
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks
LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	Tone: Low cut, 5 levels SSPL: Output, 7 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels HC/BP: High cut, 3 levels; bypass, 4 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 26



	SuperFront PP-C-L-4 SuperFront PP-C-L-4+	SuperFront PP-SC	Classica AGC
BTE instruments			
	FM	FM	FM
Peak values G max./OSPL 90	82 dB/142 dB SPL (PP-C-L-4) 81 dB/142 dB SPL (PP-C-L-4+)	82 dB/140 dB SPL	65 dB/133 dB SPL
Features	High-power low-freq. range (PP-C-L-4) Super low-freq. instrument (PP-C-L-4+)	High-power	AGC-O with a.R.T.
Description	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Broadband response Telecoil Audio-input/MicroLink compatible Battery size 675
Options	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
Programming	LC: Low cut, 9 levels HC: High cut, 6 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels BP/HC: Bypass, 6 levels; high cut, 3 levels SSPL: Output, 9 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 27

Classica C-D	Classica PP-SC	Classica PP-C-P	Classica PP-C-L-P
			
FM	FM	FM	FM
70 dB/139 dB SPL	80 dB/137 dB SPL	84 dB/144 dB SPL	80 dB/144 dB SPL
Broadband BTE with directional microphone	High-power	High gain	Extra power in low-frequency range
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink-compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI4/MIx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Phonak MicroLink MLxS Product Information at Page 1

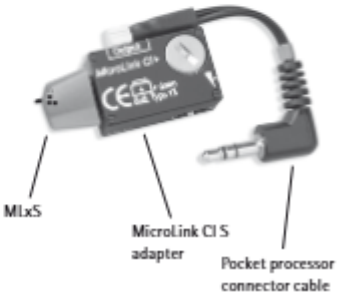
The MicroLink MLxS is the first miniaturized FM receiver with a digital frequency synthesizer for full multi-frequency flexibility. The receiver features fully automatic, non-contact frequency synchronization with either a WallPilot or the Campus S.

The MicroLink MLxS is compatible with all Phonak FM transmitters and the WallPilot, and is recommended for use with this equipment.

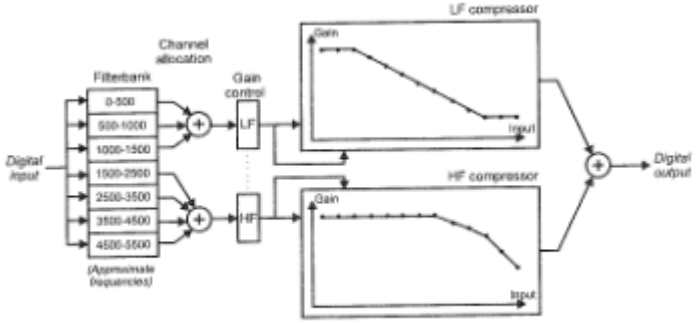
MLxS with BTE instrument

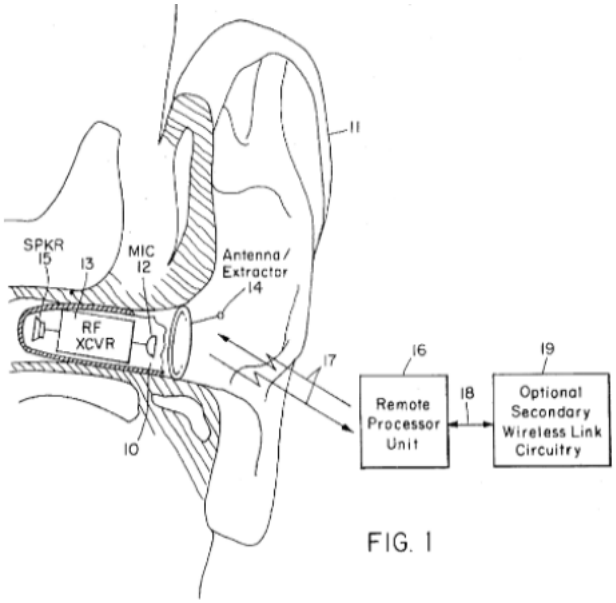


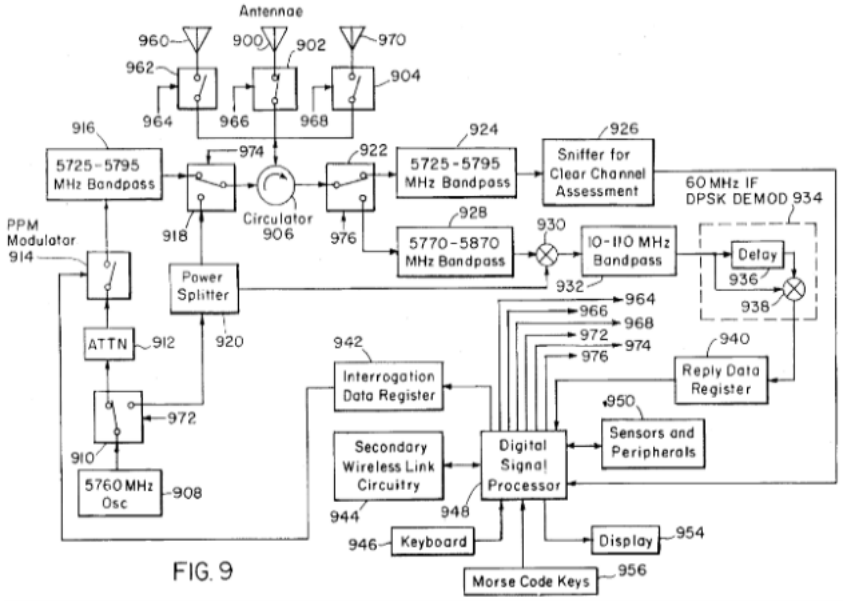
MLxS with adapter for CI pocket processor



IngenioSpec EX2007
Apple v. IngenioSpec, IPR2026-00144
Page 195

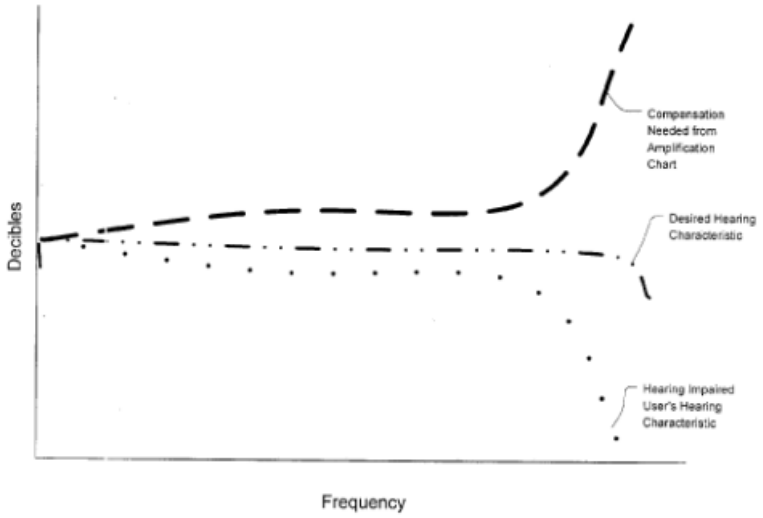
Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. Oticon – DigiFocus White Paper (1996) at Fig. 1  *Fig.1. DigiFocus - block diagram of the digital audio processor, DAP.* To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson ’783 discloses setting the parameters of the RDU based on a hearing test to perform signal enhancements in accordance with the user’s hearing capabilities resulting from the hearing test. The following citations show examples of where Anderson ’783 discloses this limitation. Anderson ’783 at FIG. 1

Claims	Prior Art
	 FIG. 1 Anderson '783 at FIG. 9

Claims	Prior Art
	 FIG. 9 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's

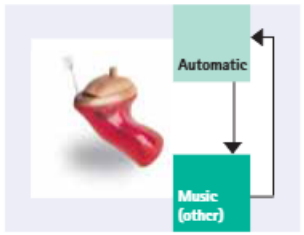
Claims	Prior Art
	needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities

Claims	Prior Art
	of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. To the extent DHA Systems do not explicitly disclose the claim limitation, Enzmann ’555 discloses modifying power based on frequency. The following citations show examples of where Enzmann ‘555

Claims	Prior Art
	discloses this limitation. Enzmann ’555 at FIG. 5  FIG. 5 Enzmann ’555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency mapping of the user's hearing characteristics. Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For

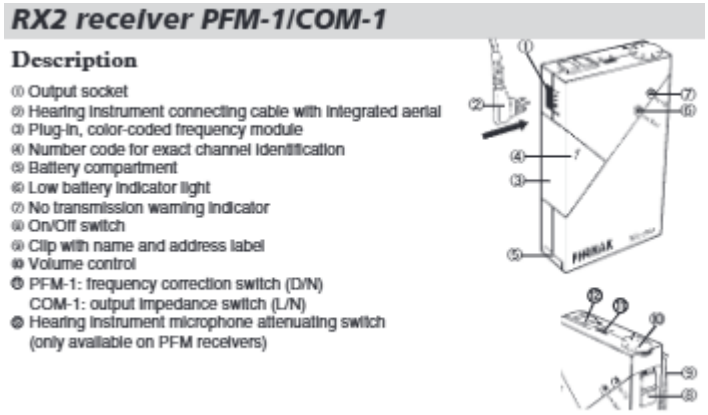
Claims	Prior Art
	example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the "••" line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the "-••" line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann '555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann '555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann '555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270.

Claims	Prior Art
	The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson ’783, and Enzmann ’555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[8c] wherein the user can change the power of the audio output signals.	DHA Systems and Anderson '783 expressly or inherently disclose "wherein the user can change the power of the audio output signals." The Digital Hearing Aids of the DHA Systems allow users to adjust the volume (e.g., change the power) of the output signals. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 19  PersonalLogic Automatic This is the ideal choice for most people.  PersonalLogic plus TacTronic TacTronic switching can be activated or integrated into any Perseo instrument. This provides additional solutions for those with special listening needs – such as listening to music.  PersonalLogic plus Remote This is the ultimate in sophistication and convenience for wearers wanting discrete access to all Perseo features including special programs and volume control (not available for Perseo 11 or Perseo 12).

Claims	Prior Art
	Phonak – Perseo Brochure at Page 20  Phonak – Claro 211 Product Information at Page 1 **Options** – Mini remote control SoundPilot FM or remote control WatchPilot for binaural program selection and volume control (with beep indicator) – Tone hooks HE4, HE4 1000 – Tamperproof battery compartment

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 32 The Active Response Unit (ARU) allows the customer to classify loudness perception with the touch of a button. The PFG software then uses this loudness profile to customise all program algorithms in Claro hearing computers.  Phonak – Fitting Guide for MLxi and MLxi Baha at Page 5 Personal preference The MLxi/MLxi Baha comes with a personal preference of 0 dB, which corresponds to a 10 dB FM Advantage when connected to a hearing instrument. The 10 dB FM Advantage is automatically checked/adjusted every time MLxi starts. Usually, the 10 dB FM Advantage is well accepted by clients. However it is possible to reduce or increase the personal preference of the FM Advatage on MLxi/MLxi Baha. The range for this change is 8 dB louder or softer respectively and can be adjusted in 2 dB steps. Phonak – Fitting Guide for MLxi and MLxi Baha at Page 5 4.3 Fitting MLxi/MLxi Baha using inspiro With Dynamic FM inspiro it is possible to change some MLxi/MLxi Baha settings. Please select "Receiver options" in the inspiro menu. • Push button activation/deactivation – use the function "lock push button" • Change of personal preference – use the function "Set FM volume" • Activation/Deactivation of the beep tone – use the function "Set beep tone"

Claims	Prior Art
	Phonak – Microlink User Guide at Page 35  **RX2 receiver PFM-1/COM-1** **Description** ① Output socket ② Hearing instrument connecting cable with integrated aerial ③ Plug-in, color-coded frequency module ④ Number code for exact channel identification ⑤ Battery compartment ⑥ Low battery indicator light ⑦ No transmission warning indicator ⑧ On/Off switch ⑨ Clip with name and address label ⑩ Volume control ⑪ PFM-1: frequency correction switch (D/N) COM-1: output impedance switch (L/N) ⑫ Hearing instrument microphone attenuating switch (only available on PFM receivers) Phonak – Microlink User Guide at Page 39 **Volume control** The volume control on the RX2 receiver only matches the signal level to that of the hearing instrument. The actual volume adjustment should always be made at the hearing instrument. The control should be set so that signals from the hearing instrument microphone and the FM-system microphone are equally loud. Your hearing care professional will be glad to help in adjusting the volume to the correct level. Phonak – Online Interview re Perseo (April 7, 2003) at Page 5 In a nutshell, Perseo is designed for new and experienced users who are looking for a hearing instrument with advanced adaptive features, enhanced sound quality, easy personalization of fitting and choice of user operation (namely, automatic, manual program control with Tactronic switch, or via remote control). The choice of one product over another is dependent on the patient's hearing loss, listening needs, and prioritization of size, cost, and available performance features. Phonak provides an entire family of digital options from Perseo, Claro, Aero, and our new digital value line that will be introduced this summer. In addition, Supero is the only digital hearing instrument designed specifically for super-power applications.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 4 *DigiFocus is an automatic hearing instrument without a volume control and programmed in accordance with the 'Adaptive Speech Alignment' fitting rationale. This rationale is implemented by the OtiSet programming software* To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses power (e.g., volume) controls that a user can actuate. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson '783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the

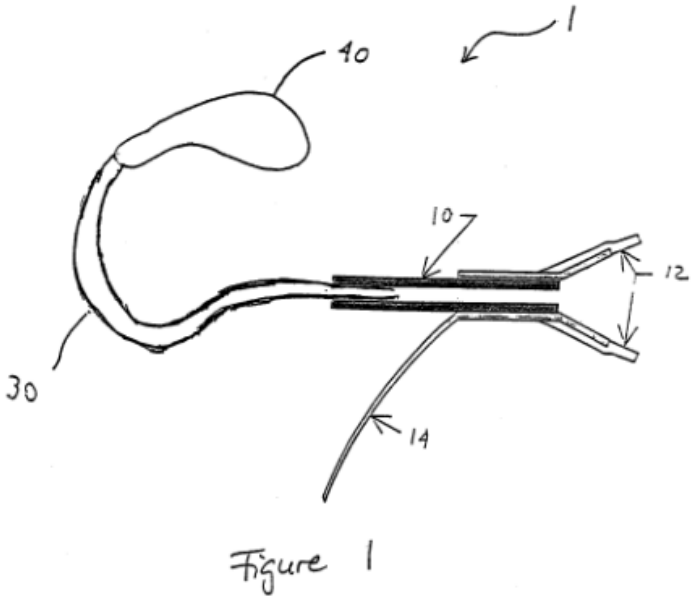
Claims	Prior Art
	signal is converted to acoustic waves heard by the user. Anderson ’783 at 21:20–25 The enter (ENT) key 76 is pressed when the displayed message is ready to be sent from the user to the RPU DSP, the left and right arrow (key 77 in FIG. 7) keys are used to edit messages, and the power-on and clear key (ON/C) and power-off (OFF, key 78 in FIG. 7) keys are used to control the RPU power. Anderson ’783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU

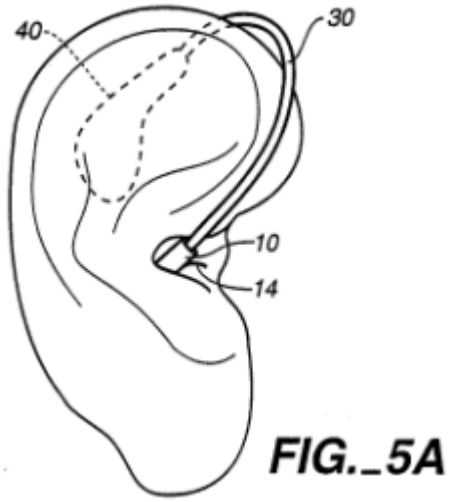
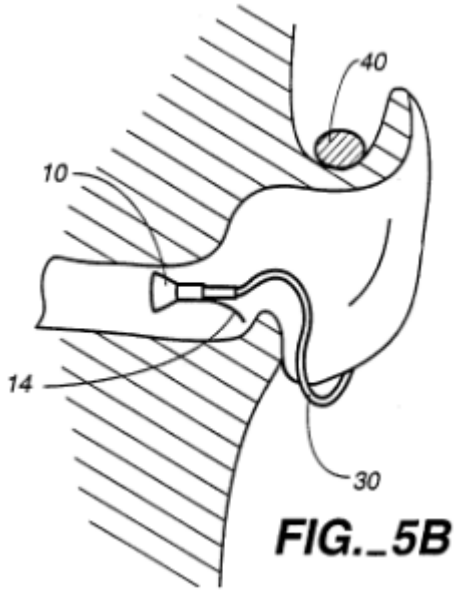
Claims	Prior Art
	and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson '783 at 25:15–27 To obtain solicited information, user requests are processed in a variety of means well known in the art, including inputs via one or more pushbuttons on the RPU and voice recognition computer programs implemented in the RPU electronics. Voice recognition can be used almost exclusively, if desired, thereby eliminating nearly all RPU pushbutton controls. Voice commands recognized by the RPU can cause the RPU to initiate actions such as changing hearing aid parameter settings (e.g., volume), or activate appliances and environmental controls (e.g., aids for the physically handicapped) in a distributed wireless network via the secondary wireless link. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
10. A hearing enhancement system as recited in claim 1, wherein the speaker is a directional speaker.	DHA Systems, Mayer '086, and Fretz '193 expressly or inherently disclose "[a] hearing enhancement system as recited in claim 1, wherein the speaker is a directional speaker." Mayer '086 discloses a directional speaker that utilizes hyperbolic and parabolic reflectors to alter a speaker's directionality (e.g., a "directional speaker"). Mayer '086 at [0009] Preferably the ultrasonic frequencies used in this case are close to the natural resonance frequency of the minute membranes in order to increase the overall efficiency of the process. In this case various frequencies that are created are preferably mixed together for example within a hollow resonance box or

Claims	Prior Art
	for example a hyperbolic or parabolic reflector, depending on whether the desired output is more directional or more omni-directional. Mayer '086 at [0010] This type of microphone can be very useful for example for recording live music, for high-quality recording for the mass media, such as for example TV or Radio interviews, and for noisy environments or environments where there are electromagnetic interferences, such as for example in cars. This can be especially important for example for use with Telematics systems in cars, which are interactive wireless information systems for cars which use interactive voice-based menus, since computer systems that can recognize spoken words are very sensitive to distortions, so normal microphones could be very problematic in cars both because of the noisy environment and because of their susceptibility to electromagnetic interference. An additional advantage is that apart from the high quality and frequency range, it can be much more lightweight and compact than the state-of-the art high-end microphones, so it can be much more convenient for example for a reporter who does field-work and needs to report from outside. Other possible applications are for example using this microphone with the more directional variations in a personal cellular remote speaking unit, that can be positioned for example on a table at a distance of for example 1 meter or less from the user, or for example in a handheld cellular or mobile phone that can be held at a certain distance from the head (preferably in each of these cases together with a directional speaker). To the extent DHA Systems do not explicitly disclose the claim limitation, Fretz '193 discloses open–ear hearing aids. Fretz '193 explains that in-ear devices create an "occlusion effect" that may be uncomfortable for the user. Open-ear devices like Fretz '193 include a "directional speaker" (e.g., a "receiver," which is an output device) which can transmit sound with a higher amplitude toward the ear drum than in another direction. Fretz '193 at Abstract An open ear canal hearing aid system (1) comprises an ear canal tube (10) sized or shaped for positioning in an ear canal of a user so that the ear canal is at least partially open for directly receiving ambient sounds. The open ear canal hearing aid system (1) further comprises a sound processor (44, 46) for amplifying received ambient sounds included within a predetermined frequency to produce processed sounds and a receiver (50) for supplying said processed sounds to said ear canal tube.

Claims	Prior Art
	Fretz ’193 at 1:24–30 The traditional approach for correcting hearing impairments has been to employ electronic "In-The-Ear" (ITE) hearing aid devices inserted into the ear and "Behind-The-Ear" (BTE) hearing aid devices attached behind the ear. Then, through various signal processing techniques, the sounds to be delivered to the ear are rebuilt and supplemented to facilitate and optimize the hearing of the user throughout the frequency range. Such devices tend to block the ear canal so that little or no sounds reach the ear in a natural, unaided manner. Fretz ’193 at 3:1–5 Conventional hearing aid systems cause an additional problem known as the occlusion effect. The occlusion effect is the increased transmission of sound by bone conduction when the ear canal is blocked and air conduction is impeded, resulting in sounds which are both unnatural and uncomfortable for the user. In particular, the user’s voice sounds different than normal when the ear is blocked. Fretz ’193 at 4:14–25 According to the present invention, an open ear canal hearing aid system comprises an ear canal tube sized for positioning in an ear canal of a user so that the ear canal is at least partially open for directly receiving ambient sounds. The open ear canal hearing aid system further comprises a sound processor for amplifying received ambient sounds included within a predetermined frequency range to produce processed sounds and for supplying said processed sounds to said ear canal tube. Providing gain for a desired range of frequencies and amplitudes allows the benefit of simpler and lower power hearing aid components, resulting in a smaller and lower cost device. Thereby, the present open ear canal hearing aid system provides a simple, comfortable, and cosmetically attractive hearing aid system that is specifically tailored for users having certain hearing deficiencies and which does not require custom manufacturing. Fretz ’193 at 9:25–10:3 Figure 6 shows a block diagram of exemplary circuitry enclosed by the case 40 according to one embodiment of the present invention. The case 40 encloses a microphone 42 for receiving sounds, a preamplifier 43 for amplifying sounds received by the microphone, and a sound processor for processing the preamplified sounds. The sound processor comprises a detector 44 for detecting whether the received sounds are within a predetermined frequency and amplitude range and a compressor 46 for adjusting the gain of the received sounds responsive to the output of the detector 44. The case 40 also encloses a receiver 50 which is an output device, such as a loudspeaker, that converts processed signals output from

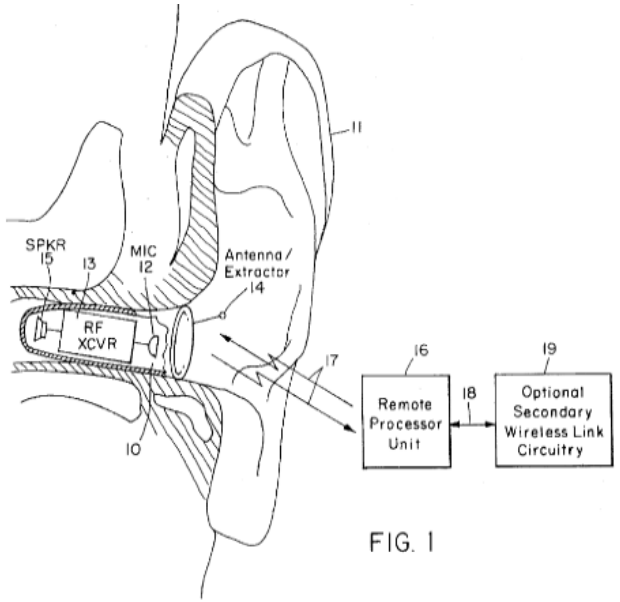
Claims	Prior Art
	the compressor 46 into audible sounds and delivers these sounds to the hearing aid tube 30. Fretz '193 at 12:12–16 Because of the nature of the open ear canal hearing aid system 1, there is a greater possibility of feedback than with conventional, sealed canal hearing aids. That is, with an open ear canal, sound emanates from the open canal with little attenuation. The microphone 42 picks up sound from both distant sources and sound coming out of the ear canal. The sound coming out of the ear canal causes feedback. Fretz '193 at 14:6–16 Yet another way to reduce feedback is to make the receiver 50 directional. Multiple outputs from the ear canal tube can thus be added in the preferred direction for cancelling sounds in the feedback direction. In an exemplary embodiment, one or more receivers can be designed so that sound is transmitted with higher amplitude toward the ear drum than it is in the other direction. For example, two receivers can be used, the outputs of the receivers being inverted (180° out of phase with each other). If one receiver is positioned inside the ear canal, and one is positioned at the entrance to the ear canal with a longer tube length, the feedback signal is less than from one receiver alone. The directional receiver thus can be referred to as an "active feedback cancellation" device since the second receiver functions to cancel the first. Fretz '193 at 14:17–24 In an exemplary embodiment, the directional receivers can be constructed using a receiver with two ports. Analogous to directional microphones, one port then has an output 180° out of phase from the other port. The directional receiver can be used together with the directional microphone or partial blocking of the ear canal. The directional receiver has the advantage over the directional microphone that since both receiver ports are in or near the ear canal, it is less sensitive to changes in the feedback path due to reflecting objects nearby or changes in the speed of sound due to temperature and barometric pressure. Fretz '193 at 14:25–15:2 In view of the foregoing, it can be appreciated that the open ear canal hearing aid system provides a simplified hearing aid that allows the user to hear as many sounds as possible in a natural manner. Because this open ear canal hearing aid system only adjusts sounds that the user has difficulty hearing, sounds can be heard by the user in a more natural manner. The open ear canal hearing aid system also reduces the occlusion effect so that the sounds heard are more comfortable to the user. In addition, since high amplitudes are not generated by the aid, smaller components can be used for this hearing aid system

Claims	Prior Art
	which further increases the comfort of the hearing aid for the user and provides a cosmetically appealing design. Fretz ’193 at FIG. 1  Figure 1

Claims	Prior Art
	Fretz ’193 at FIG. 5A  FIG._5A Fretz ’193 at FIG. 5B  FIG._5B

Claims	Prior Art
	A POSITA would have been motivated to combine the DHA Systems with the teachings of Mayer '086 to meet the claim limitation. The DHA Systems include hearing aids configured for hearing protection and noise cancellation. Phonak – Online Interview re Perseo (April 7, 2003) at Page 8. Mayer '086 discloses a directional audio system intended to be more compact and light weight with processor or computer control while also obtaining more accurate audio inputs. Mayer '086 at [0009]. A POSITA would have understood that distortions in sounds produced by the speaker of the DHA Systems would degrade the performance of such functions. A POSITA would have also understood that the DHA Systems require a small, compact speaker. The DHA Systems would thus face a problem identified in Mayer '086: distortion caused by conventional speakers. Mayer '086 at [0009]. A POSITA would seek to minimize distortions in the audio output of the DHA Systems by utilizing a compact audio system and would thus be motivated to combine Mayer '086 with the DHA Systems. A POSITA would have similarly been motivated to combine DHA Systems with the teachings of Fretz '193 to meet the claim limitations. Mayer '086's speakers are broadly applicable to systems that reproduce sounds, including loudspeakers and earphones. Mayer '086 at [0009]. Further, Mayer '086 explicitly describes that the speakers can be very compact, increasing compatibility with an earpiece. Mayer '086 at [0009], [0018]. Fretz '193 discloses a speaker configured to present audio with directionality and reduce feedback. Fretz '193 at 14:6–16. Fretz '193 further discloses its speaker system being smaller and more cosmetically appealing. Fretz '193, 6:24–7:5. A POSITA would have understood that distortions in sounds produced by the speaker of the Digital Hearing Aids of the DHA Systems would degrade the performance of such functions. A POSITA would have also understood that DHA Systems require a small, compact speaker. The Digital Hearing Aids of the DHA System would thus face a problem identified in Fretz '193: feedback caused by conventional speakers. Fretz '193 at 12:12–16. A POSITA would have had a reasonable expectation of success in combining DHA Systems with the teachings of Mayer '086 and/or Fretz '193. Fretz '193's speakers are broadly applicable to hearing aid systems—analogous to Enzmann '555's hearing aid including a speaker. Fretz '193 at 4:14–25. Fretz '193's speaker is analogous to speaker 250 of Enzmann '555's hearing aid/ear bud device. Further, Fretz '193 explicitly describes that the speakers can be smaller, cheaper, more cosmetically appealing, and just as effective, increasing compatibility with an earpiece. Fretz '193, 6:24–7:5. Enzmann '555 and Fretz '193 are thus easily combined. Similarly, Mayer '086's speakers are broadly applicable to systems that reproduce sounds, including loudspeakers and earphones—analogous to the DHA Systems' hearing aids. Mayer '086 at [0009]. Further, Mayer '086 explicitly describes that the speakers can be very compact, increasing compatibility with an earpiece such as the ear hearing aids in the DHA Systems. Mayer '086 at [0009], [0018].

Claims	Prior Art
	To the extent that DHA Systems, Mayer ‘086, and Fretz ’193 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Mayer ‘086, and Fretz ’193 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
11. A hearing enhancement system as recited in claim 1, wherein the speaker is an ear speaker.	DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “[a] hearing enhancement system as recited in claim 1, wherein the speaker is an ear speaker.” The Digital Hearing Aids of the DHA Systems include behind the ear speakers, which are examples of the claimed “ear speaker.” The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 23 

Claims	Prior Art
	To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses an earpiece that includes a speaker. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson '783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design.

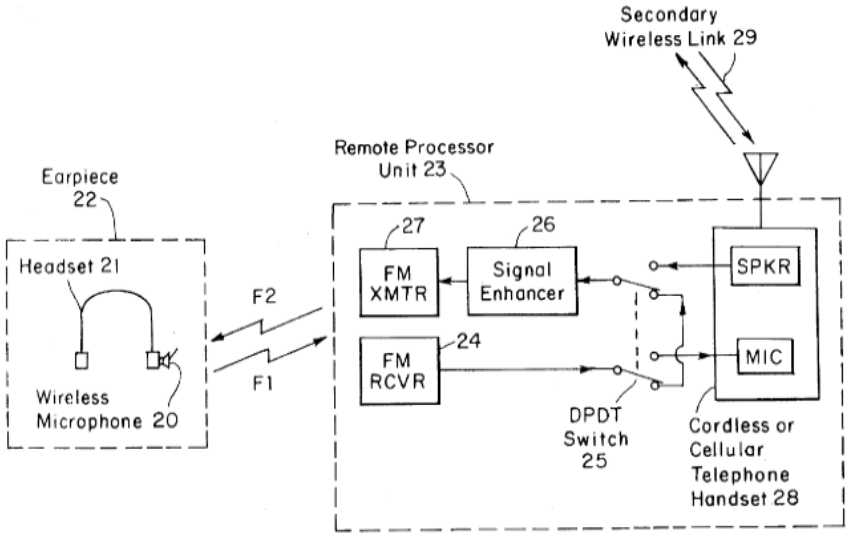
Claims	Prior Art
	Anderson ’783 at 3:52–4:14 One preferred embodiment of the invention herein described is shown in block diagram form in FIG. 1. In this figure, the earpiece 10 shown worn in the ear 11 uses a standard completely-in-the-canal (CIC) housing, well known in the art, although many other earpiece housing types known in the art (e.g., behind-the-ear, or BTE) can be used. The earpiece shown in FIG. 1 comprises a microphone 12, RF transceiver 13 with an antenna that doubles as an earpiece extractor 14, and speaker 15. Although the dual-use antenna/extractor arrangement shown in FIG. 1 is often desirable, a separate antenna or antennae can be used in conjunction with many different types of earpiece extractors as appropriate for a particular application. Antennae and extractors can be disguised as ear hair or jewelry (e.g., earrings), or conductive filaments can be permanently implanted in the ear cartilage to act as antennae using a process similar to ear piercing. The earpiece 10 communicates with a remote processor unit (RPU) 16 via a primary two-way RF link 17, although many other wireless link media (e.g., ultrasonic or infrared) may be used instead. The RPU is typically worn under clothing (e.g., carried in a pocket or purse), but may also be worn in plain sight (e.g., on a belt) if desired. The RPU 16 may be connected (via wired or wireless means 18) to optional secondary wireless link circuitry 19 that allows wireless communication between the RPU and other sources of information (e.g., the general subscriber telephone network) via a secondary wireless link. Note that the optional secondary wireless link circuitry 19 may or may not be contained within the RPU case 70 of FIG. 7. Anderson ’783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16,

Claims	Prior Art
	where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. To the extent DHA Systems do not explicitly disclose the claim limitation, Enzmann ’555 discloses the speaker being placed in an ear. The following citations show examples of where Enzmann ‘555 discloses this limitation. Enzmann ’555 at Abstract An aided ear bud device is provided that operates as a hearing aid device as well as an ear bud device for a wireless phone. The aided ear bud normally operates as a hearing aid device. The aided ear bud state is changed by a verified input from a wireless phone. Upon the change in state, the microphone input from the aided ear bud is remotely output to the wireless phone while the incoming transmission from the wireless phone is combined with the microphone input and output to the user. The ear bud device can be modified to receive analog or digital inputs from other outside sources. Enzmann ’555 at [0002] This invention relates to systems and methods for providing a hearing aid capable of communicating with a wireless phone. More particularly, this invention provides a hearing aid capable of simultaneously or

Claims	Prior Art
	alternatively performing the functions of an ear bud for the wireless phone. Enzmann ’555 at [0008] Ear bud devices have been developed to enhance the portability of a wireless phone. The ear bud device is a type of hands free device and is essentially a headphone-type device communicates with an attached wireless phone so that a user has use of their hands and attention for other tasks, such as driving, writing, etc. Current ear bud devices must be placed in or in close proximity to the ear, meaning that the ear bud placement conflicts with the placement of the hearing aid. Thus, hearing impaired users have a difficult time using ear buds. Enzmann ’555 at [0011] Therefore, this invention provides systems and methods for adapting a hearing aid to operate as an ear bud device in addition to providing conventional hearing aid functions. Using this method, this invention is able to address many of the issues hearing impaired wireless phone users encounter while addressing the inherent problems associated with the conventional solutions. Enzmann ’555 at [0015] In the various exemplary embodiments according to this invention, the ear bud device monitors the noise being received by its microphone and a transmit/receive unit. Once the transmit/receive unit accepts an input that is anything but ambient noise, the system determines if the input is coming from a valid source. The validity of the source is based on a preprogrammed indicator. Based on this determination the ear bud device will switch to the appropriate mode of operation. Enzmann ’555 at [0026] The exemplary embodiments of the systems and methods according to this invention provide a method for adapting a hearing aid so that the hearing aid is able to function as an ear bud device i.e., an aided ear bud. The exemplary embodiments also provide a system that interprets incoming signals to determine in which operating mode the aided ear bud should operate. In the exemplary embodiments, the incoming signal can be digital or analog depending on the transmitting source. Enzmann ’555 at [0027] FIG. 1 illustrates a conventional digital hearing aid. The conventional hearing aid comprises a microphone 105, an A/D converter 110, a digital signal audio processor (DSP) 120, a D/A converter 130 and a speaker

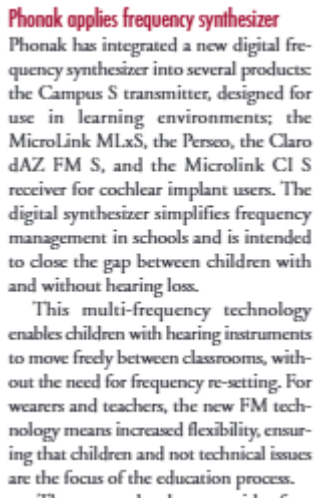
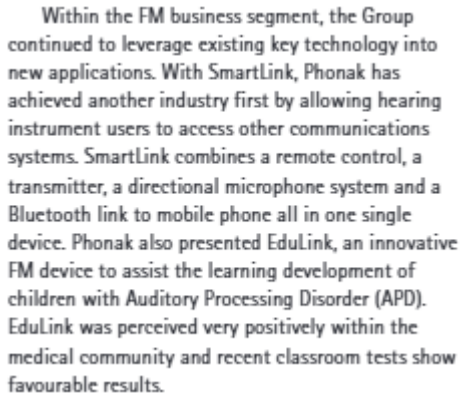
Claims	Prior Art
	140. In operation, sounds, represented by an analog signal and/or ambient noise emitted from an outside source, is captured by the microphone 105 and converted to a digital signal by the A/D converter 110. The DSP 120 manipulates the converted signal in accordance with well-known techniques and sends a processed signal to the D/A converter 130. In the D/A converter 130, the processed signal is converted to an analog signal and output to the speaker 140. The speaker 140 is placed in or around the hearing impaired user's ear. Thus, the captured sounds have been captured, processed, and amplified and output to the user. Enzmann ’555 at [0031] FIG. 2 illustrates the preferred embodiment of the aided ear bud 200, according to this invention. As seen in FIG. 2, the aided ear bud 200 contains many of the same features of the conventional hearing aid shown in FIG. 1. The aided ear bud 200 comprises a microphone 205, an A/D converter 210, a digital signal audio processor (DSP) 220, a D/A converter 240 and a speaker 250. However, in addition to those items, the aided ear bud adds a source control module 230 and a transmit/receive (TX/RX) unit 260 to provide the necessary functions of this invention. Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the “••” line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the “-••” line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann ’555 at [0051] FIG. 6 illustrates a second embodiment of this invention, wherein analog devices can be attached to the

Claims	Prior Art
	aided ear bud. In this configuration, the A/D converter 410 converts incoming analog signals into a digital signal for use by the aided ear bud in accordance with the above-description and converts digital output signals to analog format and output to devices. This configuration allows a user to attach any analog device (or analog output from a digital device) to the aided ear bud, such as portable electronics (CD players, PDA devices) and any other devices that output analog signals. Otherwise, the operation of the second embodiment is similar to the previously described embodiment once the incoming signal is converted from an analog signal to a digital signal. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
12. A hearing enhancement system as recited in claim 1, wherein the speaker is in a headset.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement system as recited in claim 1, wherein the speaker is in a headset." Anderson '783 discloses a speaker contained in a head worn device (e.g., earpiece headset 21) which is an example of the claimed "headset." The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10).

Claims	Prior Art
	Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson '783 at FIG. 2  FIG. 2 Anderson '783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson '783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art)

Claims	Prior Art
	between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 5:46–52 A miniature speaker of the type commonly used in hearing aids can be used in place of the speaker commercially supplied with the earpiece headset 21, and a miniature microphone of the type commonly used in hearing aids can be used in place of the microphone transducer commercially supplied with the earpiece wireless microphone 20. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network.

Claims	Prior Art
	The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. A POSITA would have been motivated to combine the Digital Hearing Aids of DHA Systems and Anderson '783 to meet the claim limitations with reasonable expectation of success because implementing the Digital Hearing Aids into a headset design such as that disclosed by Anderson '783 would have been a routine and conventional design choice and for the reasons discussed above in claim 1[pre]. To the extent that DHA Systems and Anderson '783 does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine DHA Systems with the teachings of Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
13[pre]. A hearing enhancement apparatus for a user, the apparatus being wirelessly coupled to an audio system, which is configured to up-convert input signals into up-converted signals to be wirelessly transmitted, the apparatus comprising:	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus for a user, the apparatus being wirelessly coupled to an audio system, which is configured to up-convert input signals into up-converted signals to be wirelessly transmitted, the apparatus." DHA Systems include Digital Hearing Aids (e.g., "hearing enhancement apparatus") wirelessly connected to Transmitters (e.g., "audio system") configured to convert input signals to various frequencies (e.g., "up–convert"). The following citations show examples of where DHA Systems practice this limitation. Phonak and Other DHA – Manufacturers News Article at Page 1 *STÄFA, SWITZERLAND*—Phonak has introduced EduLink, which it predicts will contribute greatly to the successful treatment of children with auditory processing disorders (APDs). This new device is an "ear set" that transmits the teacher's voice, using FM technology, directly to the child's ear, thus effectively reducing ambient and background noise for improved speech discrimination. EduLink is designed to complement existing therapies in the treatment of APD.

Claims	Prior Art
	Phonak and Other DHA – Manufacturers News Article at Page 2  **Phonak applies frequency synthesizer** Phonak has integrated a new digital frequency synthesizer into several products: the Campus S transmitter, designed for use in learning environments; the MicroLink MLxS, the Perseo, the Claro dAZ FM S, and the Microlink CI S receiver for cochlear implant users. The digital synthesizer simplifies frequency management in schools and is intended to close the gap between children with and without hearing loss. This multi-frequency technology enables children with hearing instruments to move freely between classrooms, without the need for frequency re-setting. For wearers and teachers, the new FM technology means increased flexibility, ensuring that children and not technical issues are the focus of the education process. Phonak – Annual Report (2003–2004) at p. 12  Within the FM business segment, the Group continued to leverage existing key technology into new applications. With SmartLink, Phonak has achieved another industry first by allowing hearing instrument users to access other communications systems. SmartLink combines a remote control, a transmitter, a directional microphone system and a Bluetooth link to mobile phone all in one single device. Phonak also presented EduLink, an innovative FM device to assist the learning development of children with Auditory Processing Disorder (APD). EduLink was perceived very positively within the medical community and recent classroom tests show favourable results.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 2 People with sensorineural hearing loss need a more favorable signal-to-noise ratio to understand speech than do normal hearing listeners. Research has shown that hearing impaired listeners may require signal-to-noise improvements of 4 dB to 18 dB, depending on the magnitude of their hearing loss to achieve word-recognition scores equivalent to those with normal hearing. FM systems are able to improve the signal-to-noise ratio. FM systems improve the user's ability to understand speech in the presence of noise. Since the sound is delivered by FM radio waves, the strength and quality of the sound remains constant (across the operational distance) from the speaker to the hearing impaired individual. FM systems consist of a microphone usually placed four to six inches from the sound source, and a transmitter, which sends the signal via radio waves directly to the miniature FM receiver, which is connected to the personal hearing instrument. In other words, the entire FM system is a complete broadcasting and receiving system. Importantly, when using FM systems, the effects of background noise and reverberation are minimal. These factors help reduce background noise while enhancing and stabilizing the main sound source. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 4 Phonak FM systems operate on an FM radio signal in the 216-217 MHz bands. These bands have been assigned by the FCC for use with equipment by the hard of hearing. There are 23 narrow band channels available from Phonak in this frequency range. In order for the transmitter and receiver to operate as a system, they must be on the same frequency or 'channel'. All Phonak FM transmitters and receivers are compatible with every other model of transmitter and receiver in the Phonak product line. Each transmitter and receiver channel 'frequency' is identified with a number. The number of the transmitter and FM receiver must be the same for these units to function together correctly. FM Transmitters and FM Receivers are available in many sizes and shapes to offer increased functionality. We will detail some of the Phonak equipment below:

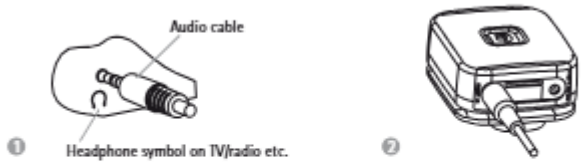
Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5 **2- HandyMic TX3**  The microphone with a built-in transmitter, used primarily for adults. The multi-microphone technology of the HandyMic combines omni directional, directional, and super directional microphones with an FM transmitter. The compact HandyMic transmits the speaker's voice directly to the hearing instrument user's FM receiver. The HandyMic can be set up directly in front of the sound source, slipped into the speaker's shirt pocket, or aimed at the speaker manually. With an audio cable, the HandyMic can also be connected to a sound system. As with all other Phonak FM products, the HandyMic has a range of 7 to 15 meters (23 to 50 feet). For business meetings, round table discussions, family gatherings, in a car, on a noisy street, at home

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5  The Phonak Campus **S** is a new addition to the Phonak product line - this multi-channel FM transmitter is developed for use in schools, universities and speech therapy. It is fully compatible with current Phonak FM products, and ready for operation with future generations of Phonak FM receivers. Campus **S** special features include a channel selector with digital display, an ergonomic user interface, a microphone with switchable directional / omni directional characteristics, handy storage for the microphone cable, connection to televisions, video recorders and radios, and an easily exchanged rechargeable battery.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 6 **4- TelCom**  Phonak's TelCom is a stationary FM transmitter that allows optimized television, telephone, and audio system usage. While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice to the FM receiver. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is returned to the previous volume setting. TelCom is equipped with a frequency synthesizer for convenient setting of FM frequencies; it has a range of 7 to 15 meters (23 to 50 feet). For television, telephone, CD player, radio, personal computer and other equipment with audio output

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 7 **2- MicroLink MLx**  This miniature FM receiver is compatible with all Phonak BTE instruments and has a standardized Euro connector that allows it to be used with most other makes of BTE hearing aids on the market today. Many leading hearing aid manufacturers such as Oticon, GN Resound, Siemens, Sonic Innovations, Unitron, and Widex have developed mechanical interfaces that allow users to combine their BTEs with MicroLink MLx. This close cooperation with other major hearing instrument manufacturers has dramatically expanded FM benefits for hearing-impaired children and adults. The small, cubed-shaped MicroLink MLx attaches directly to the base of the audio shoe and receives FM signals from all Phonak wireless transmitters. The MLx 'Universal' FM receiver has a three-position switch. The three-position switch allows the MLx user to change the function of the wireless receiver as listening conditions change. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 8 **3- MicroVox RX2 COM-1**  The MicroVox RX2 COM-1 is a small and lightweight FM receiver. With the COM-1 audio interface, the connection of an induction loop is very simple. The loop is worn around the neck, and the hearing aids receive the signal inductively via the telephone coil. A special feature of the MicroVox RX2 COM-1 is that it can also be connected to the audio input of the speech processor in a cochlea implant. Most implant manufacturers use compatible audio inputs.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 8 **4- MicroVox RX2 PFM-1**  This FM receiver has a direct output for hearing instruments so it can be connected to the audio shoes of Phonak BTEs and other BTE instrument makes. Like the COM-1, this FM receiver has easily interchangeable plug-in frequency modules. The color-coded Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 9 **5- Claro dAZ FM**  Claro dAZ FM combines two highly advanced systems for signal processing and signal reception. The Signal-to-Noise Ratio is dramatically improved with Digital Perception Processing, Adaptive digital AudioΣoom, the Fine-scale Noise Canceler, and Phonak's FM technology. The FM functions can be controlled directly at the instrument with the TacTronic switch or with the SoundPilot FM or WatchPilot remote controls.

Claims	Prior Art
	Phonak Campus-S-User-Manual at Page 1 Description  ❶ On/off button ❷ Channel selection buttons ❸ FM channel in use ❹ Battery status indicator ❺ Direct frequency synchronization ❻ There are different microphone options available (see page 6) ❼ Carrying clip ❽ Battery compartment ❾ Audio socket ❿ Battery charger socket ⓫ Label for your initials Phonak Campus-S-User-Manual at Page 12 Connecting the Campus S to a TV set, video recorder, radio or CD player  You can use the Campus S also for high quality wireless transmission of sound from audio equipment like TV sets, video recorders, radios and CD players. ❶ Plug the audio cable into the headphone output of your audio equipment. ❷ Plug the other end of the cable into the audio input underneath your Campus S. Since the Campus S uses the microphone cable as an antenna, unroll the microphone cable.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 1 **FM features** – World's smallest FM microchip – Compatible with all Phonak FM transmitters – Cordless TV and Radio link up – FM performance corresponding to audiological fitting – Soft Squelch system – Built in antenna – Band H (173–185 MHz); band J (186–201 MHz); band N (207–217 MHz) Phonak – Claro 211 Product Information at Page 1 **Processing features** – Digital Perception Processing (DPP) in 20 critical bands – Gain and output controlled by DPP – 3 hearing programs (+ mute mode): • QuietAdapt for hearing in relative quiet • NoiseAdapt for hearing speech in noise • Program 3 telephone default (other choices available) – FM programs: FM and FM+M – AutoSelect: automatic switching between QuietAdapt and NoiseAdapt – Claro's noise suppression technologies • Adaptive digital AudioZoom (dAZ) • Fine-scale Noise Canceler in 20 bands • Soft squelch Phonak – Claro 211 Product Information at Page 2 **Principle of FM operation** The transmitter unit is worn by the person speaking, placed in front of the sound source or even connected directly to TV or HiFi. The transmitter unit collects the desired signal and transmits it via radio waves directly to the FM module integrated in the hearing instrument. The incoming FM signal received by the hearing instrument is processed either in accordance with the audiological setting of the instrument, providing consistent sound quality or according to an individual FM program.

Claims	Prior Art
	Phonak Claro – World Premiere at Page 1 **Cutting-edge chip technology points the way forward** This phenomenal technical breakthrough is based on six years of intense research and development work during which it was possible for the first time ever to fully integrate psychoacoustic perception models of the ear. As a result, it has been possible to simulate the function of the so-called "20 critical bands" in the inner ear and to achieve an unprecedented natural hearing experience. This sophisticated, highly complex system goes by the name *Digital Perception Processing (DPP)* and is based on the most advanced chip generation currently available. The chip architecture is built around 0.25µm technology, which permits *Fast Fourier Transformation (FFT)* processes combined with very low power consumption. According to Andreas Rihs, it means there is still a great deal of potential for extending the chip's performance and this opens the door to some highly interesting developments on the same chip basis in the future. **The advent of a genuine communication/hearing computer** The impressive, state-of-the-art technology is combined with an exclusive, all-round communication concept based on the components *Digital Perception Processing (DPP), AutoSelect, Adaptive digital AudioZoom und Fine-scale Noise Canceler.* It provides a decisive boost to the power of the audiological solution and, with it, the benefits to the user. The Adaptive digital AudioZoom automatically locates and suppresses the main source of noise and at the same time clearly separates the voice of the person speaking within the listener's field of vision. The result of this is a positive signal-to-noise ratio on a scale that has never been achieved before. To round it off, the top model in the new Claro range is the first ever to feature the wireless FM technology found in the well-known MicroLink system and thus has all the advantages of wireless communication technology, such as speech transmission over distance in noisy surroundings (conferences, schools, etc.). As a result, the hearing computer has undergone a definitive transition to a communication/hearing computer, which in many situations is indisputably superior to the human ear. Phonak – Collections 2002 Product List at Page 3 FM 28 Phonak's unique FM solutions deliver unprecedented speech intelligibility to overcome excessive noise, reverberation and distance. Users of Phonak BTE instruments and users of many other instrument brands can benefit from FM solutions.  Campus S MLx

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

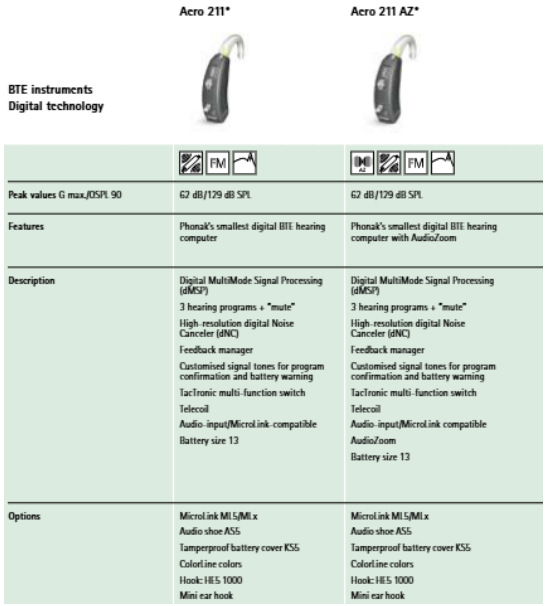
Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 9

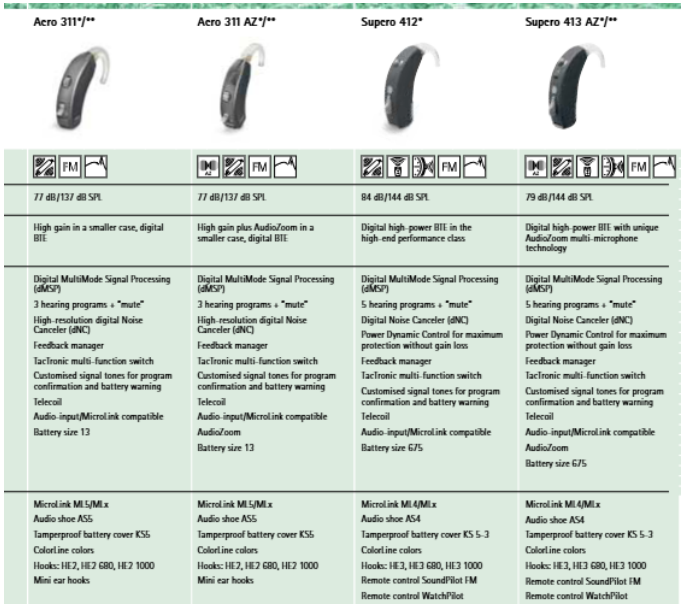
BTE instruments	Claro 111 dAZ Claro 111 dAZ FM	Claro 211 dAZ Claro 211 dAZ FM	Claro 311 dAZ Claro 311 dAZ FM
			
	FM	FM	FM
Peak values G max./OSPL 90	52 dB/126 dB SPL	62 dB/135 dB SPL	72 dB/135 dB SPL
Features	Specially designed for steep high-frequency and mild hearing losses	Digital speech transparency	Digital speech transparency and higher gain
Description	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (111 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (211 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (311 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection
Options	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)
Programming	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital, Phonak Digital Ski Slope and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 17



Aero 311*/**	Aero 311 AZ*/**	Supero 412*	Supero 413 AZ*/**
77 dB/137 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL	79 dB/144 dB SPL
High gain in a smaller case, digital BTE	High gain plus Audio/zoom in a smaller case, digital BTE	Digital high-power BTE in the high-end performance class	Digital high-power BTE with unique Audio/zoom multi-microphone technology
Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 13	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 675
MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot

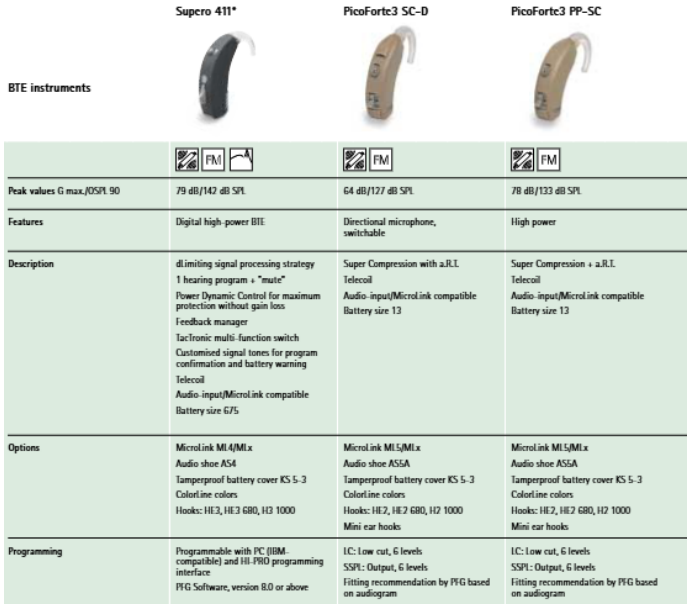
Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18

Digitally programmable BTE instruments	Piconet2 P2 	Piconet2 P2 AZ 
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 19

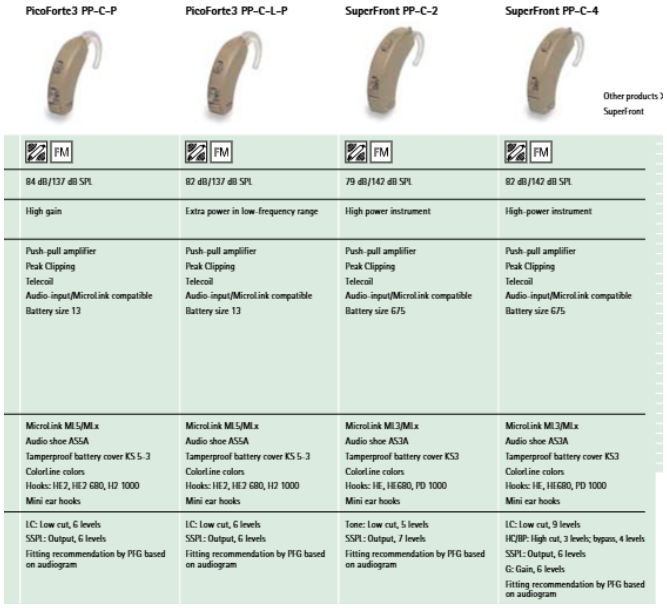
	SonoForte2 P3 AZ	PowerZoom P4 AZ	NovoForte E3	NovoForte E4
				
	AZ FM	AZ FM	FM	FM
	77 dB/137 dB SPL	79 dB/144 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL
	High gain plus AudioZoom in a smaller case	High gain and AudioZoom	2 switch-selectable programs	Phonak's most powerful digitally programmable BTE instrument
	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675
	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS6 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 24



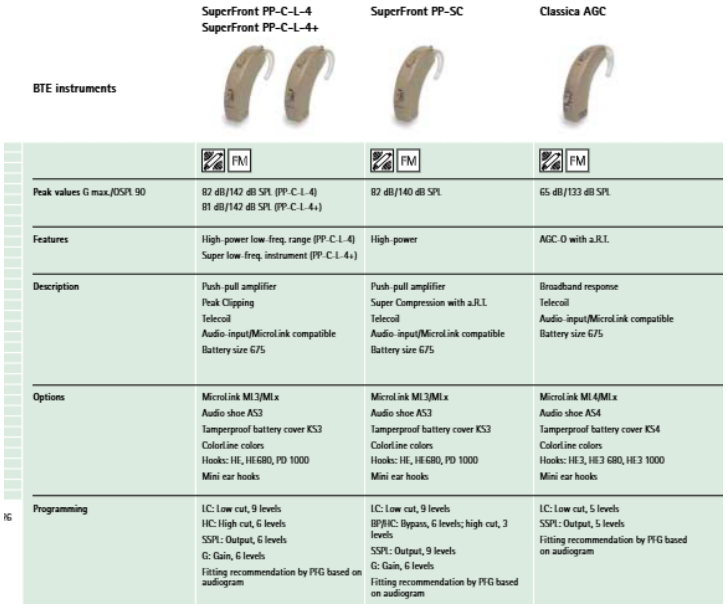
BTE instruments	Supero 411*	PicoForte3 SC-D	PicoForte3 PP-SC
	FM	FM	FM
Peak values G max./OSPL 90	79 dB/142 dB SPL	64 dB/127 dB SPL	78 dB/133 dB SPL
Features	Digital high-power BTE	Directional microphone, switchable	High power
Description	dLimiting signal processing strategy 1 hearing program + "mute" Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 13	Super Compression + a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 13
Options	MicroLink MLA/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, H3 1000	MicroLink MLS/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink MLS/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks
Programming	Programmable with PC (IBM-compatible) and HI-PRO programming interface PFG Software, version 8.0 or above	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 25



PicoForte3 PP-C-P	PicoForte3 PP-C-L-P	SuperFront PP-C-2	SuperFront PP-C-4
			Other products) Superl·ront
FM	FM	FM	FM
84 dB/137 dB SPL	82 dB/137 dB SPL	79 dB/142 dB SPL	82 dB/142 dB SPL
High gain	Extra power in low-frequency range	High power instrument	High-power instrument
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 13	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3A Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks
LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	Tone: Low cut, 5 levels SSPL: Output, 7 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels HC/BP: High cut, 3 levels; bypass, 4 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 26



	SuperFront PP-C-L-4 SuperFront PP-C-L-4+	SuperFront PP-SC	Classica AGC
BTE instruments			
	FM	FM	FM
Peak values G max./OSPL 90	82 dB/142 dB SPL (PP-C-L-4) 81 dB/142 dB SPL (PP-C-L-4+)	82 dB/140 dB SPL	65 dB/133 dB SPL
Features	High-power low-freq. range (PP-C-L-4) Super low-freq. instrument (PP-C-L-4+)	High-power	AGC-O with a.R.T.
Description	Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Broadband response Telecoil Audio-input/MicroLink compatible Battery size 675
Options	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML3/MLx Audio shoe AS3 Tamperproof battery cover KS3 ColorLine colors Hooks: HE, HE680, PD 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
Programming	LC: Low cut, 9 levels HC: High cut, 6 levels SSPL: Output, 6 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 9 levels BP/HC: Bypass, 6 levels; high cut, 3 levels SSPL: Output, 9 levels G: Gain, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 27

Classica C-D	Classica PP-SC	Classica PP-C-P	Classica PP-C-L-P
			
FM	FM	FM	FM
70 dB/139 dB SPL	80 dB/137 dB SPL	84 dB/144 dB SPL	80 dB/144 dB SPL
Broadband BTE with directional microphone	High-power	High gain	Extra power in low-frequency range
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink-compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 30

MLx, the most flexible FM receiver ever made, can be used not only with Phonak BTEs but also with most third-party hearing instruments available on the market today. This is possible thanks to the standard Euro connector which simply plugs into the audio shoe of the hearing instrument.

Once again, Phonak demonstrates its commitment to innovative developments that serve hearing-impaired adults and children.

MLx compatible BTE makes:

- Argosy
- Audifon
- Beltone
- Danavox
- GN ReSound
- Hansaton
- Interton
- Oticon
- Philips
- Phonak
- Rexton
- Siemens
- Sonic Innovations
- Unitron
- Widex





Detailed, up-to-date compatibility lists of Phonak's MLx MicroLink receiver are available online at:

www.phonak.com/mlx

Phonak – FM Transmitters including Campus S and TelCom at Page 1

TelCom

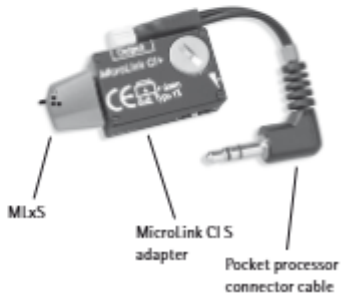


TelCom
(click to enlarge)

Phonak's TelCom is the first stationary FM transmitter that **allows optimized television, telephone, and audio system usage**.
While the user watches TV or listens to music, TelCom assures that the telephone will be heard when it rings. When the call is answered, TelCom automatically mutes the audio signal and transmits the caller's voice clearly and crisply. This does not affect the volume of the loudspeakers for others in the room. When the handset is replaced, the audio signal transmitted to the hearing instruments is turned back up to the previous volume setting. The TelCom has an operating range of 7 to 15 meters (23 to 50 feet).

For television, telephone, CD player, radio, personal computer and other equipment with audio output.

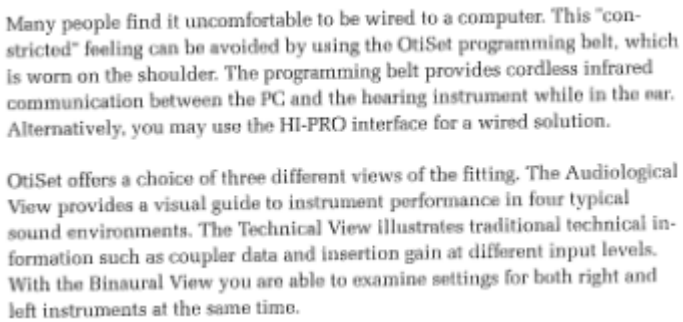
Claims	Prior Art
	Phonak – Lewis Article re ML8 Improving Speech Perception in Noise with Directional Microphones and Frequency Modulation (FM) Technology (2002) at Page 2 Personal FM systems have also been shown to improve speech intelligibility in noise (Hawkins, 1984; Fabry, 1994; Crandell & Smaldino, 2000). Past investigations have demonstrated that the utilization of FM technology can improve speech intelligibility in noise by as much as 20-25 dB (see Crandell and Smaldino, 2000). With a personal FM system, the speaker's voice is picked-up via FM wireless microphone located near the speaker's mouth - where the effects of reverberation, distance, and noise are minimal. The FM system converts the acoustic signal to an electrical waveform at the microphone, and the signal is transmitted via FM signal, from the transmitter to the receiver. Both the transmitter and the receiver are tuned to the same transmitting and receiving frequency. At the receiver end, the electrical signal is amplified, converted back to an acoustical waveform and conveyed to the listener. Phonak – Media Release re Product Offerings in F2003/2004 at Page 3 **Phonak Communications introduces the new MicroLink receivers with frequency synthesizer** Phonak Communications will introduce its new multi frequency MLx S and ML8 S receivers in the next few months. MLx S and ML8 S are the counterpart of Campus S transmitters, already introduced early 2002. Together, they comprise the new synthesized FM system generation, a system that transmits, without wires, speech to the hearing instrument in difficult listening situations. The key technology of the new system is its easy frequency adaptation. Given the extreme design constraints (low voltage, low power, miniature dimensions), the development of this technology represents an unprecedented breakthrough in wireless communication technology.

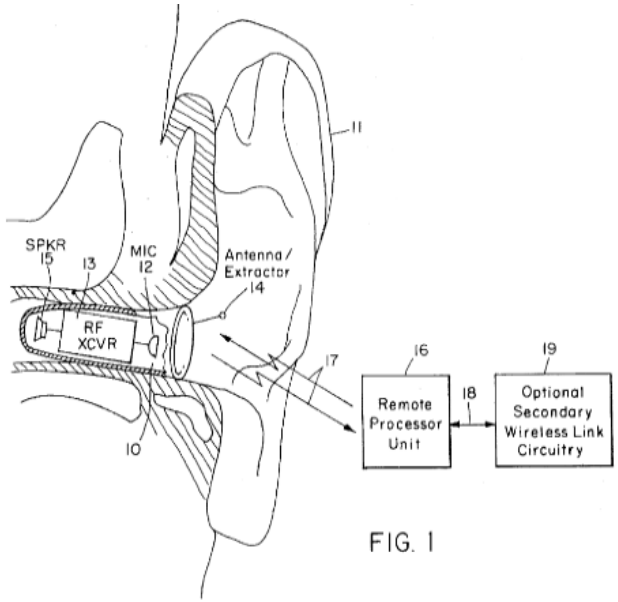
Claims	Prior Art
	Phonak MicroLink MLxS Product Information at Page 1 The MicroLink MLxS is the first miniaturized FM receiver with a digital frequency synthesizer for full multi-frequency flexibility. The receiver features fully automatic, non-contact frequency synchronization with either a WallPilot or the Campus S. The MicroLink MLxS is compatible with all Phonak FM transmitters and the WallPilot, and is recommended for use with this equipment. **MLxS with BTE instrument**  **MLxS with adapter for CI pocket processor**  Phonak – Microlink User Guide at Page 2 The desired signal – for example, a speaker's voice or the sound from a TV – is picked up by the microphone which is placed near to the source of the sound. The transmitter sends an FM signal to the receiver, which immediately relays this to the hearing instrument for you to hear – crystal clear!

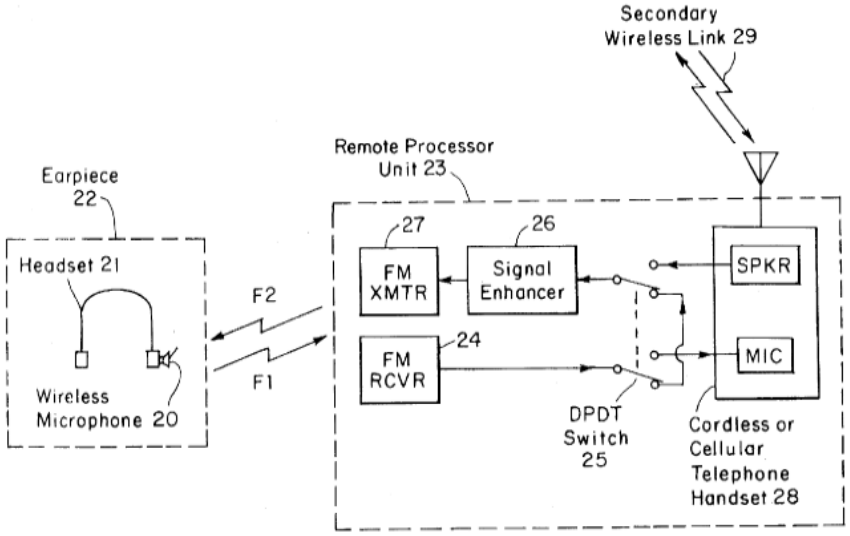
Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. Phonak – Online Interview re Perseo (April 7, 2003) at Page 9 **Liz Brassine/Phonak:** It is a digital microphone on the CIC. There are several advantages of a digital microphone over analog mics. First, increased dynamic range is provided. Additionally, with a digital mic, the analog-to-digital converter is housed within the microphone itself. This eliminates the wire between the AD-converter and the microphone. The wire is the source for ultra-high frequency interference, such as Bluetooth. TelCom User Guide at Page 2 Thank you for choosing the TelCom FM transmitter. The TelCom is a high-quality Swiss made product from Phonak, a world leader in hearing technology, innovation and reliability. It enhances communication on the telephone and optimizes hearing when watching television, or listening to other audio equipment (e.g. radio, CD player, personal computer,...). The wireless TelCom FM transmitter (FM = Frequency Modulation) sends the sound (e.g. television or telephone) to the FM receivers on the hearing instruments of the person listening. We recommend that you read this manual carefully to fully benefit from the many TelCom features. With proper care and usage, your TelCom will support your listening and communication needs for many years. Phonak – the leader in FM communication.

Claims	Prior Art
	TelCom User Guide at Page 12 Summarized benefits: • Clear sound while watching television without disturbing noise • Sound from audio equipment, speech over telephone, and even the telephone ringing signal heard through FM • The audio signal level – is automatically switched off when the telephone is picked up – automatically comes back if the telephone is hung-up • Fully automatic operation once the system is installed • Ready to operate 24 hours a day, 7 days a week • No cabling between the TelCom and the FM receivers • High-quality Swiss made equipment with high-tech design Lewis – Speech perception in noise: directional microphones (2004) at Page 429 FM technology was used. As previously mentioned, Phonak Corporation developed a new personal FM system receiver, the Phonak Microlink, which does not utilize wires or a body-worn box like its predecessors. This Lewis – Speech perception in noise: directional microphones (2004) at Page 431 All subjects were fit with digital Phonak Claro 311 dAZ BTE hearing aids bilaterally. All earmolds had select-a-vent (SAV) venting and #13 or 3 mm horn tubing. In addition to the hearing aids, subjects were fit with Phonak Microlink ML8 FM receivers bilaterally. These FM receivers attach to the bottom of a BTE hearing aid and may be utilized in either the "FM only" mode, which attenuates the hearing aid microphone by 20 dB, or in the FM plus hearing aid mode, which allows for FM input and input of environmental sounds via the hearing aid microphones simultaneously at the same output level. The Phonak TX3 HandyMic FM transmitter served as the FM transmitter. This transmitter has three microphone options: (1) Wide Angle, which picks up sounds arriving from all directions around the transmitter microphone equally; (2) Zoom, which provides reduced amplification to signals arriving from the rear (cardioid); and (3) SuperZoom, which provides reduced amplification to signals originating from the rear and the sides (hypercardioid). The

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 2 Analogue basically means that the movements in the air that constitute sound are translated into one unified, but complex, electrical current. You may think of analogue sound as making a photocopy: the sound is depicted and you get an overall picture. Processing or recopying can be done only to a certain extent because it causes a deterioration of the original imprint. Digital means that sound is described mathematically. This makes it much more precise to actually process the sound, bit by bit. Descriptions of certain details can be changed without affecting the general picture. Descriptions can be repeated accurately and endlessly without deterioration of the quality. Oticon – DigiFocus White Paper (1996) at Page 3 After the A/D-conversion, the resulting digital code can be mathematically manipulated, or processed (as it is normally expressed when talking about sound). This is where the real benefits of digital technology come in. The amount and types of processing that are possible with digital technology far surpass the capabilities of analogue processing. Once the processing is complete, the digital signal is converted back to analogue form by the D/A-converter. It is now ready for transmission to the small receiver inside the hearing instrument, which makes the sound audible. □ Oticon – DigiFocus White Paper (1996) at Page 3 In order to be digitized, the changes in amplitude and time need to be converted into discreet points, i.e. continuous sets of x/y coordinates (at time x1 the amplitude equals y1, etc.). Digital technology includes two basic concepts: Sampling and quantization. Sampling simply means how often the x/y-coordinates are measured. Quantization refers to how finely the amplitude variations are measured and is reported as the number of bits used in the conversion process. In general, the higher the sampling rate and quantization, the better the quality of the digital sound. This is illustrated in figure B, which shows what the original analogue signal will look like if it is sampled at a low rate with a large amplitude step size. The result is an imprecise digital representation of the original sound. In figure C the original sound is sampled with a higher sampling rate and finer amplitude step size, leading to better fidelity. In general, the sampling frequency should be at least twice as high as the highest frequency of interest (the Nyquist frequency). Because a hearing instrument focuses on the informative parts of speech, the highest frequency of interest is around 7 KHz. Accordingly, the sampling rate of DigiFocus has been set to 16 KHz. Had this rule not been followed, a phenomenon called aliasing would occur, which would result in audible distortion. DigiFocus incorporates a so-called anti-aliasing filter that drastically attenuates frequencies above 7 KHz, which could otherwise cause distortion.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 11  Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses a wireless connection between a hearing enhancement apparatus (e.g., the disclosed earpiece) and an audio system (e.g., the disclosed wireless device) to up–convert input signals (e.g., the conversion performed in the RPU) and wireless transmit said upconverted signals. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation.

Claims	Prior Art
	Anderson ’783 at FIG. 1  FIG. 1

Claims	Prior Art
	Anderson ’783 at FIG. 2  FIG. 2 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as

Claims	Prior Art
	in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson ’783 at 3:52–4:14 One preferred embodiment of the invention herein described is shown in block diagram form in FIG. 1. In this figure, the earpiece 10 shown worn in the ear 11 uses a standard completely-in-the-canal (CIC) housing, well known in the art, although many other earpiece housing types known in the art (e.g., behind-the-ear, or BTE) can be used. The earpiece shown in FIG. 1 comprises a microphone 12, RF transceiver 13 with an antenna that doubles as an earpiece extractor 14, and speaker 15. Although the dual-use antenna/extractor arrangement shown in FIG. 1 is often desirable, a separate antenna or antennae

Claims	Prior Art
	can be used in conjunction with many different types of earpiece extractors as appropriate for a particular application. Antennae and extractors can be disguised as ear hair or jewelry (e.g., earrings), or conductive filaments can be permanently implanted in the ear cartilage to act as antennae using a process similar to ear piercing. The earpiece 10 communicates with a remote processor unit (RPU) 16 via a primary two-way RF link 17, although many other wireless link media (e.g., ultrasonic or infrared) may be used instead. The RPU is typically worn under clothing (e.g., carried in a pocket or purse), but may also be worn in plain sight (e.g., on a belt) if desired. The RPU 16 may be connected (via wired or wireless means 18) to optional secondary wireless link circuitry 19 that allows wireless communication between the RPU and other sources of information (e.g., the general subscriber telephone network) via a secondary wireless link. Note that the optional secondary wireless link circuitry 19 may or may not be contained within the RPU case 70 of FIG. 7. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to

Claims	Prior Art
	a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing

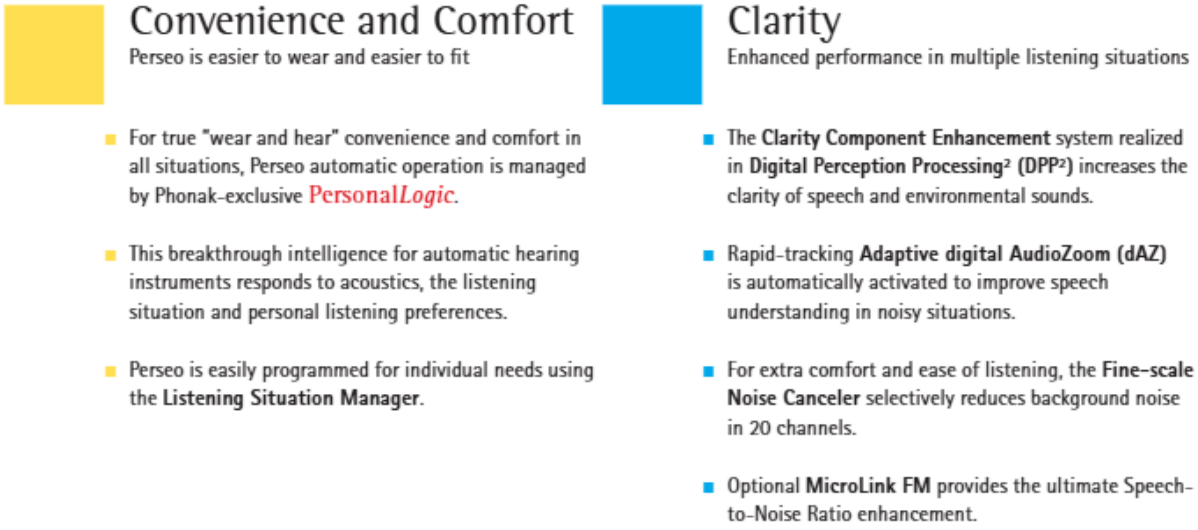
Claims	Prior Art
	functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. Anderson ’783 at 25:15–27 To obtain solicited information, user requests are processed in a variety of means well known in the art, including inputs via one or more pushbuttons on the RPU and voice recognition computer programs implemented in the RPU electronics. Voice recognition can be used almost exclusively, if desired, thereby eliminating nearly all RPU pushbutton controls. Voice commands recognized by the RPU can cause the RPU to initiate actions such as changing hearing aid parameter settings (e.g., volume), or activate appliances and environmental controls (e.g., aids for the physically handicapped) in a distributed wireless network via the secondary wireless link. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[13a] a wireless receiver configured to wirelessly receive the up-converted signals;	DHA Systems and Anderson '783 expressly or inherently disclose "a wireless receiver configured to wirelessly receive the up-converted signals." *See* above at claim [1b]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[13b] a down-converter configured to down-convert the received up-converted signals into down-converted signals;	DHA Systems and Anderson '783 expressly or inherently disclose "a down-converter configured to down-convert the received up-converted signals into down-converted signals." *See* above at claim [1c]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[13c] a modifier configured to modify the down-converted signals into modified signals based on at least one hearing characteristic of the user to enhance the hearing of the user; and	DHA Systems and Anderson '783 expressly or inherently disclose "a modifier configured to modify the down-converted signals into modified signals based on at least one hearing characteristic of the user to enhance the hearing of the user." *See* above at claim [1d]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA

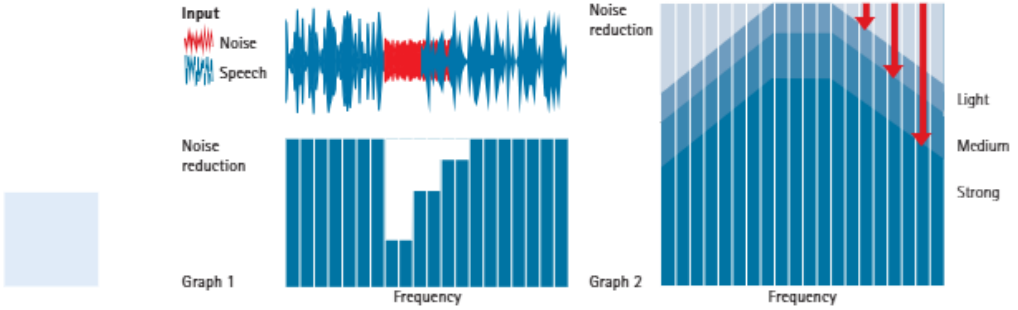
Claims	Prior Art
	Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[13d] a speaker configured to generate audio output signals from the modified signals for the user.	DHA Systems and Anderson ’783 expressly or inherently disclose “a speaker configured to generate audio output signals from the modified signals for the user.” *See* above at claim [1e]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
14. A hearing enhancement apparatus as recited in claim 13, wherein the down-converted signals are modified such that a portion of the audio output signals has an increased power to enhance the hearing of the user.	DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 13, wherein the down-converted signals are modified such that a portion of the audio output signals has an increased power to enhance the hearing of the user.” *See* above at claim 6. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claims 2 and 6. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
15[pre]. A hearing enhancement apparatus as recited in claim 14,	To the extent the preamble is limiting, DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 14.” *See* above at claims 6, 14.

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claims 2 and 6. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[15a] wherein the portion with the increased power is selected based on frequency,	DHA Systems and Enzmann '555 expressly or inherently disclose "wherein the portion with the increased power is selected based on frequency." *See* above at claim [7a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[15b] wherein a higher frequency portion has increased power,	DHA Systems and Enzmann '555 expressly or inherently disclose "wherein a higher frequency portion has increased power." *See* above at claim [7b]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[15c] wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing,	DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing.” *See* above at claim [8a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson ’783, and Enzmann ’555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[15d] wherein the power of the audio output signals can be changed as a function of frequency, and	DHA Systems and Enzmann ’555 expressly or inherently disclose “wherein the power of the audio output signals can be changed as a function of frequency.” *See* above at claim [7a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann ’555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[15e] wherein the user can change the power of the audio output signals.	DHA Systems and Anderson ’783 expressly or inherently disclose “wherein the user can change the power of the audio output signals.” *See* above at claim [8c]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a].

Claims	Prior Art
	To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
16. A hearing enhancement apparatus as recited in claim 15, wherein the down-converted signals are further modified based on the noise level of the environment of the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 15, wherein the down-converted signals are further modified based on the noise level of the environment of the apparatus." The Digital Hearing Aids of the DHA Systems modify the output signals based on ambient noise (e.g., "noise level of the environment of the apparatus"). The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 7  Convenience and Comfort Perseo is easier to wear and easier to fit ■ For true "wear and hear" convenience and comfort in all situations, Perseo automatic operation is managed by Phonak-exclusive PersonalLogic. ■ This breakthrough intelligence for automatic hearing instruments responds to acoustics, the listening situation and personal listening preferences. ■ Perseo is easily programmed for individual needs using the **Listening Situation Manager**. Clarity Enhanced performance in multiple listening situations ■ The **Clarity Component Enhancement** system realized in **Digital Perception Processing² (DPP²)** increases the clarity of speech and environmental sounds. ■ Rapid-tracking **Adaptive digital AudioZoom (dAZ)** is automatically activated to improve speech understanding in noisy situations. ■ For extra comfort and ease of listening, the **Fine-scale Noise Canceler** selectively reduces background noise in 20 channels. ■ Optional **MicroLink FM** provides the ultimate Speech-to-Noise Ratio enhancement.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 10 PersonalLogic™ provides the right response for each wearer PersonalLogic and dual-base automatic provide professionals with the control over signal processing that is essential to enhance user satisfaction. ■ PersonalLogic is a new control system that continuously updates signal processing parameters in response to acoustic information, listening situation classification, the wearers' hearing status and listening preferences. ■ Two independently programmable base-programs are used as the basis for signal processing. PersonalLogic selects the appropriate base-program and continually adapts its signal processing parameters to suit individual wearer needs. Phonak – Perseo Brochure at Page 11 ■ With **dual-base automatic** the fitter has direct access to the two separate base-programs. Performance can be matched to each user's needs in quiet situations without disrupting performance in noisy situations and vice versa. The result is less fine-tuning effort than with single-base instruments. With **single-base automatic** time is wasted "juggling" a single set of fitting parameters while attempting to balance performance in multiple listening situations. ■ To further simplify fitting, PersonalLogic is pre-set according to typical needs and is easily re-programmed to individual preferences using the **Listening Situation Manager (LSM)**. Ensuring that an automatic hearing system responds correctly in noisy situations where there is no speech is an important consideration for safety and to eliminate feelings of isolation. The **LSM** provides this functionality with a single mouse click. Matching the system's sensitivity to noise with that of the client's, and controlling the auditory contrast between quiet and noisy settings is equally easy.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 13 Enhanced sound quality and Speech-to-Noise Ratio **Clarity Component Enhancement – DPP²** Speech clarity depends on both its acoustic properties and the listener's auditory perception. Conventional spectral enhancement systems consider only the acoustics of sound, not how it will be perceived by the listener. Perseo goes well beyond this with **DPP²**, the new generation of Digital Perception Processing. **DPP²** with **Clarity Component Enhancement** is individualized for each wearer. It analyzes the acoustic and the psychoacoustic characteristics of incoming sound in 20 critical bands to identify accurately the components that contribute to clarity. It then selectively amplifies them to optimize clarity for the wearer. Phonak – Perseo Brochure at Page 14 Enhanced comfort in all situations **Fine-scale Noise Canceler in 20 channels** Finely scaled frequency resolution in 20 channels gives the **Fine-scale Noise Canceler (FNC)** the most precise background noise reduction capability. Noise reduction depends on the relative amounts of speech and noise in each channel (graph 1) and the importance of each channel for speech understanding. The **FNC** in Perseo ensures maximum comfort and ease of listening. Annoying background sounds are reduced for comfort while the important sounds of speech are preserved for stress-free listening. The maximum amount of noise reduction can be fitter-programmed to match the individual wearer's tastes and requirements. Thanks to the **dual-base automatic**, separate settings can be made for relatively quiet and noisy situations, ensuring optimal comfort in multiple situations (graph 2). 

Claims	Prior Art
	Phonak – Perseo Brochure at Page 15

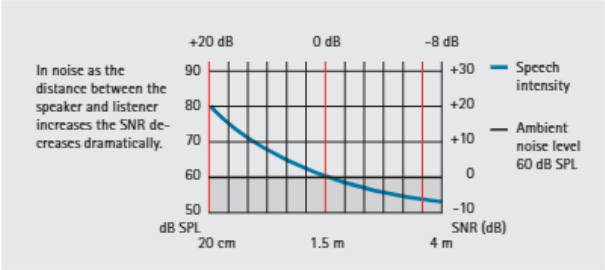
The perfectly integrated communication system

FM MicroLink

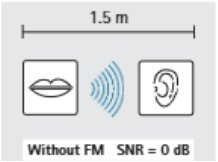
FM technology has allowed thousands of children to participate in standard education settings and to be actively involved in social activities. Phonak pioneered this development and the integration of FM into hearing instruments to produce communication systems that are effective in even the most demanding situations. Since the innovation of miniaturized Phonak **MicroLink** systems, FM has become an important solution also for adults with a high communication need in work and leisure environments.

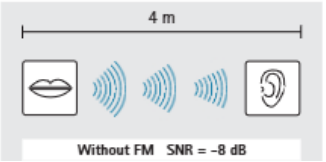
All Perseo BTEs have been designed to incorporate MicroLink with its fully integrated appearance and operation. This integrated system is unique to Phonak.

Speech-to-Noise Ratio (SNR) as a function of distance between speaker and listener



Speech-to-Noise Ratio without FM is distance dependent





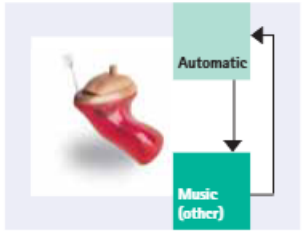
IngenioSpec EX2007
Apple v. IngenioSpec, IPR2026-00144
Page 268

Claims	Prior Art
	Phonak – Perseo Brochure at Page 19



PersonalLogic Automatic

This is the ideal choice for most people.



PersonalLogic plus TacTronic

TacTronic switching can be activated or integrated into any Perseo instrument. This provides additional solutions for those with special listening needs – such as listening to music.



PersonalLogic plus Remote

This is the ultimate in sophistication and convenience for wearers wanting discrete access to all Perseo features including special programs and volume control (not available for Perseo 11 or Perseo 12).

Phonak and Other DHA – Manufacturers News Article at Page 1

STÄFA, SWITZERLAND—Phonak has introduced EduLink, which it predicts will contribute greatly to the successful treatment of children with auditory processing disorders (APDs). This new device is an "ear set" that transmits the teacher's voice, using FM technology, directly to the child's ear, thus effectively reducing ambient and background noise for improved speech discrimination. EduLink is designed to complement existing therapies in the treatment of APD.

Claims	Prior Art
	Phonak – BTE Elite Article at Page 1 **Perseo – the outstanding features place Perseo in a class of its own** • **Personal*Logic*** makes Perseo the first digital hearing system with personalized automatic operation. **Personal*Logic*** selects the appropriate base program and continually adapts its parameters to suit the needs of the wearer. • **Dual-base automatic** allows processing and features to be separately adjusted for quiet and noisy situations for optimum automatic performance. Adjustments for noise never disrupt adjustments for quiet and vice versa. • **Digital Perception Processing (DPP)** with Clarity Component Enhancement: Increased clarity and sound quality also in loud environments. Processing in 20 critical bands. • **Personal System Managers**: Experience Manager, Dynamic Feedback Manager, Occlusion Manager, and Listening Situation Manager for easy and individual adjustment of Personal*Logic*. • **Multi-programs** • **Fast tracking Adaptive digital AudioZoom (dAZ)** to separate actively speech from background noise. • **Fine-scale Noise Canceler** in 20 channels. • **TacTronic program switch** • **Optional remote control** • **FM compatible** • **Wind and weather protection** • **Fashion Color Line** (choice among 12 attractive colors)

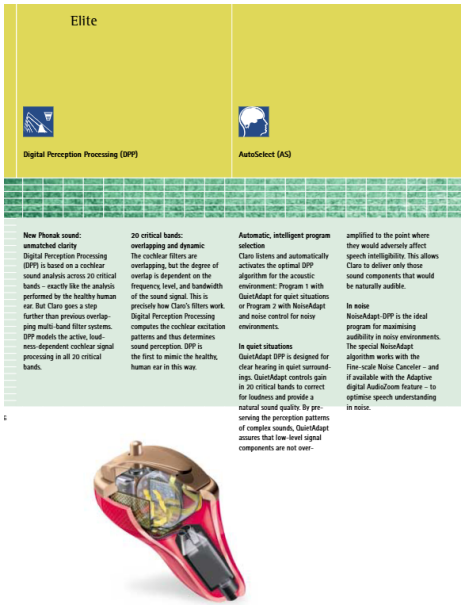
Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 2 People with sensorineural hearing loss need a more favorable signal-to-noise ratio to understand speech than do normal hearing listeners. Research has shown that hearing impaired listeners may require signal-to-noise improvements of 4 dB to 18 dB, depending on the magnitude of their hearing loss to achieve word-recognition scores equivalent to those with normal hearing. FM systems are able to improve the signal-to-noise ratio. FM systems improve the user's ability to understand speech in the presence of noise. Since the sound is delivered by FM radio waves, the strength and quality of the sound remains constant (across the operational distance) from the speaker to the hearing impaired individual. FM systems consist of a microphone usually placed four to six inches from the sound source, and a transmitter, which sends the signal via radio waves directly to the miniature FM receiver, which is connected to the personal hearing instrument. In other words, the entire FM system is a complete broadcasting and receiving system. Importantly, when using FM systems, the effects of background noise and reverberation are minimal. These factors help reduce background noise while enhancing and stabilizing the main sound source. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 7 **1- MicroLink ML3-7**  MicroLink is the smallest FM receiver available on the market today. It is integrated in an audio shoe that simply clips on to the hearing instrument. It can remain locked in place or removed again in seconds. AFC (automatic frequency control) effectively prevents distortion. The soft-squelch system suppresses noise. The ML7 FM receiver features the ability to easily switch between numerous frequency channels. The MicroLink receivers are compatible with all Phonak BTE instruments.

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 7 **2- MicroLink MLx**  This miniature FM receiver is compatible with all Phonak BTE instruments and has a standardized Euro connector that allows it to be used with most other makes of BTE hearing aids on the market today. Many leading hearing aid manufacturers such as Oticon, GN Resound, Siemens, Sonic Innovations, Unitron, and Widex have developed mechanical interfaces that allow users to combine their BTEs with MicroLink MLx. This close cooperation with other major hearing instrument manufacturers has dramatically expanded FM benefits for hearing-impaired children and adults. The small, cubed-shaped MicroLink MLx attaches directly to the base of the audio shoe and receives FM signals from all Phonak wireless transmitters. The MLx 'Universal' FM receiver has a three-position switch. The three-position switch allows the MLx user to change the function of the wireless receiver as listening conditions change. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 9 **5- Claro dAZ FM**  Claro dAZ FM combines two highly advanced systems for signal processing and signal reception. The Signal-to-Noise Ratio is dramatically improved with Digital Perception Processing, Adaptive digital AudioΣoom, the Fine-scale Noise Canceler, and Phonak's FM technology. The FM functions can be controlled directly at the instrument with the TacTronic switch or with the SoundPilot FM or WatchPilot remote controls.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 1 Digital, automatic, BTE hearing instrument with FM module integrated into the streamlined housing. Featuring Phonak's Digital Perception Processing (DPP), three hearing programs and automatic program selection for quiet and for environments with speech in broadband noise. Includes Adaptive digital AudioZoom for optimization of Speech in noise and the Fine-scale Noise Canceler. Manual control via the TacTronic switch or the optional mini remote control SoundPilot FM or the remote control WatchPilot. Phonak – Claro 211 Product Information at Page 1 **Processing features** – Digital Perception Processing (DPP) in 20 critical bands – Gain and output controlled by DPP – 3 hearing programs (+ mute mode): • QuietAdapt for hearing in relative quiet • NoiseAdapt for hearing speech in noise • Program 3 telephone default (other choices available) – FM programs: FM and FM+M – AutoSelect: automatic switching between QuietAdapt and NoiseAdapt – Claro's noise suppression technologies • Adaptive digital AudioZoom (dAZ) • Fine-scale Noise Canceler in 20 bands • Soft squelch Phonak Claro – A World First from Phonak at Page 1 **Efficient noise suppression** Unwanted noise mixed with the speech and other sounds that the individual wishes to hear poses the greatest challenge of all to any hearing instrument. Claro solves the problem by combining a Fine-scale Noise Canceler and an automatically adapting digital AudioZoom system (dAZ), which represents a significant development of Phonak's own Multi-Microphone Technology. Rather like radar, this breakthrough system continuously localizes the direction of origin for the loudest noise. The instrument then activates the best possible protection and the noise is efficiently suppressed. Users have found this to be the most effective way ever developed for improving speech intelligibility in noise, one of the greatest needs for people with impaired hearing.

Claims	Prior Art
	Phonak Claro - Technology of the Digital Future at Page 1 • The most natural sound quality ever thanks to Digital Perception Processing (DPP), exclusive to Phonak. • Optimal understanding, even in noisy environments due to combined noise suppression systems, including the exclusive Phonak Adaptive digital AudioZoom. • Interference-free cell-phone communication. • Dedicated to individual needs as a result of a wide range of product options and programming possibilities. • The freedom of choice: automatic (AutoSelect), manual (TacTronic) or via WatchPilot or SoundPilot. • Quality designed to last thanks to the use of innovative and durable materials and Swiss precision. Phonak – Collections 2002 Product List at Page 3 FM 28 Phonak's unique FM solutions deliver unprecedented speech intelligibility to overcome excessive noise, reverberation and distance. Users of Phonak BTE instruments and users of many other instrument brands can benefit from FM solutions.  Campus S MLx

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 6



Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 7



Adaptive digital AudioZoom (dAZ)

Fine-scale Noise Canceler (FNC)

Active and adaptive separation of speech from noise
The Speech-to-Noise Ratio (SNR) can only be optimised if the noise is spatially separated from the speech signal with directional microphone technology. As a pioneer in multi-microphone technologies, Phonak introduced AudioZoom, a feature which significantly improves listening and understanding in noisy situations, enhancing user satisfaction. Now, Phonak goes a step further in the refinement of multi-microphone technology with Adaptive digital AudioZoom: it seeks, finds, and suppresses noise automatically.

Fully automatic, fully adaptive
With its unique spatial processing system, Phonak's Adaptive digital AudioZoom can detect noise not only from directly behind, but anywhere in the rear plane. Whether the hearing-impaired person is moving or the location of the noise source changes, the directional characteristic is constantly adapted to the listening situation. In this manner, the Adaptive digital AudioZoom automatically establishes the best possible SNR.

Twenty-band noise control
Claro constantly monitors the Speech-to-Noise Ratio (SNR) in all 20 bands. If a poor SNR is measured in certain bands, the Fine-scale Noise Canceler will reduce gain only in those bands. The result of this precision noise control is a selective and intelligent improvement of the SNR with only a marginal influence on the speech signal.

Precise and selective
All frequency bands are separately analysed and controlled. Gain is reduced selectively only in those bands where noise is present. This high-resolution analysis and gain control makes it possible to suppress noise with extremely high accuracy. Neighboring frequency bands without noise remain unaffected.

Intelligent
The magnitude of gain reduction is not constant. In frequency bands with higher SNRs and in bands which are important for speech intelligibility, gain is reduced only slightly. This intelligent control algorithm reduces the masking and distractive effects of background noise. Important speech information is preserved.

7

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 9

BTE instruments	Claro 111 dAZ Claro 111 dAZ FM	Claro 211 dAZ Claro 211 dAZ FM	Claro 311 dAZ Claro 311 dAZ FM
			
	FM	FM	FM
Peak values G max./OSPL 90	52 dB/126 dB SPL	62 dB/135 dB SPL	72 dB/135 dB SPL
Features	Specially designed for steep high-frequency and mild hearing losses	Digital speech transparency	Digital speech transparency and higher gain
Description	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (111 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (211 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (311 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection
Options	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)
Programming	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital, Phonak Digital Ski Slope and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 12

Enhanced Signal-to-Noise Ratio
Phonak's zoom technology is the optimum solution for improving user satisfaction in noisy listening situations. Phonak utilises two separate microphones in its hearing computers with AudioZoom or miniZoom. The microphones are controlled by an electronic network to produce a directional or omnidirectional characteristic. By touching a key on the remote control or operating the switch on the instrument, the user can select the appropriate microphone mode: omnidirectional (wide-angle) or directional (zoom).

Phonak's electronically controlled multi-microphone technology delivers the best Signal-to-Noise Ratio (SNR).
The Signal-to-Noise Ratio is important for understanding speech in noisy surroundings. An improved SNR is crucial even for mild hearing loss. A hearing-impaired person with a hearing loss of 40 dB HL requires an average SNR improvement of +5 dB SNR. If the hearing loss is 70 dB HL, the required improvement is +9 dB SNR.

Phonak's zoom technology is available in the following models:

ITE
Aero 23 mZ
MicroZoom P2 AZ

BTE
Aero 211 AZ
Aero 311 AZ
Supero 413 AZ
Piconet2 P2 AZ
SonoForte2 P3 AZ
PowerZoom P4 AZ

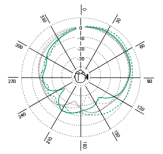
Supero
Often, power instruments differ from other hearing instruments only in terms of higher gain and greater output sound pressure levels. However, Supero was designed from scratch as a hearing instrument which addresses the needs of people with severe and profound hearing impairments. It features a specially robust case based on Phonak's patented 2K technology (optimised protection against moisture and dust), versatile fitting algorithms, flexible signal processing strategies, and unique output-limiting strategies.
Supero 412 is Phonak's most powerful instrument in terms of gain and MPO.

NovoForte E4
People with severe to profound hearing loss need maximum audibility, particularly in the low frequency range. The NovoForte E4 provides excellent low frequency gain with minimal distortion.

PowerZoom P4 AZ
The greater the hearing loss, the more effective a higher SNR. Phonak's PowerZoom P4 AZ achieves an average improvement of the Signal-to-Noise Ratio of 13.7 dB.
This instrument is designed for hearing-impaired people with severe sensorineural or combined hearing loss and a measurable hearing threshold of up to about 2 kHz.
The Phonak PowerZoom P4 AZ preserves loudness in the low frequency range in both hearing programs.

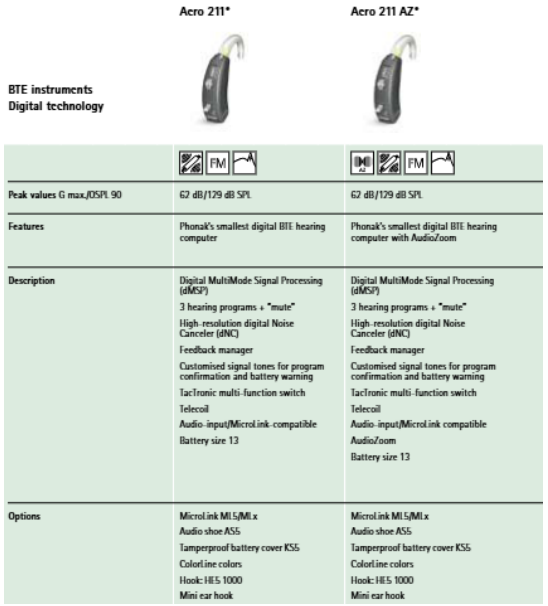
SonoForte2 P3 AZ
The SonoForte2 P3 AZ hearing computer is ideal for people with moderate to severe hearing loss. The AudioZoom feature can be directly programmed to the T position of the MTO switch.

12



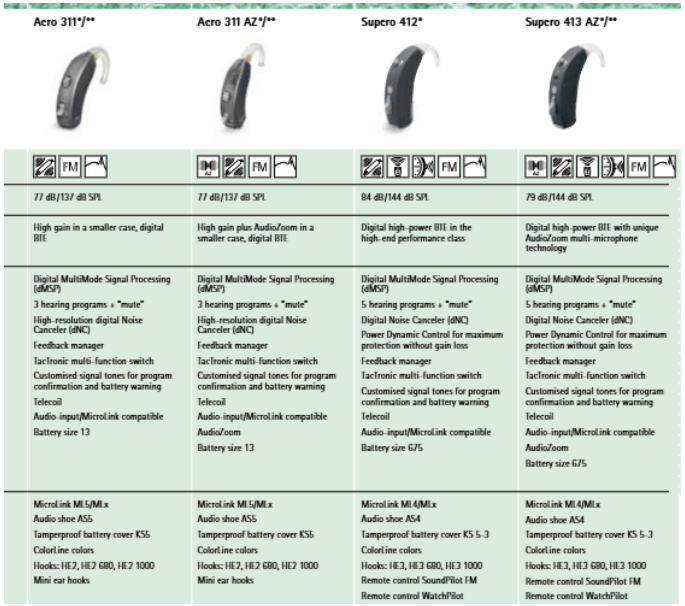
Directional characteristic
500 Hz Polar diagram for a BTE
1000 Hz hearing instrument in
2000 Hz the zoom mode,
4000 Hz KEMAR measurement.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



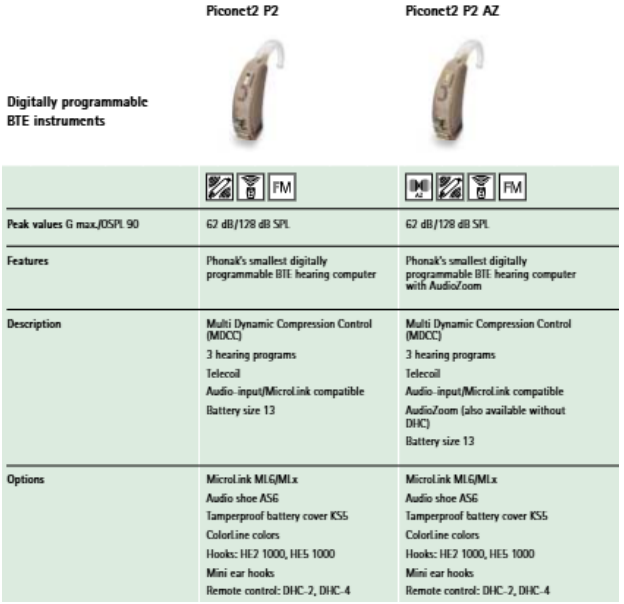
BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 17



Aero 311*/**	Aero 311 AZ*/**	Supero 412*	Supero 413 AZ*/**
77 dB/137 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL	79 dB/144 dB SPL
High gain in a smaller case, digital BTE	High gain plus Audio/zoom in a smaller case, digital BTE	Digital high-power BTE in the high-end performance class	Digital high-power BTE with unique Audio/zoom multi-microphone technology
Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 13	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 675
MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18



Digitally programmable BTE instruments	Piconet2 P2	Piconet2 P2 AZ
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink MLG/MLx Audio shoe ASG Tamperproof battery cover KSS ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink MLG/MLx Audio shoe ASG Tamperproof battery cover KSS ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Phonak – Field Study News Article re PersonalLogic at Page 1

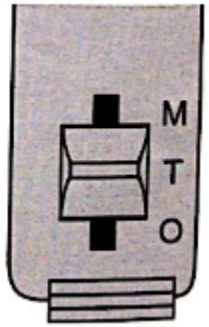
Introduction

Hearing needs and preferences can be very individual, with marked differences from one person to the next in the same hearing situation. So, in addition to compensating for measured hearing loss, an advanced hearing system also must cater to specific personal requirements, and be customizable simply and effectively to individual client needs. The Perseo hearing system with its Personal*Logic* automatic function can be "tailored" to the client's needs as part of the fitting process. In Perseo, the default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. The automatic

Claims	Prior Art
	Phonak – Fitting Guide for MLxi and MLxi Baha at Page 5 However, MLxi can also be used with the following Classic FM transmitters: Campus SX, EasyLink, ZoomLink, SmartLink and Classic FM inspiro. For these combinations, there is no Adaptive FM Advantage feature, which automatically adjusts the FM Advantage in noisy environments, and no Voice Activity Detection, which automatically reduces the FM level when no voice is present at the transmitter microphone. In those cases the user needs to have the chance to select between "Off", "FM only" and "FM+M", as with a Classic FM receiver. For DPAI Yes hearing instruments this selection takes place by toggling between different HI programs such as "no FM", "FM only" and "FM+M". For DPAI No hearing instruments this selection takes place on the receiver. Phonak – Microlink User Guide at Page 7 You may even connect the system directly to your telephone, if it has an audio output socket. Alternatively, use the optional adapter available for your HandyMic. Switching off the microphone then allows you to hear the telephone signal without any background noise. Phonak – Online Interview re Perseo (April 7, 2003) at Page 2 Dave Fabry/Phonak: The Listening Situation Manager is the software control for the PersonalLogic system, which has evolved from the original AutoSelect feature. AutoSelect decides, based on an acoustic analysis of the listening environment, which one of two listening programs is automatically selected to ensure optimum speech understanding in quiet or noise. Personal*Logic* now makes is possible to efficiently control that automatic function, based on a combination of the user's personal preference and the acoustics of the listening environment. For example, the sensitivity to background noise may be adjusted, using a series of five steps, to change how often Perseo switches between base programs (slide 12 on www.phonakpro.com)

Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Dave Fabry/Phonak:** It is all about power consumption at the circuit level. There are essentially three ways to reduce feedback: phase cancellation, notch filtering, and gain reduction. In particular, phase cancellation can use up to 50% of a hearing aid's processing power to monitor and reduce feedback, which is undesirable. The 20-band compression system used in Perseo enables very precise control over gain in a narrow frequency band to preserve audibility and loudness for all listening situations while preventing feedback with no additional influence on power consumption. If you use fewer compression and/or frequency equalization bands, you are correct to say that audibility can be affected, particularly in the high frequencies. In summary, Perseo provides effective feedback suppression through narrow-band gain reduction without sacrificing battery life while maintaining audibility and speech intelligibility. Phonak Perseo with PersonalLogic Article at Page 1  click for Flash animation The key breakthrough technology in Perseo is PersonalLogic, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance now has a new level of intelligence beyond merely adapting according to acoustic changes in the environment. For the first time "how", "when" and "where" automatic instruments provide processing for noisy situations can be tuned to the wearer's preferences, and updated if preferences change with experience. Phonak Perseo with PersonalLogic Article at Page 1 **Perseo is a dual-base automatic** hearing system with all parameters set independently for quiet AND noisy listening situations. Performance can be matched to hearing needs and individual preferences in quiet without disrupting performance in noise and vice versa. This is a distinct advantage over single-base automatic systems in which changes for one situation will affect performance in the other.

Claims	Prior Art
	Phonak – The Hearing Review Article re Perseo (Sep. 5, 2003) at Page 2 Perseo is a 20-channel digital hearing instrument. The default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. This dual-base automatic function allows for independent fine tuning in one listening situation without compromising performance in the other. The automatic performance is designed to be easily personalized for the individual needs and preferences of the user. Lewis – Speech perception in noise: directional microphones (2004) at Page 431 All subjects were fit with digital Phonak Claro 311 dAZ BTE hearing aids bilaterally. All earmolds had select-a-vent (SAV) venting and #13 or 3 mm horn tubing. In addition to the hearing aids, subjects were fit with Phonak Microlink ML8 FM receivers bilaterally. These FM receivers attach to the bottom of a BTE hearing aid and may be utilized in either the "FM only" mode, which attenuates the hearing aid microphone by 20 dB, or in the FM plus hearing aid mode, which allows for FM input and input of environmental sounds via the hearing aid microphones simultaneously at the same output level. The Phonak TX3 HandyMic FM transmitter served as the FM transmitter. This transmitter has three microphone options: (1) Wide Angle, which picks up sounds arriving from all directions around the transmitter microphone equally; (2) Zoom, which provides reduced amplification to signals arriving from the rear (cardioid); and (3) SuperZoom, which provides reduced amplification to signals originating from the rear and the sides (hypercardioid). The

Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 4 Function switch **M:** Hearing instrument switched **on** and microphone connected. **Normal use.** **T:** Hearing instrument switched **on** and telecoil connected. Where a telemagnetic loop system has been installed or when you talk on the phone (in many countries), you may then be able to use your hearing instruments with minimum disturbance from background noise. **O:** Hearing instrument switched **off.**  Oticon – LA Time Article re THE GOODS: The Sound Wave of the Future (Nov. 10 1995) at 1 "Today's amplifiers are not smart," said Peter Hahn, managing director of Oticon's U.S. headquarters in Somerset, N.J. "The digital processor can organize frequencies and manipulate speech signals to separate them from background noise." Oticon – LA Time Article re THE GOODS: The Sound Wave of the Future (Nov. 10 1995) at 1 DigiFocus' computer chips can remember different sound environments and adjust for them, depending on what listening situation the person is experiencing. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 Audiologists at the Grunewald-Blitz Children's Clinic at The University of Arizona in Tucson are testing what promises to be a long-awaited breakthrough in hearing care -- a fully automatic compact hearing aid that digitally processes sound. It adjusts automatically to different noise levels. To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses adjusting the sounds received from the environment, including signal enhancement and noise cancellation. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear

Claims	Prior Art
	canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:4–6 Note that the present invention also maintains all capabilities (e.g., acoustic feedback reduction and adaptive volume control) of prior art devices. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative

Claims	Prior Art
	to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson '783 at 7:10–13 Note that auxiliary body-worn microphones (e.g., in the RPU 16) may be used to measure background noise for the purpose of automatically setting hearing aid parameters. Anderson '783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson '783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as

Claims	Prior Art
	optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 23:65–24:14 Background noise and competing talker cancellation are achieved using any of a number of techniques and circuits well known in the art, e.g., variations of the Least Mean Squares (LMS) technique as implemented in the Motorola DSP56200 LMS filter integrated circuit, or the equivalent function implemented in the general-purpose RPU DSP 948. Note that for all binaural signal processing functions, data contained in replies from the left earpiece (i.e., audio data from the left earpiece microphone) is processed in the RPU DSP 948 by combining said data with other data contained in replies from the right earpiece (i.e., audio data from the right earpiece microphone). The processed audio data transmitted from the RPU to the left and right earpiece speakers via RPU interrogations is therefore a function of data received from both the left and right earpiece microphones via earpiece replies. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950.

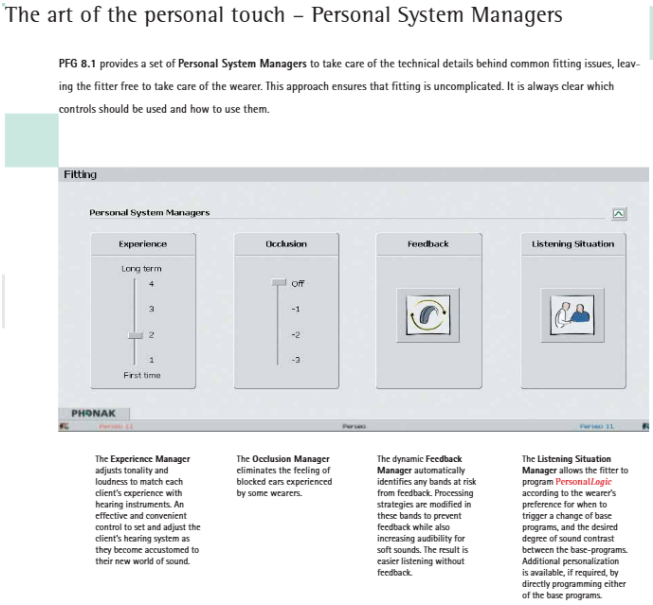
Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. Specifically, a POSITA would have been motivated to incorporate Anderson '783's disclosure regarding modifying hearing aid parameters based on environmental noise, including noise cancellation, into DHA Systems' Digital Hearing Aids in order to improve DHA Systems' audio output and related functionality, including signal-to-noise ratio. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
17. A hearing enhancement apparatus as recited in claim 16, wherein the apparatus is also configured to operate as at least a part of a phone.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 16, wherein the apparatus is also configured to operate as at least a part of a phone." *See* above at claim 4. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. A hearing enhancement apparatus as recited in claim 14,	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 14." *See* above at claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre].

Claims	Prior Art
	To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[18a] wherein the portion with increased power is selected based on frequency, and	DHA Systems and Enzmann ’555 expressly or inherently disclose “wherein the portion with increased power is selected based on frequency.” *See* above at claim [7a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann ’555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[18b] wherein a higher frequency portion has increased power.	DHA Systems and Enzmann ’555 expressly or inherently disclose “wherein a higher frequency portion has increased power.” *See* above at claim [7b]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann ’555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading..
19. A hearing enhancement apparatus as recited in claim 13, wherein the up-converted signals are in the WiFi frequency band.	DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 13, wherein the up-converted signals are in the WiFi frequency band.” *See* above at claim 2.

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
20[pre]. A hearing enhancement apparatus as recited in claim 13,	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13." *See* above at claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[20a] wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing,	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing." *See* above at claim [8a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a].

Claims	Prior Art
	To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson ’783, and Enzmann ’555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[20b] wherein the power of the audio output signals can be changed as a function of frequency, and	DHA Systems and Enzmann ’555 expressly or inherently disclose “wherein the power of the audio output signals can be changed as a function of frequency.” *See* above at claim [7a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [7a]. To the extent that DHA Systems and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Enzmann ’555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[20c] wherein the user can change the power of the audio output signals.	DHA Systems and Anderson ’783 expressly or inherently disclose “wherein the user can change the power of the audio output signals.” *See* above at claim [8c]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
22. A hearing enhancement apparatus as recited in claim 13, wherein the down-converted signals are further modified based on the noise level of the environment of the apparatus.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 13, wherein the down-converted signals are further modified based on the noise level of the environment of the apparatus.” *See* above at claim 16.

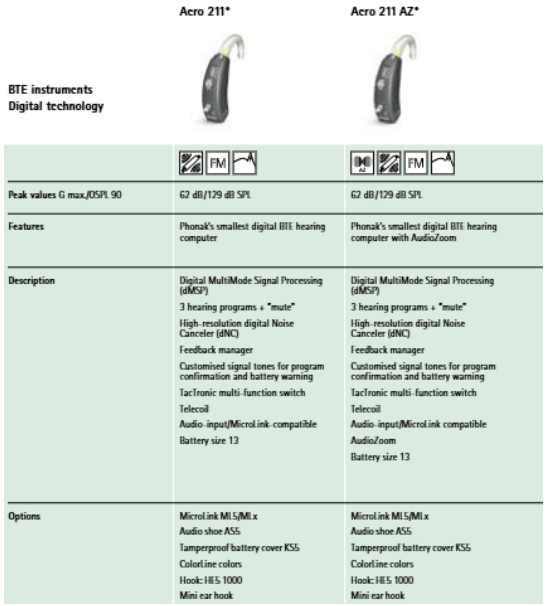
Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
23. A hearing enhancement apparatus as recited in claim 13, wherein the apparatus is also configured to operate as a phone.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein the apparatus is also configured to operate as a phone." *See* above at claim 4. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
24. A hearing enhancement apparatus as recited in claim 13, wherein the at least one hearing characteristic of the user is wirelessly received and stored in the hearing enhancement apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein the at least one hearing characteristic of the user is wirelessly received and stored in the hearing enhancement apparatus." Parameters of the DHA Systems are set based on the user's hearing capabilities on an external personal manager system, which are then stored on the Digital Hearing Aids (e.g., "the hearing enhancement apparatus"). The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 18  The art of the personal touch – Personal System Managers PFG 8.1 provides a set of **Personal System Managers** to take care of the technical details behind common fitting issues, leaving the fitter free to take care of the wearer. This approach ensures that fitting is uncomplicated. It is always clear which controls should be used and how to use them. Fitting Personal System Managers Experience Long term 4 3 2 1 First time Occlusion Off -1 -2 -3 Feedback Listening Situation PHONAK Perseo The **Experience Manager** adjusts tonality and loudness to match each client's experience with hearing instruments. An effective and convenient control to set and adjust the client's hearing system as they become accustomed to their new world of sound. The **Occlusion Manager** eliminates the feeling of blocked ears experienced by some wearers. The dynamic **Feedback Manager** automatically identifies any bands at risk from feedback. Processing strategies are modified in these bands to prevent feedback while also increasing audibility for soft sounds. The result is easier listening without feedback. The **Listening Situation Manager** allows the fitter to program *PersonalLogic* according to the wearer's preference for when to trigger a change of base programs, and the desired degree of sound contrast between the base-programs. Additional personalization is available, if required, by directly programming either of the base programs. Phonak – Claro 211 Product Information at Page 1 Digital, automatic, BTE hearing instrument with FM module integrated into the streamlined housing. Featuring Phonak's Digital Perception Processing (DPP), three hearing programs and automatic program selection for quiet and for environments with speech in broadband noise. Includes Adaptive digital AudioZoom for optimization of Speech in noise and the Fine-scale Noise Canceler. Manual control via the TacTronic switch or the optional mini remote control SoundPilot FM or the remote control WatchPilot.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 9

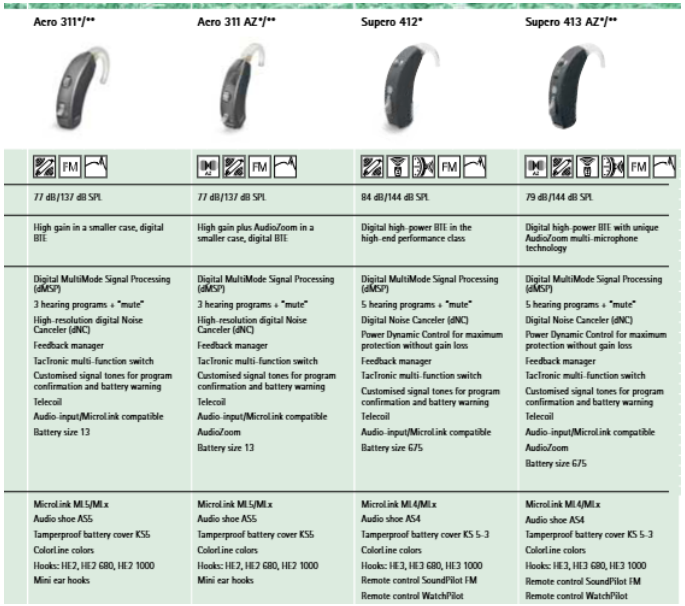
BTE instruments	Claro 111 dAZ Claro 111 dAZ FM	Claro 211 dAZ Claro 211 dAZ FM	Claro 311 dAZ Claro 311 dAZ FM
			
	FM	FM	FM
Peak values G max./OSPL 90	52 dB/126 dB SPL	62 dB/135 dB SPL	72 dB/135 dB SPL
Features	Specially designed for steep high-frequency and mild hearing losses	Digital speech transparency	Digital speech transparency and higher gain
Description	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (111 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (211 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (311 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection
Options	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE4, HE4 330, HE4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)
Programming	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital, Phonak Digital Ski Slope and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



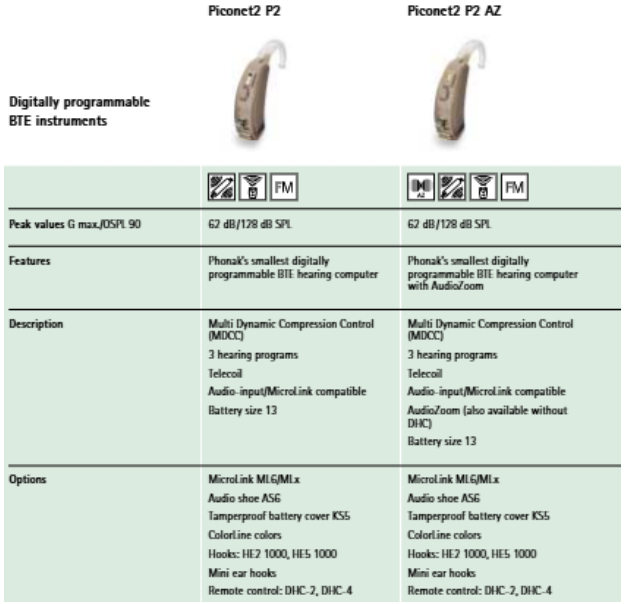
BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 17



Aero 311*/**	Aero 311 AZ*/**	Supero 412*	Supero 413 AZ*/**
77 dB/137 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL	79 dB/144 dB SPL
High gain in a smaller case, digital BTE	High gain plus Audio/zoom in a smaller case, digital BTE	Digital high-power BTE in the high-end performance class	Digital high-power BTE with unique Audio/zoom multi-microphone technology
Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 13	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 675
MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18

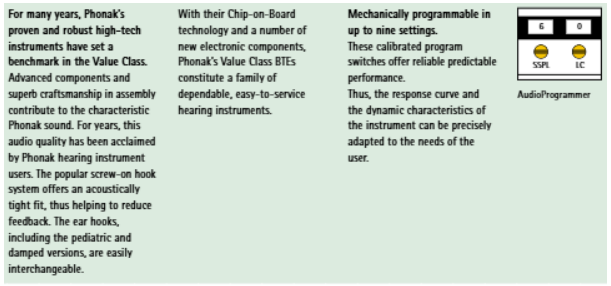


Digitally programmable BTE instruments	Piconet2 P2	Piconet2 P2 AZ
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 19

	SonoForte2 P3 AZ	PowerZoom P4 AZ	NovoForte E3	NovoForte E4
				
	FM	FM	FM	FM
	77 dB/137 dB SPL	79 dB/144 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL
	High gain plus AudioZoom in a smaller case	High gain and AudioZoom	2 switch-selectable programs	Phonak's most powerful digitally programmable BTE instrument
	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675
	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS6 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22



For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

With their Chip-on-Board technology and a number of new electronic components, Phonak's Value Class BTEs constitute a family of dependable, easy-to-service hearing instruments.

Mechanically programmable in up to nine settings.
These calibrated program switches offer reliable predictable performance.
Thus, the response curve and the dynamic characteristics of the instrument can be precisely adapted to the needs of the user.

AudioProgrammer



Phonak – Media Release re Product Offerings in F2003/2004 at Page 2

> The key breakthrough technology in Perseo is Personal*Logic*, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance has now a new level of intelligence beyond merely adapting to acoustic changes in the environment. Perseo is the first hearing system with customized automatic operation, as opposed to operation based on factory settings. It allows hearing professionals to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Phonak – Online Interview re Perseo (April 7, 2003) at Page 3

> **Dave Fabry/Phonak**: Basically, the occlusion manager is designed to reduce the sound of a person's own voice by lowering gain for the 80 dB input, primarily in the low frequencies, effectively increasing compression ratio. Low-frequency G50 is reduced as well, but to a lesser degree. From the clinician's point of view, however, these adjustments are all made via an adjustment to a slidebar with three steps (you can see it on slide 11 at www.phonakpro.com)

Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 5 In a nutshell, Perseo is designed for new and experienced users who are looking for a hearing instrument with advanced adaptive features, enhanced sound quality, easy personalization of fitting and choice of user operation (namely, automatic, manual program control with Tactronic switch, or via remote control). The choice of one product over another is dependent on the patient's hearing loss, listening needs, and prioritization of size, cost, and available performance features. Phonak provides an entire family of digital options from Perseo, Claro, Aero, and our new digital value line that will be introduced this summer. In addition, Supero is the only digital hearing instrument designed specifically for super-power applications. Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Liz Brassine/Phonak:** All Perseo instruments, including the CIC, have 3 memories. Patients may access these memories via the standard TacTronic memory switch on the CIC. For the 23 dAZ, or any of the BTEs, they may also use either of the optional remote controls—the SoundPilot or WatchPilot. Oticon – DigiFocus White Paper (1996) at Page 9 With DigiFocus you have an extremely flexible hearing instrument. By using the right tools you can define a personal, social and audiological profile for each individual patient. This enables you to utilize the capacity of DigiFocus to the fullest extent. The Human Link tools for DigiFocus include: Oticon – DigiFocus White Paper (1996) at Page 9 • The DigiFocus diary enables you to determine quickly when a hearing instrument needs adjustment • The fine-tuning recommendations help you to adjust the settings • OtiSet, a PC based software program, and the programming belt enable you to fit and fine tune DigiFocus while the client is wearing the instrument. This takes place without your patient being wired to the PC.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 1-0 OtiSet version 3.5 is a programming and fitting software module that complies with the hearing industry's standard NOAH platform. It runs on any PC in a Windows 3.11 environment. Together with Oticon's other Human Link tools, it provides everything you need to fit DigiFocus. OtiSet has been designed to make fitting easy while giving you relevant and context-sensitive audiological information. Underneath its simple and easy to use interface, OtiSet considers all the advanced knowledge on which DigiFocus is built. It relies on top audiologi-cal research, summarizing many years of work and field testing performed at Oticon's Eriksholm Research Centre in cooperation with hearing care professionals and audiological researchers worldwide. The new version of OtiSet fully supports DigiFocus, helping you to fit the exact needs of your patients. While using OtiSet, you are able to compare your patient's audiogram with the fitting range of all Oticon's hearing instruments. Based on the choice of instrument and available audiological data, OtiSet automatically recommends the initial control settings. During fitting, OtiSet gives you instant access to graphical representations that show how various speech and sound spectra perform as the controls are adjusted on screen. Oticon – DigiFocus White Paper (1996) at Page 10 *The OtiSet software is the single most important tool for fitting DigiFocus. Underneath its simple and easy to use interface, OtiSet sums up all of the advanced knowledge on which DigiFocus is built. By analyzing all of the available personal data, OtiSet automatically recommends the best suitable settings. In short, OtiSet enables you to draw on all the audiological knowledge available from Oticon.* Oticon – DigiFocus White Paper (1996) at Page 11 Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time.

Claims	Prior Art
	To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses wirelessly storing and retrieving the results of a user's hearing test (e.g., hearing characteristic) from the RPU. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845.

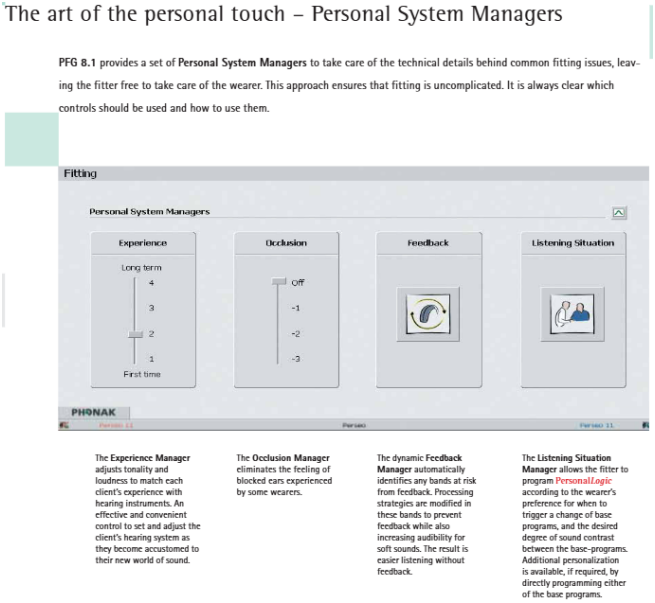
Claims	Prior Art
	Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for

Claims	Prior Art
	the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. Further, a POSITA would have been motivated to store the user's hearing characteristics in DHA Systems' Digital Hearing Aid to provide greater flexibility in modifying the hearing parameters through the personal system managers. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
26. A hearing enhancement apparatus as recited in claim 13, wherein the speaker is a directional speaker.	DHA Systems, Mayer '086, and Fretz '193 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein the speaker is a directional speaker." *See* above at claim 10. A POSITA would have been motivated to combine the DHA Systems with the teachings of Mayer '086 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 10. A POSITA would have further been motivated to combine the DHA Systems with the teachings of Fretz '193 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 10. To the extent that DHA Systems, Mayer '086, and Fretz '193 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Mayer '086, and Fretz '193, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
27. A hearing enhancement apparatus as recited in claim 13, wherein the speaker is an ear speaker.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein the speaker is an ear speaker." *See* above at claim 11.

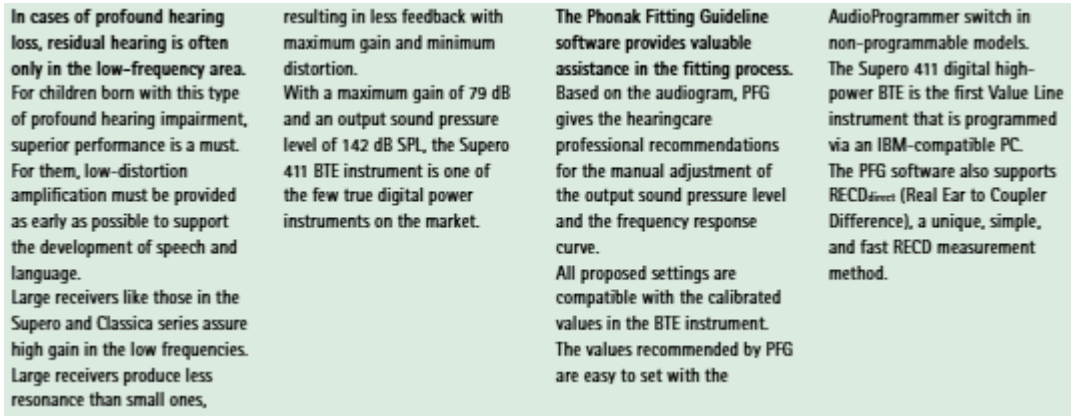
Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
28. A hearing enhancement apparatus as recited in claim 13, wherein the speaker is in a headset.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein the speaker is in a headset." *See* above at claim 12. A POSITA would have been motivated to combine the DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 12. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
29[pre]. A hearing enhancement apparatus as recited in claim 13,	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13." *See* above at claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[29a] wherein the audio system is configured to operate as a phone,	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "wherein the audio system is configured to operate as a phone." *See* above at claim 4. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[29b] wherein the hearing enhancement apparatus is configured to operate in conjunction with or at least as a part of a mobile phone,	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "wherein the hearing enhancement apparatus is configured to operate in conjunction with or at least as a part of a mobile phone." *See* above at claim 4. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[29c] wherein the speaker is an ear speaker, and	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "wherein the speaker is an ear speaker." *See* above at claim 11.

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[29d] wherein to enhance the hearing of the user, the modifier is configured to modify the down-converted signals into modified signals at one or more frequencies within the audio frequencies, with the one or more frequencies being determined by the at least one hearing characteristic of the user.	DHA Systems and Anderson '783 expressly or inherently disclose "wherein to enhance the hearing of the user, the modifier is configured to modify the down-converted signals into modified signals at one or more frequencies within the audio frequencies, with the one or more frequencies being determined by the at least one hearing characteristic of the user." *See* above at claim [1d]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
30[pre]. A hearing enhancement apparatus as recited in claim 29,	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 29." *See* above at claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA

Claims	Prior Art
	Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[30a] wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing at least across the one or more frequencies to generate at least a portion of the hearing profile of the user, and	DHA Systems, Anderson ’783, and Enzmann ’555 expressly or inherently disclose “wherein the at least one hearing characteristic of the user is determined via calibrating the user's hearing at least across the one or more frequencies to generate at least a portion of the hearing profile of the user.” *See* above claim 8. The Digital Hearing Aids of the DHA Systems are used to measure a user’s hearing across frequencies. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 18 

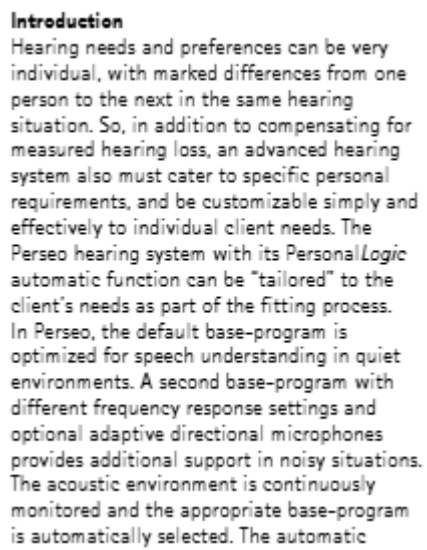
Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22



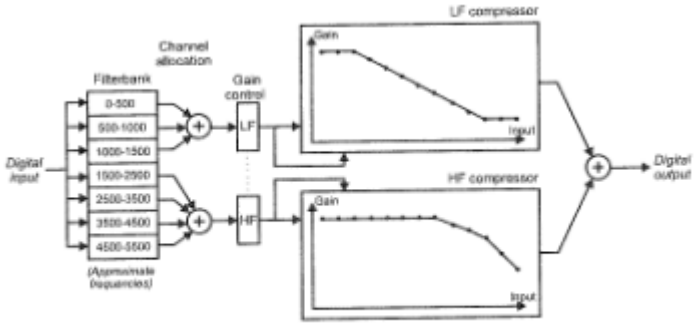
In cases of profound hearing loss, residual hearing is often only in the low-frequency area. For children born with this type of profound hearing impairment, superior performance is a must. For them, low-distortion amplification must be provided as early as possible to support the development of speech and language.
Large receivers like those in the Supero and Classica series assure high gain in the low frequencies. Large receivers produce less resonance than small ones, resulting in less feedback with maximum gain and minimum distortion.
With a maximum gain of 79 dB and an output sound pressure level of 142 dB SPL, the Supero 411 BTE instrument is one of the few true digital power instruments on the market.

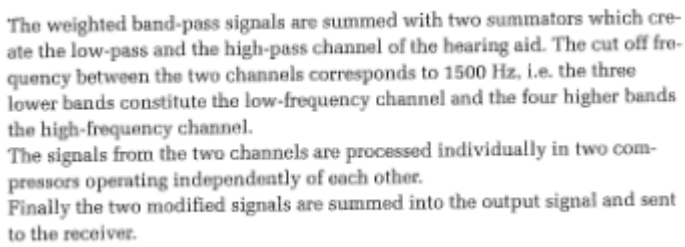
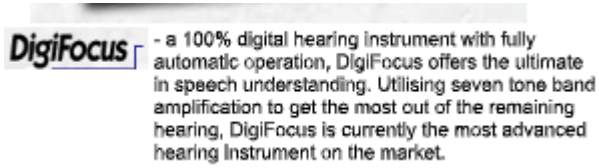
The Phonak Fitting Guideline software provides valuable assistance in the fitting process. Based on the audiogram, PFG gives the hearingcare professional recommendations for the manual adjustment of the output sound pressure level and the frequency response curve.
All proposed settings are compatible with the calibrated values in the BTE instrument. The values recommended by PFG are easy to set with the AudioProgrammer switch in non-programmable models.
The Supero 411 digital high-power BTE is the first Value Line instrument that is programmed via an IBM-compatible PC.
The PFG software also supports RECD$_{direct}$ (Real Ear to Coupler Difference), a unique, simple, and fast RECD measurement method.

Phonak – Field Study News Article re PersonalLogic at Page 1

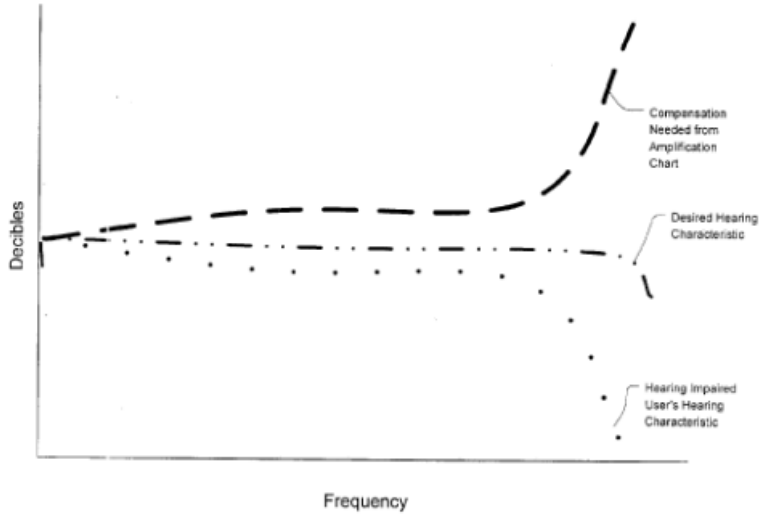


Introduction
Hearing needs and preferences can be very individual, with marked differences from one person to the next in the same hearing situation. So, in addition to compensating for measured hearing loss, an advanced hearing system also must cater to specific personal requirements, and be customizable simply and effectively to individual client needs. The Perseo hearing system with its Personal*Logic* automatic function can be "tailored" to the client's needs as part of the fitting process.
In Perseo, the default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations.
The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. The automatic

Claims	Prior Art
	Phonak – The Hearing Review Article re Perseo (Sep. 5, 2003) at Page 2 Perseo is a 20-channel digital hearing instrument. The default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. This dual-base automatic function allows for independent fine tuning in one listening situation without compromising performance in the other. The automatic performance is designed to be easily personalized for the individual needs and preferences of the user. Oticon – DigiFocus White Paper (1996) at Fig. 1  *Fig.1. DigiFocus - block diagram of the digital audio processor, DAP.* Oticon – DigiFocus White Paper (1996) at Page 4 The input signal from the microphone or the telecoil is digitized and fed to a filterbank, which divides the signal into seven band-pass filters with centre frequencies at: 250, 700, 1200, 2000, 3000, 4000 and 5000 Hz. The filterbank covers the frequency range from 125 to about 6000 Hz. The output from each band-pass filter is equipped with an attenuator by which each filtered signal can be weighted. This allows for a very precise fitting in accordance with the audiometric profile of the hearing impaired.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 4  The weighted band-pass signals are summed with two summators which create the low-pass and the high-pass channel of the hearing aid. The cut off frequency between the two channels corresponds to 1500 Hz, i.e. the three lower bands constitute the low-frequency channel and the four higher bands the high-frequency channel. The signals from the two channels are processed individually in two compressors operating independently of each other. Finally the two modified signals are summed into the output signal and sent to the receiver. Oticon – LA Time Article re THE GOODS: The Sound Wave of the Future (Nov. 10 1995) at 1 "Today's amplifiers are not smart," said Peter Hahn, managing director of Oticon's U.S. headquarters in Somerset, N.J. "The digital processor can organize frequencies and manipulate speech signals to separate them from background noise." Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 What makes the new digital hearing instrument a true breakthrough is its flexibility in processing sound, he added. "Think of the difference between a radio with only bass and treble controls and a fully-featured studio mixer, which adjusts sounds in many different frequency bands. Because of the miniature computer in DigiFocus, sound can be split into seven frequency bands, each of which can be adjusted in several ways. These bands are then processed through two channels to automatically adjust for loudness levels and speech." Oticon – Products Index at Page 1  DigiFocus - a 100% digital hearing instrument with fully automatic operation, DigiFocus offers the ultimate in speech understanding. Utilising seven tone band amplification to get the most out of the remaining hearing, DigiFocus is currently the most advanced hearing instrument on the market. To the extent DHA Systems do not explicitly disclose this claim limitation, Anderson '783 discloses conducting a hearing test across a plurality of frequencies to determine a user's hearing profile (e.g., the stored results of the hearing test). The following citations show examples of where Anderson '783 discloses

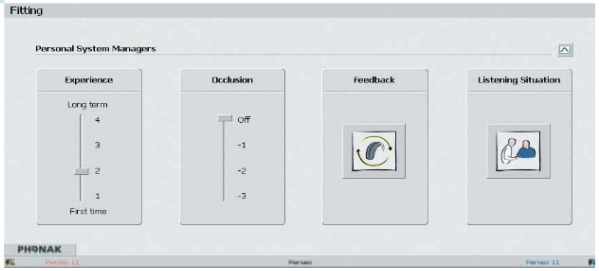
Claims	Prior Art
	this limitation. Anderson ’783 at 3:52–4:14 One preferred embodiment of the invention herein described is shown in block diagram form in FIG. 1. In this figure, the earpiece 10 shown worn in the ear 11 uses a standard completely-in-the-canal (CIC) housing, well known in the art, although many other earpiece housing types known in the art (e.g., behind-the-ear, or BTE) can be used. The earpiece shown in FIG. 1 comprises a microphone 12, RF transceiver 13 with an antenna that doubles as an earpiece extractor 14, and speaker 15. Although the dual-use antenna/extractor arrangement shown in FIG. 1 is often desirable, a separate antenna or antennae can be used in conjunction with many different types of earpiece extractors as appropriate for a particular application. Antennae and extractors can be disguised as ear hair or jewelry (e.g., earrings), or conductive filaments can be permanently implanted in the ear cartilage to act as antennae using a process similar to ear piercing. The earpiece 10 communicates with a remote processor unit (RPU) 16 via a primary two-way RF link 17, although many other wireless link media (e.g., ultrasonic or infrared) may be used instead. The RPU is typically worn under clothing (e.g., carried in a pocket or purse), but may also be worn in plain sight (e.g., on a belt) if desired. The RPU 16 may be connected (via wired or wireless means 18) to optional secondary wireless link circuitry 19 that allows wireless communication between the RPU and other sources of information (e.g., the general subscriber telephone network) via a secondary wireless link. Note that the optional secondary wireless link circuitry 19 may or may not be contained within the RPU case 70 of FIG. 7. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950.

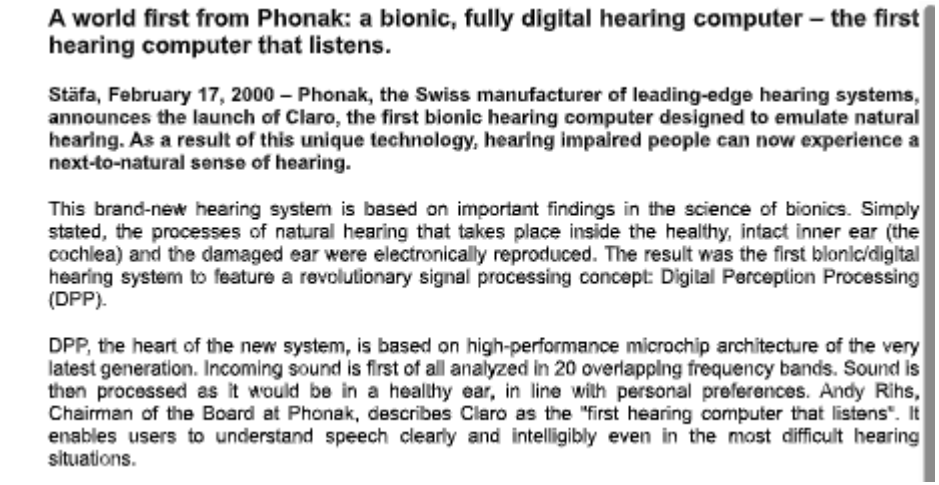
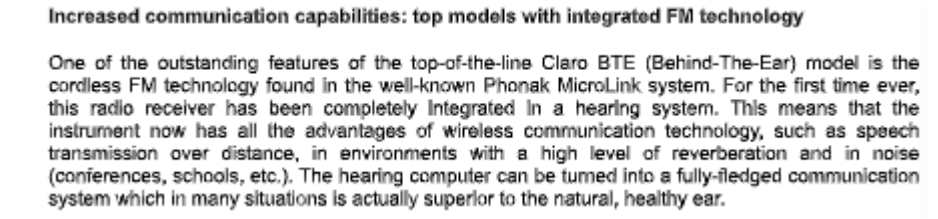
Claims	Prior Art
	Enzmann ’555 also discloses this limitation, including calibrating the user’s hearing across frequencies to generate a hearing profile. The following citations show examples of where Enzmann ‘555 discloses this limitation. Enzmann ’555 at FIG. 5  FIG. 5 Enzmann ’555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency mapping of the user's hearing characteristics. Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave

Claims	Prior Art
	shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the "••" line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the "-••" line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann '555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann '555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann '555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless

Claims	Prior Art
	phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 and/or Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claims [1pre], 2, [8a]. To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[30b] wherein the hearing profile is stored in the hearing enhancement apparatus.	DHA Systems and Anderson ’783 expressly or inherently disclose “wherein the hearing profile is stored in the hearing enhancement apparatus.” *See* above at claim 24.

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 24. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
31. A hearing enhancement apparatus as recited in claim 30, wherein the hearing enhancement apparatus allows the user to calibrate the user's hearing via a computing device.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 30, wherein the hearing enhancement apparatus allows the user to calibrate the user's hearing via a computing device." DHA Systems include a personal manage system on, for example, a computer (e.g., "computing device") for calibrating the characteristics of the hearing aids (e.g., "hearing enhancement apparatus"). The Digital Hearing Aids of the DHA Systems also automatically calibrate to a user's hearing to their environment, The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 5 The Science of PersonalLogic™ Phonak has applied knowledge from new research and past experience to add a new dimension of individualized logic to automatic hearing systems – PersonalLogic. Combining new and proven features, PersonalLogic optimizes the functioning, operation and fitting of hearing systems for each individual user. Thanks to PersonalLogic, Perseo takes customization to a level beyond "custom-fitted" related to individual hearing loss. The new digital system from Phonak is the first hearing system with customized automatic operation, as opposed to operation based on factory set, unchangeable rules. Now, Perseo gives hearing professionals control over automatic operation, allowing them to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 10 PersonalLogic™ provides the right response for each wearer PersonalLogic and dual-base automatic provide professionals with the control over signal processing that is essential to enhance user satisfaction. ■ PersonalLogic is a new control system that continuously updates signal processing parameters in response to acoustic information, listening situation classification, the wearers' hearing status and listening preferences. ■ Two independently programmable base-programs are used as the basis for signal processing. PersonalLogic selects the appropriate base-program and continually adapts its signal processing parameters to suit individual wearer needs. Phonak – Perseo Brochure at Page 18 The art of the personal touch – Personal System Managers PFG 8.1 provides a set of Personal System Managers to take care of the technical details behind common fitting issues, leaving the fitter free to take care of the wearer. This approach ensures that fitting is uncomplicated. It is always clear which controls should be used and how to use them.  The Experience Manager adjusts tonality and loudness to match each client's experience with hearing instruments. An effective and convenient control to set and adjust the client's hearing system as they become accustomed to their new world of sound. The Occlusion Manager eliminates the feeling of blocked ears experienced by some wearers. The dynamic Feedback Manager automatically identifies any bands at risk from feedback. Processing strategies are modified in these bands to prevent feedback while also increasing audibility for soft sounds. The result is easier listening without feedback. The Listening Situation Manager allows the fitter to program PersonalLogic according to the wearer's preference for when to trigger a change of base programs, and the desired degree of sound contrast between the base-programs. Additional personalization is available, if required, by directly programming either of the base programs.

Claims	Prior Art
	Phonak Claro – A World First from Phonak at Page 1  **A world first from Phonak: a bionic, fully digital hearing computer – the first hearing computer that listens.** **Stäfa, February 17, 2000 – Phonak, the Swiss manufacturer of leading-edge hearing systems, announces the launch of Claro, the first bionic hearing computer designed to emulate natural hearing. As a result of this unique technology, hearing impaired people can now experience a next-to-natural sense of hearing.** This brand-new hearing system is based on important findings in the science of bionics. Simply stated, the processes of natural hearing that takes place inside the healthy, intact inner ear (the cochlea) and the damaged ear were electronically reproduced. The result was the first bionic/digital hearing system to feature a revolutionary signal processing concept: Digital Perception Processing (DPP). DPP, the heart of the new system, is based on high-performance microchip architecture of the very latest generation. Incoming sound is first of all analyzed in 20 overlapping frequency bands. Sound is then processed as it would be in a healthy ear, in line with personal preferences. Andy Rihs, Chairman of the Board at Phonak, describes Claro as the "first hearing computer that listens". It enables users to understand speech clearly and intelligibly even in the most difficult hearing situations. Phonak Claro – A World First from Phonak at Page 1  **Increased communication capabilities: top models with integrated FM technology** One of the outstanding features of the top-of-the-line Claro BTE (Behind-The-Ear) model is the cordless FM technology found in the well-known Phonak MicroLink system. For the first time ever, this radio receiver has been completely integrated in a hearing system. This means that the instrument now has all the advantages of wireless communication technology, such as speech transmission over distance, in environments with a high level of reverberation and in noise (conferences, schools, etc.). The hearing computer can be turned into a fully-fledged communication system which in many situations is actually superior to the natural, healthy ear. Phonak Claro – Remote control WatchPilot and Claro dAZ at Page 1  **Claro from Phonak, the first bionic, fully digital hearing computer, sets new standards in hearing instrument technology. At the 45th International Congress of Hearing Aid Acousticians in Cologne (October 5 – 7) the Swiss company, whose name is synonymous with high-tech innovation, presents two more world-firsts: WatchPilot, a wristwatch with an integrated hearing system remote control, and Claro dAZ FM hearing computers, a fully digital hearing system with an integrated miniature radio receiver. At the same time, Phonak will be unveiling Claro 311 dAZ, the most powerful behind-the-ear instrument in the Claro line to date. "The new products represent major advances in hearing instrument technology," says Peter Pfluger, CEO of the Phonak Group. "We are giving hearing impaired individuals an improved quality of life and helping to turn the hearing instrument into a modern communication system."**

Claims	Prior Art
	Phonak Claro – World Premiere at Page 1 In market surveys hearing instrument users have repeatedly stressed the importance of hearing and understanding in noise as a top priority and the weakest point of the instruments currently available on the market. Hearing instrument users frequently complained of frustration over their instruments. Claro is Phonak's answer to the main worry of hearing instrument users. Hearing and understanding clearly again will be the order of the day once again for millions of individuals suffering from hearing loss. As Andreas Rihs puts it, Claro is "the first communication/hearing computer that actually listens for you!" Phonak Claro – World Premiere at Page 1 **Cutting-edge chip technology points the way forward** This phenomenal technical breakthrough is based on six years of intense research and development work during which it was possible for the first time ever to fully integrate psychoacoustic perception models of the ear. As a result, it has been possible to simulate the function of the so-called "20 critical bands" in the inner ear and to achieve an unprecedented natural hearing experience. This sophisticated, highly complex system goes by the name *Digital Perception Processing (DPP)* and is based on the most advanced chip generation currently available. The chip architecture is built around 0.25µm technology, which permits *Fast Fourier Transformation (FFT)* processes combined with very low power consumption. According to Andreas Rihs, it means there is still a great deal of potential for extending the chip's performance and this opens the door to some highly interesting developments on the same chip basis in the future. **The advent of a genuine communication/hearing computer** The impressive, state-of-the-art technology is combined with an exclusive, all-round communication concept based on the components *Digital Perception Processing (DPP), AutoSelect, Adaptive digital AudioZoom und Fine-scale Noise Canceler.* It provides a decisive boost to the power of the audiological solution and, with it, the benefits to the user. The Adaptive digital AudioZoom automatically locates and suppresses the main source of noise and at the same time clearly separates the voice of the person speaking within the listener's field of vision. The result of this is a positive signal-to-noise ratio on a scale that has never been achieved before. To round it off, the top model in the new Claro range is the first ever to feature the wireless FM technology found in the well-known MicroLink system and thus has all the advantages of wireless communication technology, such as speech transmission over distance in noisy surroundings (conferences, schools, etc.). As a result, the hearing computer has undergone a definitive transition to a communication/hearing computer, which in many situations is indisputably superior to the human ear.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

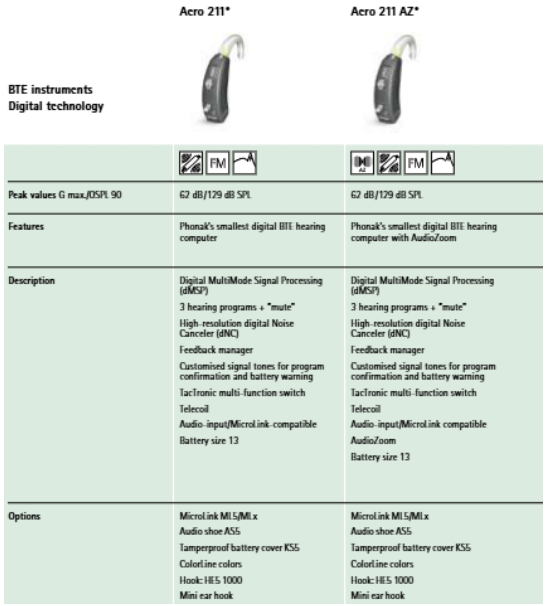
Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18

Digitally programmable BTE instruments	Piconet2 P2 	Piconet2 P2 AZ 
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22

For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

With their Chip-on-Board technology and a number of new electronic components, Phonak's Value Class BTEs constitute a family of dependable, easy-to-service hearing instruments.

Mechanically programmable in up to nine settings.
These calibrated program switches offer reliable predictable performance.
Thus, the response curve and the dynamic characteristics of the instrument can be precisely adapted to the needs of the user.



AudioProgrammer



IngenioSpec EX2007
Apple v. IngenioSpec, IPR2026-00144
Page 324

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 33

PFG –
new perspectives
in fitting success





QuickGuide
The versatile, easy-to-use online tour through the PFG fitting process with access to all optional fitting tools.

Instrument selection wizard
This online assistant recommends the product that best matches the customer's needs.

Initial SoundCheck
This is an ideal tool for fast and simple fine tuning of sound quality. Three controls provide convenient gain and balance settings in the high- and low-frequency ranges.

Automatic fine tuning
Based on the customer's hearing perception, the software automatically computes the most suitable modifications.

Manual fine tuning
A high degree of fitting precision can be attained with this broad spectrum of parameters in an optimised display format.

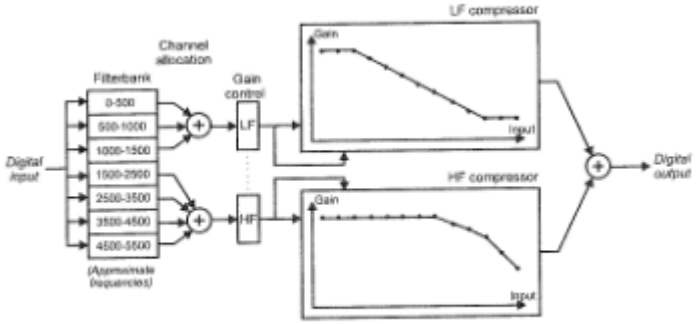
Phonak Sound
The degree of fitting success can be dramatically improved by using these real-life sound clips. All sound examples can be saved on a computer as MP3 files; they are also available on a sound CD.

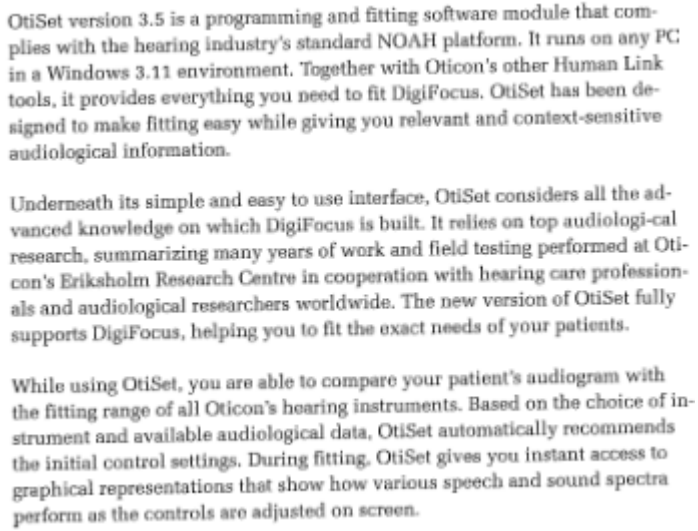
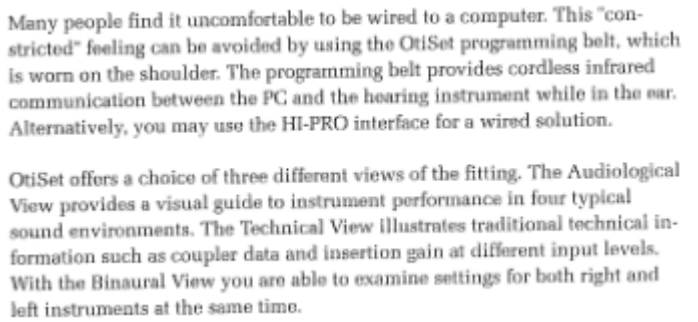
Proven PFG benefits
- One program for all Phonak hearing computers
- NOAH compatible or standalone version
- Detailed help system with in-depth scientific and technical information
- PFG training demo

Claims	Prior Art
	Phonak – Field Study News Article re PersonalLogic at Page 1 **Introduction** Hearing needs and preferences can be very individual, with marked differences from one person to the next in the same hearing situation. So, in addition to compensating for measured hearing loss, an advanced hearing system also must cater to specific personal requirements, and be customizable simply and effectively to individual client needs. The Perseo hearing system with its Personal*Logic* automatic function can be "tailored" to the client's needs as part of the fitting process. In Perseo, the default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. The automatic Phonak – Media Release re Product Offerings in F2003/2004 at Page 2 The key breakthrough technology in Perseo is Personal*Logic*, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance has now a new level of intelligence beyond merely adapting to acoustic changes in the environment. Perseo is the first hearing system with customized automatic operation, as opposed to operation based on factory settings. It allows hearing professionals to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 2 Dave Fabry/Phonak: First of all, Perseo serves as the flagship hearing system in Phonak's hearing aid family, combining leading edge, innovative hardware with efficient, flexible, and user-friendly software in one package. We call it the art and science of hearing aid fitting, in that it enables both experienced and inexperienced clinicians to efficiently optimize hearing aid parameters for each and every patient at the initial fitting session. Furthermore, using a series of Personal System Managers, they enable the clinician to easily accommodate the patient's changing needs over time. Hearing solutions should be individual, and Perseo offers the ultimate in personalization to achieve that goal. Valente - Effect of type of noise and loudspeaker array on the performance at 402 The Phonak fitting software (Version 8.3) was used to program the hearing aids. First, hearing thresholds were entered into the NOAH software. The manufacturer's prescribed "First-Fit" was calculated from these hearing thresholds. The default settings in each of the software "personal system" menus (provides adjustments to the "First-Fit" for prior experience; occlusion effect and feedback) were utilized. If the patient reported occlusion, then this feature was activated. If feedback was noticed, the feedback manager was accessed. All hearing Oticon – DigiFocus Description at Page 1 Inside each DigiFocus, the digital chips have the same processing power as a fast laptop computer. This power is used to analyse the incoming sound signal, and speech is extracted through a unique system called ASA - Adaptive Speech Alignment. ASA always makes speech audible, amplifying it as much as necessary without making it uncomfortably loud or distorted. Sounds are reproduced very naturally - making speech far easier to understand than with any other hearing instrument on the market.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 1 The OtiSet software is the single most important tool for fitting DigiFocus. Underneath its simple and easy to use interface, OtiSet sums up all of the advanced knowledge on which DigiFocus is built. By analyzing all of the available personal data, OtiSet automatically recommends the most appropiate set tings. In short, OtiSet enables you to draw on all the audiological knowledge available from Oticon. □ Oticon – DigiFocus White Paper (1996) at Page 1 A number of different tools are provided by Oticon to help make fitting DigiFocus and other instruments easy and efficient. These tools are part of Oticon's Human Link concept. The tools include: user diaries, specially designed interview forms, fine tuning guides, the OtiSet programming software, and more. □ Oticon – DigiFocus White Paper (1996) at Page 1 DigiFocus is a fully digital hearing instrument built around the digital audio processor, DAP. This processor is designed to have a specific functionality and to comply with a series of physical, acoustical and audiological demands. □ Oticon – DigiFocus White Paper (1996) at Page 1 In many areas digital technology has already become an integral part of our lives. Now it is also available for the hard of hearing. With size and battery consumption diminished, the DigiFocus hearing instrument has computing power equalling today's standard PCs. In this article you will get a description of the basic concepts of digital sound processing. □ Oticon – DigiFocus White Paper (1996) at Page 2 *In many areas digital technology has already become an integral part of our lives. Now it is also available for the hard of hearing. With size and battery consumption diminished, the DigiFocus hearing instrument has computing power equalling today's standard PCs. In this article you will get a description of the basic concepts of digital audio processing.* Oticon – DigiFocus White Paper (1996) at Page 2 Manufacturers of hearing instruments have worked hard to overcome the troubles of size and battery consumption. With the thickness of digital microchips at only 1/100 of a human hair, this has now been accomplished in the world's first fully digital, at the ear hearing instrument - DigiFocus. Inside DigiFocus there is computing power available which equals that of a PC.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Fig. 1  *Fig.1. DigiFocus - block diagram of the digital audio processor, DAP.* Oticon – DigiFocus White Paper (1996) at Page 4 The input signal from the microphone or the telecoil is digitized and fed to a filterbank, which divides the signal into seven band-pass filters with centre frequencies at: 250, 700, 1200, 2000, 3000, 4000 and 5000 Hz. The filterbank covers the frequency range from 125 to about 6000 Hz. The output from each band-pass filter is equipped with an attenuator by which each filtered signal can be weighted. This allows for a very precise fitting in accordance with the audiometric profile of the hearing impaired. Oticon – DigiFocus White Paper (1996) at Page 9 • The DigiFocus diary enables you to determine quickly when a hearing ir strument needs adjustment • The fine-tuning recommendations help you to adjust the settings • OtiSet, a PC based software program, and the programming belt enable you to fit and fine tune DigiFocus while the client is wearing the instrument. This takes place without your patient being wired to the PC.

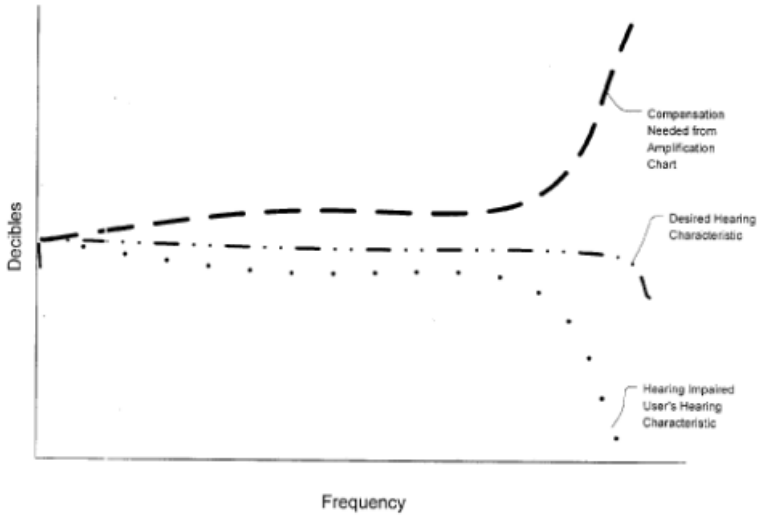
Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 1-0  OtiSet version 3.5 is a programming and fitting software module that complies with the hearing industry's standard NOAH platform. It runs on any PC in a Windows 3.11 environment. Together with Oticon's other Human Link tools, it provides everything you need to fit DigiFocus. OtiSet has been designed to make fitting easy while giving you relevant and context-sensitive audiological information. Underneath its simple and easy to use interface, OtiSet considers all the advanced knowledge on which DigiFocus is built. It relies on top audiologi-cal research, summarizing many years of work and field testing performed at Oticon's Eriksholm Research Centre in cooperation with hearing care professionals and audiological researchers worldwide. The new version of OtiSet fully supports DigiFocus, helping you to fit the exact needs of your patients. While using OtiSet, you are able to compare your patient's audiogram with the fitting range of all Oticon's hearing instruments. Based on the choice of instrument and available audiological data, OtiSet automatically recommends the initial control settings. During fitting, OtiSet gives you instant access to graphical representations that show how various speech and sound spectra perform as the controls are adjusted on screen. Oticon – DigiFocus White Paper (1996) at Page 11  Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time. Oticon – LA Time Article re THE GOODS: The Sound Wave of the Future (Nov. 10 1995) at 1 DigiFocus operates on two tiny new computer chips that have the processing power of a normal desktop computer. Traditional hearing instruments have only up to 10 adjustable parameters, but Oticon representatives say that their processor will give a maximum of 100 software-controlled adjustment parameters. And the device can be programmed by an audiologist while the hearing-impaired person is wearing it.

Claims	Prior Art
	Oticon – LA Time Article re THE GOODS: The Sound Wave of the Future (Nov. 10 1995) at 1 "Today's amplifiers are not smart," said Peter Hahn, managing director of Oticon's U.S. headquarters in Somerset, N.J. "The digital processor can organize frequencies and manipulate speech signals to separate them from background noise." Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 What makes the new digital hearing instrument a true breakthrough is its flexibility in processing sound, he added. "Think of the difference between a radio with only bass and treble controls and a fully-featured studio mixer, which adjusts sounds in many different frequency bands. Because of the miniature computer in DigiFocus, sound can be split into seven frequency bands, each of which can be adjusted in several ways. These bands are then processed through two channels to automatically adjust for loudness levels and speech." To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 processing capabilities in the ear piece (e.g., "computing device") that can be used to adjust (e.g., "calibrate") a user's hearing. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson '783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary

Claims	Prior Art
	two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson '783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson '783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson '783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The

Claims	Prior Art
	signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson '783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired

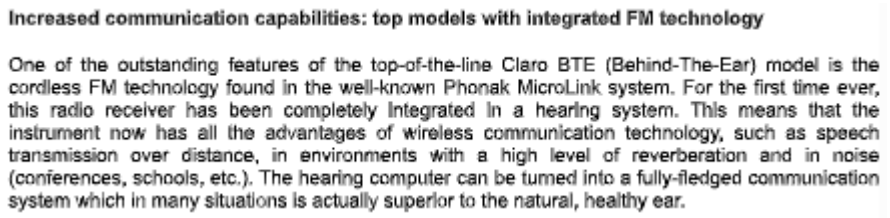
Claims	Prior Art
	information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. Anderson ’783 at 26:24–34 RPU computer applications: The combination of an earpiece 10 with an RPU 16 can be used in lieu of a laptop computer or "personal digital assistant" in many instances, and results in a practically theft-proof system. The system facilitates text-to-speech translation of electronic mail messages and faxes, where information is received via the secondary link and processed by the RPU DSP 948. Voice mail messages and paging services are readily accommodated by the system via the secondary wireless link 19 circuitry, with both digital data and speech signals exchanged between the RPU and a remote-site computer. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory

Claims	Prior Art
	resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. Enzmann '555 also discloses this limitation, including calibrating the user's hearing via a computing device. The following citations show examples of where Enzmann '555 discloses this limitation. Enzmann '555 at FIG. 5  FIG. 5 Enzmann '555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency mapping of the user's hearing characteristics.

Claims	Prior Art
	Enzmann ’555 at [0046] The amplification chart 325 contains a series of pre-stored dynamic frequency maps based on the user's hearing characteristics, the speaker characteristics and the ambient noise near the aided ear bud 200. The digital logic 320 will receive the transmitted signal from the TX/RX unit 260 and process those signals to an optimal form based on the user's hearing, speaker and ambient noise characteristics. The arrangement of the logic devices within the digital logic 320 will serve to produce each of the characteristics (wave shape) of the amplitude chart 325. The user's hearing characteristics remain static unless the aided ear bud 200 is reprogrammed to compensate for additional hearing loss or increase and different users. For example, as shown in FIG. 5, a mapping of a user's hearing characteristic (denoted by the “••” line) illustrates that the user lacks significant hearing capability in higher frequencies. The desired hearing characteristic is denoted by the “-••” line. This desired hearing characteristic depicts or represents how a non-hearing impaired person's hearing characteristics may be. As known to those skilled in the art, close representation of this hearing characteristic is achievable by adding a complementary characteristic to the user's hearing characteristic to produce a result that is very close to the desired characteristic. Each of the characteristics is corrected using the process shown in FIG. 5. Enzmann ’555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann ’555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann ’555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above,

Claims	Prior Art
	and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claims 2, [8a]. To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
33. A hearing enhancement apparatus as recited in claim 30, wherein at least a portion of the at least one hearing characteristic of the user is wirelessly received by and stored in the hearing enhancement apparatus.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 30, wherein at least a portion of the at least one hearing characteristic of the user is wirelessly received by and stored in the hearing enhancement apparatus.” For example: *See* above at claim 24. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 24. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
34. A hearing enhancement apparatus as recited in claim 33, wherein the hearing enhancement apparatus is a headset.	DHA Systems and Anderson ‘783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 33, wherein the hearing enhancement apparatus is a headset.” Parameters of the DHA Systems are set based on the user’s hearing capabilities on an external personal manager system, which are then stored on the Digital Hearing Aids (e.g., “the hearing enhancement apparatus”). The following citations show examples of where DHA Systems practice this limitation. Phonak Claro – A World First from Phonak at Page 1 **A world first from Phonak: a bionic, fully digital hearing computer – the first hearing computer that listens.** **Stäfa, February 17, 2000 – Phonak, the Swiss manufacturer of leading-edge hearing systems, announces the launch of Claro, the first bionic hearing computer designed to emulate natural hearing. As a result of this unique technology, hearing impaired people can now experience a next-to-natural sense of hearing.** This brand-new hearing system is based on important findings in the science of bionics. Simply stated, the processes of natural hearing that takes place inside the healthy, intact inner ear (the cochlea) and the damaged ear were electronically reproduced. The result was the first bionic/digital hearing system to feature a revolutionary signal processing concept: Digital Perception Processing (DPP). DPP, the heart of the new system, is based on high-performance microchip architecture of the very latest generation. Incoming sound is first of all analyzed in 20 overlapping frequency bands. Sound is then processed as it would be in a healthy ear, in line with personal preferences. Andy Rihs, Chairman of the Board at Phonak, describes Claro as the "first hearing computer that listens". It enables users to understand speech clearly and intelligibly even in the most difficult hearing situations.

Claims	Prior Art
	Phonak Claro – A World First from Phonak at Page 1  **Increased communication capabilities: top models with integrated FM technology** One of the outstanding features of the top-of-the-line Claro BTE (Behind-The-Ear) model is the cordless FM technology found in the well-known Phonak MicroLink system. For the first time ever, this radio receiver has been completely integrated in a hearing system. This means that the instrument now has all the advantages of wireless communication technology, such as speech transmission over distance, in environments with a high level of reverberation and in noise (conferences, schools, etc.). The hearing computer can be turned into a fully-fledged communication system which in many situations is actually superior to the natural, healthy ear. Phonak Claro – Remote control WatchPilot and Claro dAZ at Page 1 **Claro from Phonak, the first bionic, fully digital hearing computer, sets new standards in hearing instrument technology. At the 45th International Congress of Hearing Aid Acousticians in Cologne (October 5 – 7) the Swiss company, whose name is synonymous with high-tech innovation, presents two more world-firsts: WatchPilot, a wristwatch with an integrated hearing system remote control, and Claro dAZ FM hearing computers, a fully digital hearing system with an integrated miniature radio receiver. At the same time, Phonak will be unveiling Claro 311 dAZ, the most powerful behind-the-ear instrument in the Claro line to date. "The new products represent major advances in hearing instrument technology," says Peter Pfluger, CEO of the Phonak Group. "We are giving hearing impaired individuals an improved quality of life and helping to turn the hearing instrument into a modern communication system."** Phonak Claro – World Premiere at Page 1 In market surveys hearing instrument users have repeatedly stressed the importance of hearing and understanding in noise as a top priority and the weakest point of the instruments currently available on the market. Hearing instrument users frequently complained of frustration over their instruments. Claro is Phonak's answer to the main worry of hearing instrument users. Hearing and understanding clearly again will be the order of the day once again for millions of individuals suffering from hearing loss. As Andreas Rihs puts it, Claro is "the first communication/hearing computer that actually listens for you!"

Claims	Prior Art
	Phonak Claro – World Premiere at Page 1

Cutting-edge chip technology points the way forward

This phenomenal technical breakthrough is based on six years of intense research and development work during which it was possible for the first time ever to fully integrate psychoacoustic perception models of the ear. As a result, it has been possible to simulate the function of the so-called "20 critical bands" in the inner ear and to achieve an unprecedented natural hearing experience. This sophisticated, highly complex system goes by the name *Digital Perception Processing (DPP)* and is based on the most advanced chip generation currently available. The chip architecture is built around 0.25µm technology, which permits *Fast Fourier Transformation (FFT)* processes combined with very low power consumption. According to Andreas Rihs, it means there is still a great deal of potential for extending the chip's performance and this opens the door to some highly interesting developments on the same chip basis in the future.

The advent of a genuine communication/hearing computer

The impressive, state-of-the-art technology is combined with an exclusive, all-round communication concept based on the components *Digital Perception Processing (DPP), AutoSelect, Adaptive digital AudioZoom und Fine-scale Noise Canceler.* It provides a decisive boost to the power of the audiological solution and, with it, the benefits to the user. The Adaptive digital AudioZoom automatically locates and suppresses the main source of noise and at the same time clearly separates the voice of the person speaking within the listener's field of vision. The result of this is a positive signal-to-noise ratio on a scale that has never been achieved before.

To round it off, the top model in the new Claro range is the first ever to feature the wireless FM technology found in the well-known MicroLink system and thus has all the advantages of wireless communication technology, such as speech transmission over distance in noisy surroundings (conferences, schools, etc.). As a result, the hearing computer has undergone a definitive transition to a communication/hearing computer, which in many situations is indisputably superior to the human ear.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

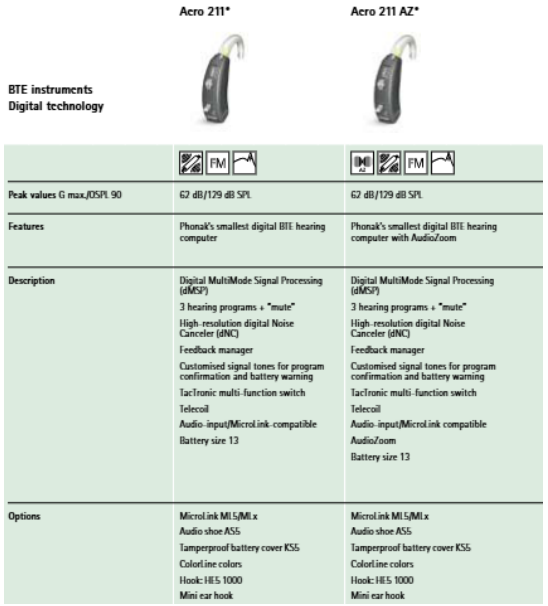
Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

Elite Line features:

- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16

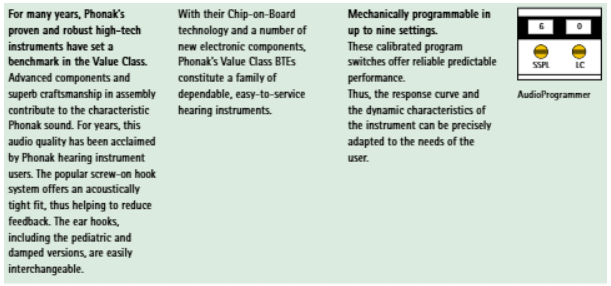


BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18

Digitally programmable BTE instruments	Piconet2 P2 	Piconet2 P2 AZ 
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22



For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

With their Chip-on-Board technology and a number of new electronic components, Phonak's Value Class BTEs constitute a family of dependable, easy-to-service hearing instruments.

Mechanically programmable in up to nine settings.
These calibrated program switches offer reliable predictable performance.
Thus, the response curve and the dynamic characteristics of the instrument can be precisely adapted to the needs of the user.

AudioProgrammer



Oticon – DigiFocus Description at Page 1

> Inside each DigiFocus, the digital chips have the same processing power as a fast laptop computer. This power is used to analyse the incoming sound signal, and speech is extracted through a unique system called ASA - Adaptive Speech Alignment. ASA always makes speech audible, amplifying it as much as necessary without making it uncomfortably loud or distorted. Sounds are reproduced very naturally - making speech far easier to understand than with any other hearing instrument on the market.

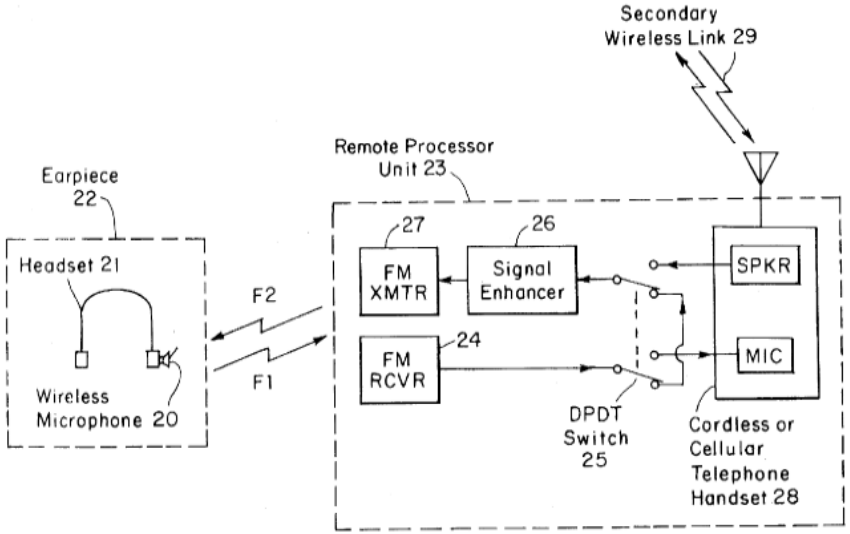
Oticon – DigiFocus White Paper (1996) at Page 1

> DigiFocus is a fully digital hearing instrument built around the digital audio processor, DAP. This processor is designed to have a specific functionality and to comply with a series of physical, acoustical and audiological demands. □

Oticon – DigiFocus White Paper (1996) at Page 1

> In many areas digital technology has already become an integral part of our lives. Now it is also available for the hard of hearing. With size and battery consumption diminished, the DigiFocus hearing instrument has computing power equalling today's standard PCs. In this article you will get a description of the basic concepts of digital sound processing. □

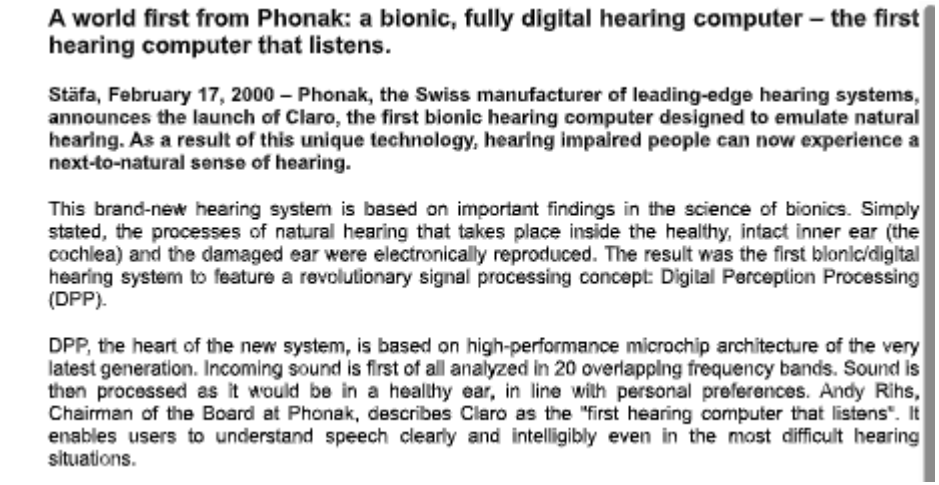
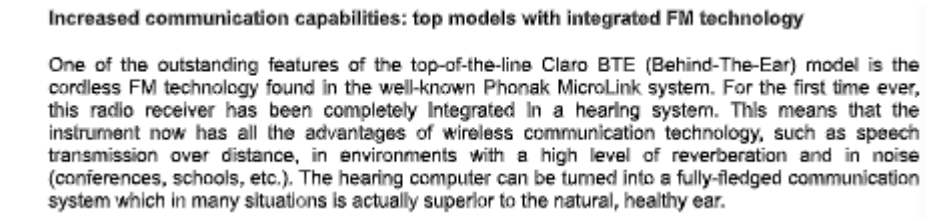
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Claims	Prior Art
	The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson '783 at FIG. 2  FIG. 2 Anderson '783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants.

Claims	Prior Art
	Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal

Claims	Prior Art
	enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 5:46–52 A miniature speaker of the type commonly used in hearing aids can be used in place of the speaker commercially supplied with the earpiece headset 21, and a miniature microphone of the type commonly used in hearing aids can be used in place of the microphone transducer commercially supplied with the earpiece wireless microphone 20. Anderson ’783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within

Claims	Prior Art
	the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. Anderson '783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. A POSITA would have been motivated to combine the DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 12. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
35. A hearing enhancement apparatus as recited in claim 33, wherein the hearing enhancement apparatus is a computing device that is wearable.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 33, wherein the hearing enhancement apparatus is a computing device that is wearable." The Digital Hearing Aids of the DHA Systems include processing capabilities, which are examples of the claimed "computing device that is wearable." The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak Claro – A World First from Phonak at Page 1  **A world first from Phonak: a bionic, fully digital hearing computer – the first hearing computer that listens.** **Stäfa, February 17, 2000 – Phonak, the Swiss manufacturer of leading-edge hearing systems, announces the launch of Claro, the first bionic hearing computer designed to emulate natural hearing. As a result of this unique technology, hearing impaired people can now experience a next-to-natural sense of hearing.** This brand-new hearing system is based on important findings in the science of bionics. Simply stated, the processes of natural hearing that takes place inside the healthy, intact inner ear (the cochlea) and the damaged ear were electronically reproduced. The result was the first bionic/digital hearing system to feature a revolutionary signal processing concept: Digital Perception Processing (DPP). DPP, the heart of the new system, is based on high-performance microchip architecture of the very latest generation. Incoming sound is first of all analyzed in 20 overlapping frequency bands. Sound is then processed as it would be in a healthy ear, in line with personal preferences. Andy Rihs, Chairman of the Board at Phonak, describes Claro as the "first hearing computer that listens". It enables users to understand speech clearly and intelligibly even in the most difficult hearing situations. Phonak Claro – A World First from Phonak at Page 1  **Increased communication capabilities: top models with integrated FM technology** One of the outstanding features of the top-of-the-line Claro BTE (Behind-The-Ear) model is the cordless FM technology found in the well-known Phonak MicroLink system. For the first time ever, this radio receiver has been completely integrated in a hearing system. This means that the instrument now has all the advantages of wireless communication technology, such as speech transmission over distance, in environments with a high level of reverberation and in noise (conferences, schools, etc.). The hearing computer can be turned into a fully-fledged communication system which in many situations is actually superior to the natural, healthy ear. Phonak Claro – Remote control WatchPilot and Claro dAZ at Page 1  **Claro from Phonak, the first bionic, fully digital hearing computer, sets new standards in hearing instrument technology. At the 45th International Congress of Hearing Aid Acousticians in Cologne (October 5 – 7) the Swiss company, whose name is synonymous with high-tech innovation, presents two more world-firsts: WatchPilot, a wristwatch with an integrated hearing system remote control, and Claro dAZ FM hearing computers, a fully digital hearing system with an integrated miniature radio receiver. At the same time, Phonak will be unveiling Claro 311 dAZ, the most powerful behind-the-ear instrument in the Claro line to date. "The new products represent major advances in hearing instrument technology," says Peter Pfluger, CEO of the Phonak Group. "We are giving hearing impaired individuals an improved quality of life and helping to turn the hearing instrument into a modern communication system."**

Claims	Prior Art
	Phonak Claro – World Premiere at Page 1 In market surveys hearing instrument users have repeatedly stressed the importance of hearing and understanding in noise as a top priority and the weakest point of the instruments currently available on the market. Hearing instrument users frequently complained of frustration over their instruments. Claro is Phonak's answer to the main worry of hearing instrument users. Hearing and understanding clearly again will be the order of the day once again for millions of individuals suffering from hearing loss. As Andreas Rihs puts it, Claro is "the first communication/hearing computer that actually listens for you!" Phonak Claro – World Premiere at Page 1 **Cutting-edge chip technology points the way forward** This phenomenal technical breakthrough is based on six years of intense research and development work during which it was possible for the first time ever to fully integrate psychoacoustic perception models of the ear. As a result, it has been possible to simulate the function of the so-called "20 critical bands" in the inner ear and to achieve an unprecedented natural hearing experience. This sophisticated, highly complex system goes by the name *Digital Perception Processing (DPP)* and is based on the most advanced chip generation currently available. The chip architecture is built around 0.25µm technology, which permits *Fast Fourier Transformation (FFT)* processes combined with very low power consumption. According to Andreas Rihs, it means there is still a great deal of potential for extending the chip's performance and this opens the door to some highly interesting developments on the same chip basis in the future. **The advent of a genuine communication/hearing computer** The impressive, state-of-the-art technology is combined with an exclusive, all-round communication concept based on the components *Digital Perception Processing (DPP), AutoSelect, Adaptive digital AudioZoom und Fine-scale Noise Canceler.* It provides a decisive boost to the power of the audiological solution and, with it, the benefits to the user. The Adaptive digital AudioZoom automatically locates and suppresses the main source of noise and at the same time clearly separates the voice of the person speaking within the listener's field of vision. The result of this is a positive signal-to-noise ratio on a scale that has never been achieved before. To round it off, the top model in the new Claro range is the first ever to feature the wireless FM technology found in the well-known MicroLink system and thus has all the advantages of wireless communication technology, such as speech transmission over distance in noisy surroundings (conferences, schools, etc.). As a result, the hearing computer has undergone a definitive transition to a communication/hearing computer, which in many situations is indisputably superior to the human ear.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

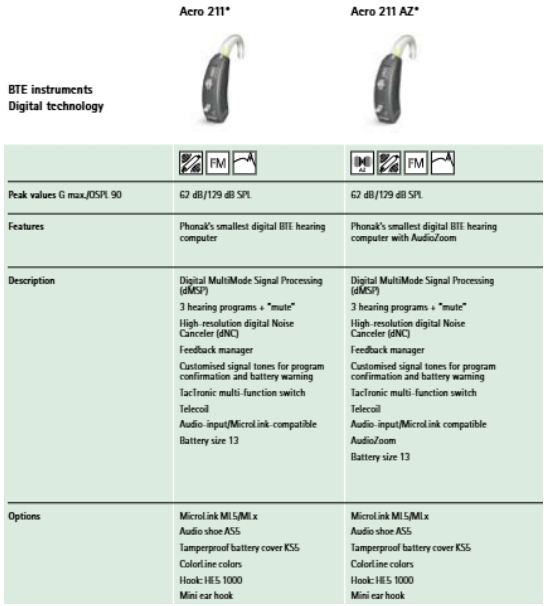
Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

Elite Line features:

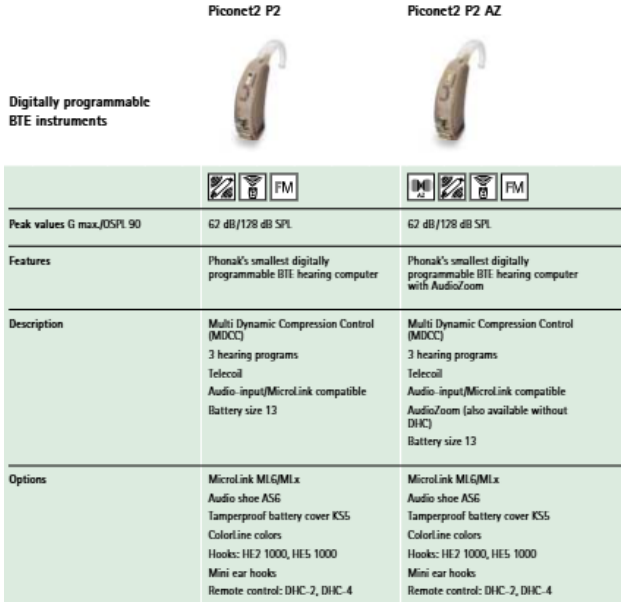
- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18



Digitally programmable BTE instruments	Piconet2 P2	Piconet2 P2 AZ
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
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For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

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Oticon – DigiFocus White Paper (1996) at Page 1

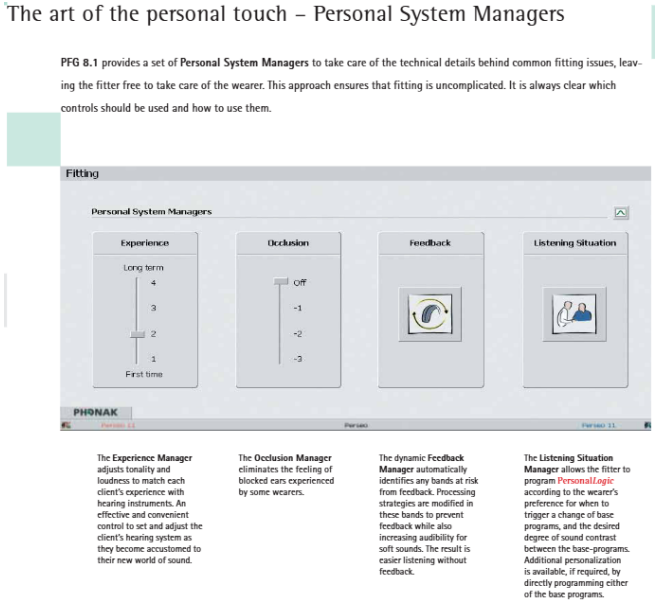
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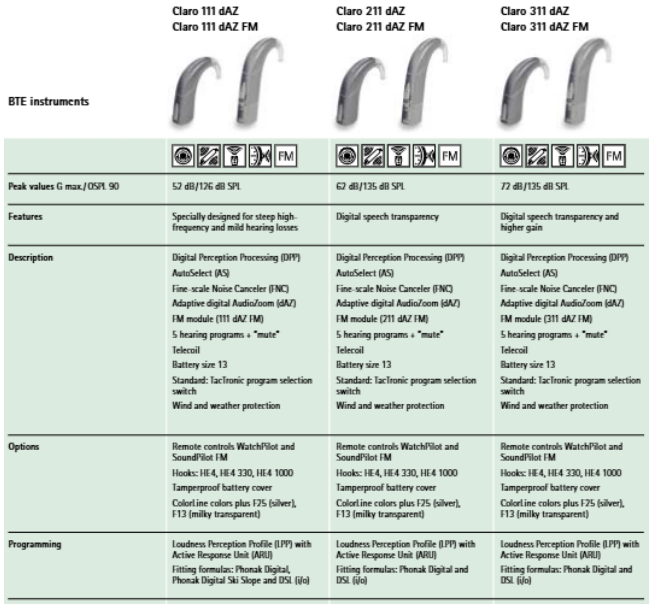
Claims	Prior Art
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Claims	Prior Art
	Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece.

Claims	Prior Art
	Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is

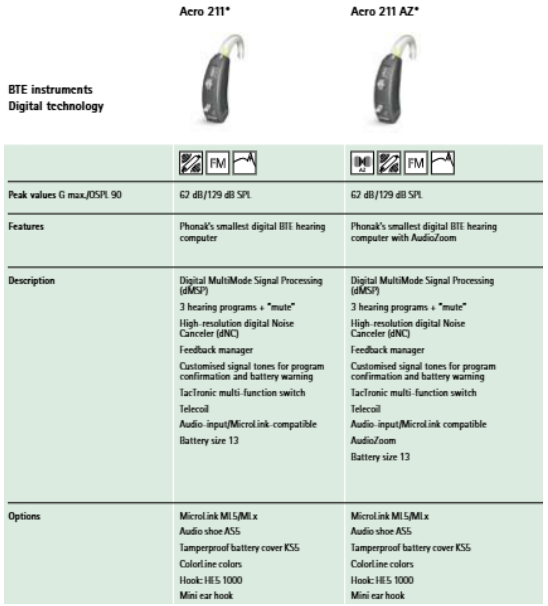
Claims	Prior Art
	then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
39. A hearing enhancement apparatus as recited in claim 29, wherein at least a portion of the at least one hearing characteristic is wirelessly received by and stored	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 29, wherein at least a portion of the at least one hearing characteristic is wirelessly received by and stored in the hearing enhancement apparatus.” *See* above at claim 24.

Claims	Prior Art
in the hearing enhancement apparatus.	A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 24. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
40. A hearing enhancement apparatus as recited in claim 39, wherein the hearing enhancement apparatus is a headset.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 39, wherein the hearing enhancement apparatus is a headset." Parameters of the DHA Systems are set based on the user's hearing capabilities on an external personal manager system, which are then stored on the Digital Hearing Aids (e.g., "the hearing enhancement apparatus"). The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 18  The art of the personal touch – Personal System Managers PFG 8.1 provides a set of Personal System Managers to take care of the technical details behind common fitting issues, leaving the fitter free to take care of the wearer. This approach ensures that fitting is uncomplicated. It is always clear which controls should be used and how to use them. Fitting Personal System Managers Experience Long term 4 3 2 1 First time Occlusion Off -1 -2 -3 Feedback Listening Situation PHONAK Perseo The Experience Manager adjusts tonality and loudness to match each client's experience with hearing instruments. An effective and convenient control to set and adjust the client's hearing system as they become accustomed to their new world of sound. The Occlusion Manager eliminates the feeling of blocked ears experienced by some wearers. The dynamic Feedback Manager automatically identifies any bands at risk from feedback. Processing strategies are modified in these bands to prevent feedback while also increasing audibility for soft sounds. The result is easier listening without feedback. The Listening Situation Manager allows the fitter to program PersonalLogic according to the wearer's preference for when to trigger a change of base programs, and the desired degree of sound contrast between the base-programs. Additional personalization is available, if required, by directly programming either of the base programs.

Claims	Prior Art
	Phonak – Claro 211 Product Information at Page 1 Digital, automatic, BTE hearing instrument with FM module integrated into the streamlined housing. Featuring Phonak's Digital Perception Processing (DPP), three hearing programs and automatic program selection for quiet and for environments with speech in broadband noise. Includes Adaptive digital AudioZoom for optimization of Speech in noise and the Fine-scale Noise Canceler. Manual control via the TacTronic switch or the optional mini remote control SoundPilot FM or the remote control WatchPilot. Phonak – Collections 2002 Product List at Page 9 

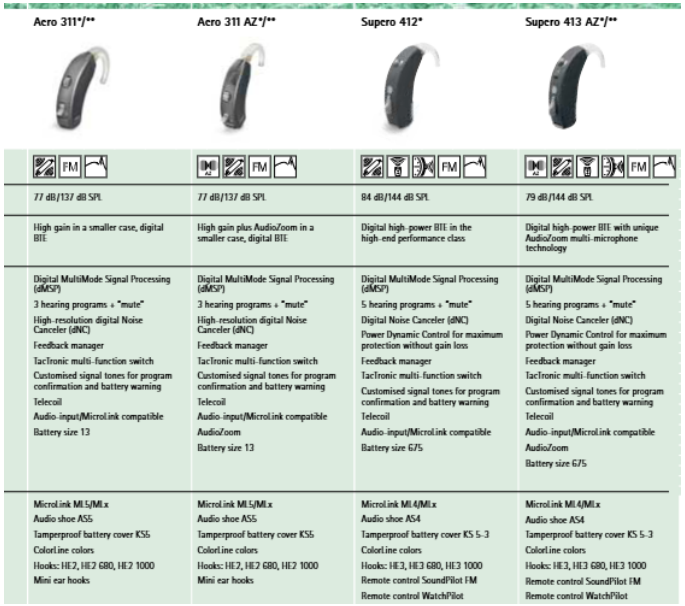
	Claro 111 dAZ Claro 111 dAZ FM	Claro 211 dAZ Claro 211 dAZ FM	Claro 311 dAZ Claro 311 dAZ FM
BTE instruments			
	FM	FM	FM
Peak values G max./OSPL 90	52 dB/126 dB SPL	62 dB/135 dB SPL	72 dB/135 dB SPL
Features	Specially designed for steep high-frequency and mild hearing losses	Digital speech transparency	Digital speech transparency and higher gain
Description	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (111 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (211 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection	Digital Perception Processing (DPP) AutoSelect (AS) Fine-scale Noise Canceler (FNC) Adaptive digital AudioZoom (dAZ) FM module (311 dAZ FM) 5 hearing programs + "mute" Telecoil Battery size 13 Standard: TacTronic program selection switch Wind and weather protection
Options	Remote controls WatchPilot and SoundPilot FM Hooks: HE 4, HE 4 330, HE 4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE 4, HE 4 330, HE 4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)	Remote controls WatchPilot and SoundPilot FM Hooks: HE 4, HE 4 330, HE 4 1000 Tamperproof battery cover ColorLine colors plus F25 (silver), F13 (milky transparent)
Programming	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital, Phonak Digital Ski Slope and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)	Loudness Perception Profile (LPP) with Active Response Unit (ARU) Fitting formulas: Phonak Digital and DSL (i/o)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



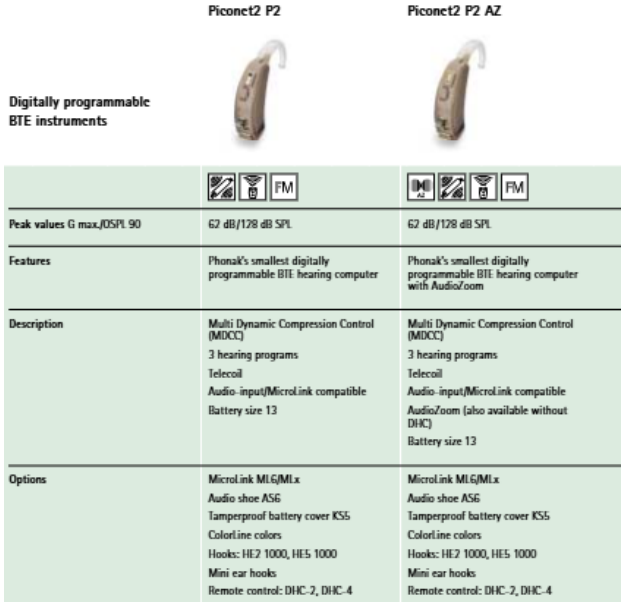
BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 17



Aero 311*/**	Aero 311 AZ*/**	Supero 412*	Supero 413 AZ*/**
77 dB/137 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL	79 dB/144 dB SPL
High gain in a smaller case, digital BTE	High gain plus Audio/zoom in a smaller case, digital BTE	Digital high-power BTE in the high-end performance class	Digital high-power BTE with unique Audio/zoom multi-microphone technology
Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 13	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Digital MultiMode Signal Processing (dMSP) 5 hearing programs + "mute" Digital Noise Canceler (dNC) Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Audio/zoom Battery size 675
MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Remote control SoundPilot FM Remote control WatchPilot

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18



Digitally programmable BTE instruments	Piconet2 P2	Piconet2 P2 AZ
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 19

SonoForte2 P3 AZ	PowerZoom P4 AZ	NovoForte E3	NovoForte E4
			
AZ FM	AZ FM	FM	FM
77 dB/137 dB SPL	79 dB/144 dB SPL	77 dB/137 dB SPL	84 dB/144 dB SPL
High gain plus AudioZoom in a smaller case	High gain and AudioZoom	2 switch-selectable programs	Phonak's most powerful digitally programmable BTE instrument
Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675	Signal processing strategy: WDRC, SC + a.R.T., PC 2 switch-selectable hearing programs Telecoil Audio-input/MicroLink compatible Programmable user controls Battery size 675
MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS6 ColorLine colors Hooks: HE2, HE2 680, HE2 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3	MicroLink ML7/MLx Audio shoe AS7 Tamperproof battery cover KS7 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks Remote control: DHC-3

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22

For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

With their Chip-on-Board technology and a number of new electronic components, Phonak's Value Class BTEs constitute a family of dependable, easy-to-service hearing instruments.

Mechanically programmable in up to nine settings.
These calibrated program switches offer reliable predictable performance.
Thus, the response curve and the dynamic characteristics of the instrument can be precisely adapted to the needs of the user.



AudioProgrammer



Phonak – Media Release re Product Offerings in F2003/2004 at Page 2

> The key breakthrough technology in Perseo is Personal*Logic*, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance has now a new level of intelligence beyond merely adapting to acoustic changes in the environment. Perseo is the first hearing system with customized automatic operation, as opposed to operation based on factory settings. It allows hearing professionals to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

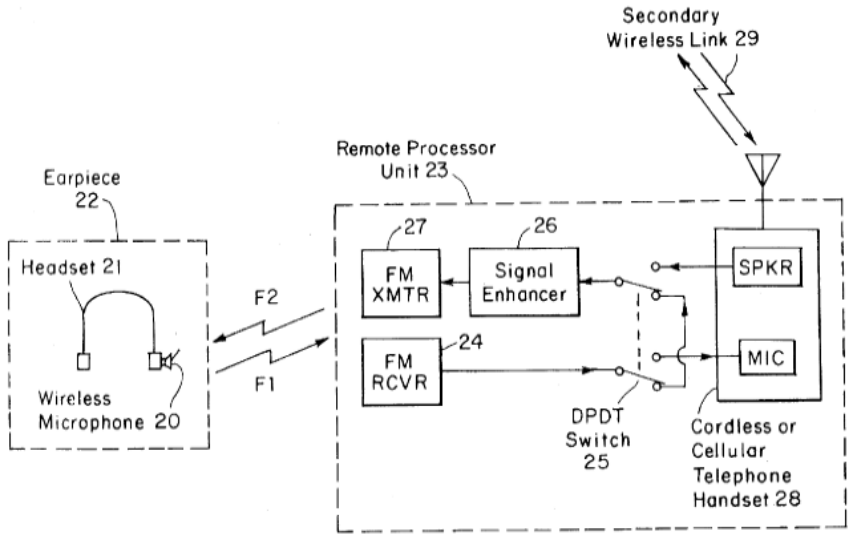
Phonak – Online Interview re Perseo (April 7, 2003) at Page 3

> **Dave Fabry/Phonak**: Basically, the occlusion manager is designed to reduce the sound of a person's own voice by lowering gain for the 80 dB input, primarily in the low frequencies, effectively increasing compression ratio. Low-frequency G50 is reduced as well, but to a lesser degree. From the clinician's point of view, however, these adjustments are all made via an adjustment to a slidebar with three steps (you can see it on slide 11 at www.phonakpro.com)

Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 5 In a nutshell, Perseo is designed for new and experienced users who are looking for a hearing instrument with advanced adaptive features, enhanced sound quality, easy personalization of fitting and choice of user operation (namely, automatic, manual program control with Tactronic switch, or via remote control). The choice of one product over another is dependent on the patient's hearing loss, listening needs, and prioritization of size, cost, and available performance features. Phonak provides an entire family of digital options from Perseo, Claro, Aero, and our new digital value line that will be introduced this summer. In addition, Supero is the only digital hearing instrument designed specifically for super-power applications. Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Liz Brassine/Phonak:** All Perseo instruments, including the CIC, have 3 memories. Patients may access these memories via the standard TacTronic memory switch on the CIC. For the 23 dAZ, or any of the BTEs, they may also use either of the optional remote controls—the SoundPilot or WatchPilot. Oticon – DigiFocus White Paper (1996) at Page 9 With DigiFocus you have an extremely flexible hearing instrument. By using the right tools you can define a personal, social and audiological profile for each individual patient. This enables you to utilize the capacity of DigiFocus to the fullest extent. The Human Link tools for DigiFocus include: Oticon – DigiFocus White Paper (1996) at Page 9 • The DigiFocus diary enables you to determine quickly when a hearing instrument needs adjustment • The fine-tuning recommendations help you to adjust the settings • OtiSet, a PC based software program, and the programming belt enable you to fit and fine tune DigiFocus while the client is wearing the instrument. This takes place without your patient being wired to the PC.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 1-0 OtiSet version 3.5 is a programming and fitting software module that complies with the hearing industry's standard NOAH platform. It runs on any PC in a Windows 3.11 environment. Together with Oticon's other Human Link tools, it provides everything you need to fit DigiFocus. OtiSet has been designed to make fitting easy while giving you relevant and context-sensitive audiological information. Underneath its simple and easy to use interface, OtiSet considers all the advanced knowledge on which DigiFocus is built. It relies on top audiologi-cal research, summarizing many years of work and field testing performed at Oticon's Eriksholm Research Centre in cooperation with hearing care professionals and audiological researchers worldwide. The new version of OtiSet fully supports DigiFocus, helping you to fit the exact needs of your patients. While using OtiSet, you are able to compare your patient's audiogram with the fitting range of all Oticon's hearing instruments. Based on the choice of instrument and available audiological data, OtiSet automatically recommends the initial control settings. During fitting, OtiSet gives you instant access to graphical representations that show how various speech and sound spectra perform as the controls are adjusted on screen. Oticon – DigiFocus White Paper (1996) at Page 10 *The OtiSet software is the single most important tool for fitting DigiFocus. Underneath its simple and easy to use interface, OtiSet sums up all of the advanced knowledge on which DigiFocus is built. By analyzing all of the available personal data, OtiSet automatically recommends the best suitable settings. In short, OtiSet enables you to draw on all the audiological knowledge available from Oticon.* Oticon – DigiFocus White Paper (1996) at Page 11 Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time.

Claims	Prior Art
	Anderson ’783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. To the extent DHA Systems do not explicitly disclose a headset, Anderson ‘783 discloses a speaker contained in a head worn device (e.g., earpiece headset 21). The following citations show examples of where Anderson ’783 discloses this limitation.

Claims	Prior Art
	Anderson ’783 at FIG. 2  FIG. 2 Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as

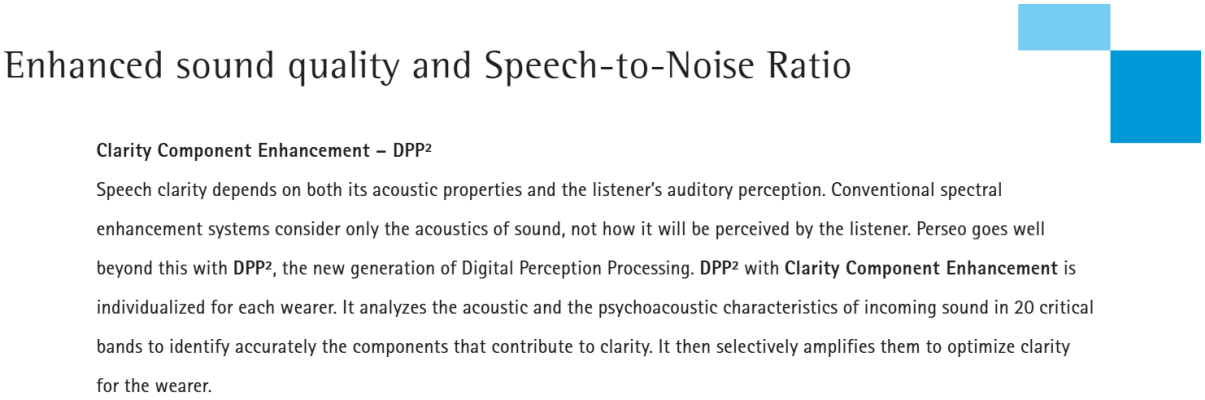
Claims	Prior Art
	in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 5:46–52 A miniature speaker of the type commonly used in hearing aids can be used in place of the speaker commercially supplied with the earpiece headset 21, and a miniature microphone of the type commonly used in hearing aids can be used in place of the microphone transducer commercially supplied with the earpiece wireless microphone 20. Anderson ’783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage

Claims	Prior Art
	870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link

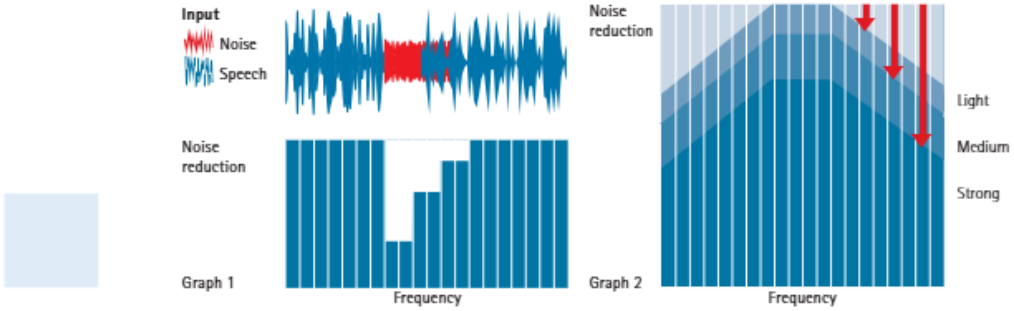
Claims	Prior Art
	circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. Anderson ’783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948

Claims	Prior Art
	through the secondary wireless link 944 or a wired peripheral link 950. A POSITA would have been motivated to combine the DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 12. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
41. A hearing enhancement apparatus as recited in claim 39, wherein the hearing enhancement apparatus is a computing device that is wearable.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 39, wherein the hearing enhancement apparatus is a computing device that is wearable." *See* above at claim 35. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
43. A hearing enhancement apparatus as recited in claim 29, wherein the hearing enhancement apparatus is configured to alter a power level of the audio output signals based on a noise level of the environment of the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 29, wherein the hearing enhancement apparatus is configured to alter a power level of the audio output signals based on a noise level of the environment of the apparatus." *See* above at claim 16. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

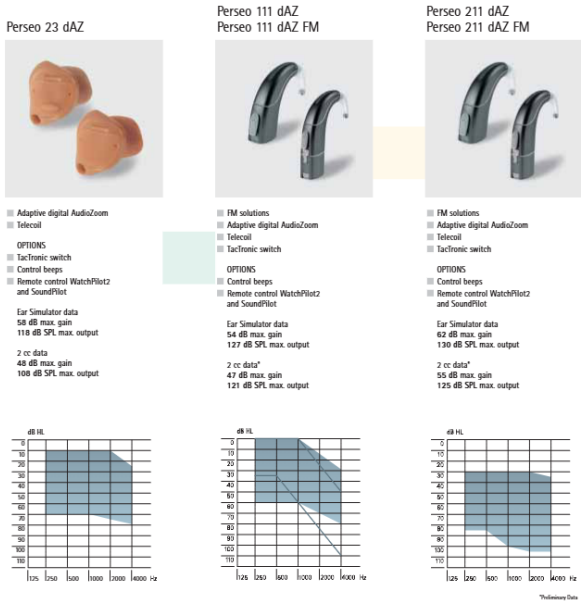
Claims	Prior Art
44[pre]. A hearing enhancement apparatus as recited in claim 43,	To the extent the preamble is limiting, DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 43." *See* above at claim 1[pre]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[44a] wherein the hearing enhancement apparatus is configured to increase the power of the audio output signals as the noise level increases, and	DHA Systems, Anderson '783 expressly or inherently disclose "wherein the hearing enhancement apparatus is configured to increase the power of the audio output signals as the noise level increases." The Digital Hearing Aids of the DHA Systems increase the audio power to compensate for environmental noise. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 11 ▪ With **dual-base automatic** the fitter has direct access to the two separate base-programs. Performance can be matched to each user's needs in quiet situations without disrupting performance in noisy situations and vice versa. The result is less fine-tuning effort than with single-base instruments. With **single-base automatic** time is wasted "juggling" a single set of fitting parameters while attempting to balance performance in multiple listening situations. ▪ To further simplify fitting, Personal*Logic* is pre-set according to typical needs and is easily re-programmed to individual preferences using the **Listening Situation Manager (LSM)**. Ensuring that an automatic hearing system responds correctly in noisy situations where there is no speech is an important consideration for safety and to eliminate feelings of isolation. The **LSM** provides this functionality with a single mouse click. Matching the system's sensitivity to noise with that of the client's, and controlling the auditory contrast between quiet and noisy settings is equally easy.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 13  To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson '783 discloses amplifying audio signals to compensate for environmental sounds (e.g., noise). The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 2:4–6 Note that the present invention also maintains all capabilities (e.g., acoustic feedback reduction and adaptive volume control) of prior art devices. Anderson '783 at 7:10–13 Note that auxiliary body-worn microphones (e.g., in the RPU 16) may be used to measure background noise for the purpose of automatically setting hearing aid parameters. Anderson '783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the

Claims	Prior Art
	earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[44b] wherein the hearing enhancement apparatus is configured not to further increase the power of the audio output signals if the noise level is beyond a certain predetermined threshold.	DHA Systems and Anderson '783 expressly or inherently disclose "wherein the hearing enhancement apparatus is configured not to further increase the power of the audio output signals if the noise level is beyond a certain predetermined threshold." The Digital Hearing Aids of the DHA Systems include a maximum threshold for raising the volume of the output signals (e.g., "increase the power of the audio output signals"). The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 14 Enhanced comfort in all situations **Fine-scale Noise Canceler in 20 channels** Finely scaled frequency resolution in 20 channels gives the **Fine-scale Noise Canceler (FNC)** the most precise background noise reduction capability. Noise reduction depends on the relative amounts of speech and noise in each channel (graph 1) and the importance of each channel for speech understanding. The **FNC** in Perseo ensures maximum comfort and ease of listening. Annoying background sounds are reduced for comfort while the important sounds of speech are preserved for stress-free listening. The maximum amount of noise reduction can be fitter-programmed to match the individual wearer's tastes and requirements. Thanks to the **dual-base automatic**, separate settings can be made for relatively quiet and noisy situations, ensuring optimal comfort in multiple situations (graph 2). 

Claims	Prior Art
	Phonak – Perseo Brochure at Page 27



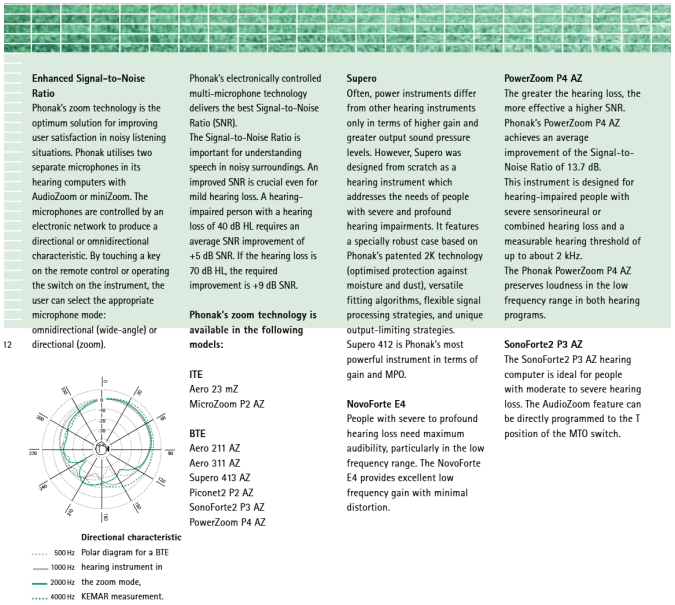
IngenioSpec EX2007
Apple v. IngenioSpec, IPR2026-00144
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Claims	Prior Art
	Phonak – Perseo Brochure at Page 28



IngenioSpec EX2007
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Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 12



Enhanced Signal-to-Noise Ratio
Phonak's zoom technology is the optimum solution for improving user satisfaction in noisy listening situations. Phonak utilises two separate microphones in its hearing computers with AudioZoom or miniZoom. The microphones are controlled by an electronic network to produce a directional or omnidirectional characteristic. By touching a key on the remote control or operating the switch on the instrument, the user can select the appropriate microphone mode: omnidirectional (wide-angle) or directional (zoom).

Phonak's electronically controlled multi-microphone technology delivers the best Signal-to-Noise Ratio (SNR).
The Signal-to-Noise Ratio is important for understanding speech in noisy surroundings. An improved SNR is crucial even for mild hearing loss. A hearing-impaired person with a hearing loss of 40 dB HL requires an average SNR improvement of +5 dB SNR. If the hearing loss is 70 dB HL, the required improvement is +9 dB SNR.

Phonak's zoom technology is available in the following models:

ITE
Aero 23 mZ
MicroZoom P2 AZ

BTE
Aero 211 AZ
Aero 311 AZ
Supero 413 AZ
Piconet2 P2 AZ
SonoForte2 P3 AZ
PowerZoom P4 AZ

Supero
Often, power instruments differ from other hearing instruments only in terms of higher gain and greater output sound pressure levels. However, Supero was designed from scratch as a hearing instrument which addresses the needs of people with severe and profound hearing impairments. It features a specially robust case based on Phonak's patented 2K technology (optimised protection against moisture and dust), versatile fitting algorithms, flexible signal processing strategies, and unique output-limiting strategies.
Supero 412 is Phonak's most powerful instrument in terms of gain and MPO.

NovoForte E4
People with severe to profound hearing loss need maximum audibility, particularly in the low frequency range. The NovoForte E4 provides excellent low frequency gain with minimal distortion.

PowerZoom P4 AZ
The greater the hearing loss, the more effective a higher SNR. Phonak's PowerZoom P4 AZ achieves an average improvement of the Signal-to-Noise Ratio of 13.7 dB.
This instrument is designed for hearing-impaired people with severe sensorineural or combined hearing loss and a measurable hearing threshold of up to about 2 kHz.
The Phonak PowerZoom P4 AZ preserves loudness in the low frequency range in both hearing programs.

SonoForte2 P3 AZ
The SonoForte2 P3 AZ hearing computer is ideal for people with moderate to severe hearing loss. The AudioZoom feature can be directly programmed to the T position of the MTO switch.

12

Directional characteristic
500 Hz
1000 Hz
2000 Hz
4000 Hz
Polar diagram for a BTE hearing instrument in the zoom mode, KEMAR measurement.

Phonak – Online Interview re Perseo (April 7, 2003) at Page 7

> PersonalLogic may be personalized, via the Listening Situation Manager, to meet individual patient preferences for listening in noise. The clinician may select whether PersonalLogic adapts to noise on the basis of audibility or comfort. Audibility changes to Noisy situation processing only when speech in noise is detected, but not with speech alone or noise alone. Comfort adapts WHENEVER noise is present that exceeds a certain dB level. Are you with me?

Oticon – DigiFocus Description at Page 1

> Inside each DigiFocus, the digital chips have the same processing power as a fast laptop computer. This power is used to analyse the incoming sound signal, and speech is extracted through a unique system called ASA - Adaptive Speech Alignment. ASA always makes speech audible, amplifying it as much as necessary without making it uncomfortably loud or distorted. Sounds are reproduced very naturally - making speech far easier to understand than with any other hearing instrument on the market.

Claims	Prior Art
	To the extent DHA Systems do not explicitly disclose the claim limitation, Anderson ‘783 discloses preventing audio outputs from exceeding limits imposed by government agencies depending for safety purposes through set parameters. The following citations show examples of where Anderson ’783 discloses this limitation. Anderson ’783 at 6:26–35 RF output power of the earpiece wireless microphone 20 and RPU FM transmitter 27 may be limited by FCC regulations to a level of -47 dBm, or -47 decibels relative to a power level of one milliwatt (see 47 CFR Ch. 1, Para. 15.239, for field strength limits, and the relationship between field strength and transmitter power is discussed later with regard to the full-featured embodiment) in the 88 MHz to 108 MHz band, which is low compared to the RF power output from commercial broadcast radio stations that operate in the same band. Anderson ’783 at 7:10–13 Note that auxiliary body-worn microphones (e.g., in the RPU 16) may be used to measure background noise for the purpose of automatically setting hearing aid parameters. Anderson ’783 at 9:3–30 Operating power limitations: Operation in many frequency bands is possible as long as the applicable requirements are met. A frequency band slightly below 6 GHz, the 5725 to 5875 MHz ISM (industrial, scientific and medical) band, is used here to illustrate the operation of a full-featured preferred embodiment. Non-licensed operation in this band is governed in the United States by 47 CFR Ch. 1, Para. 15.249, and other restrictions may apply depending upon the country in which the invention is used. For the present discussion, only the constraints imposed on operation by the United States Federal Communications Commission are considered. In the 5725 MHz to 5875 MHz ISM band, the average field strength at three meters must be less than 50 mV/meter. For an isotropic radiator, the power in watts is expressed as 3.33% of the square of the product of the field strength in V/meter and the range in meters. See the section on antennas, especially with regard to field strength and radiated power from antennas in free space, in "Reference Data for Radio Engineers," as well as Annex K of the "Manual of Regulations and Procedures for Federal Radio Frequency Management" for derivations. For the stated range of three meters and field strength of 50 mV/meter, the average power limit is 0.75 mW (-1.25 dBm). A peak field strength value 20 dB (a factor of 10) higher is allowed (500 mV/meter), which leads to a peak power limit of 75 mW (+18.75 dBm). Other restrictions also apply, but these restrictions are easily met by standard

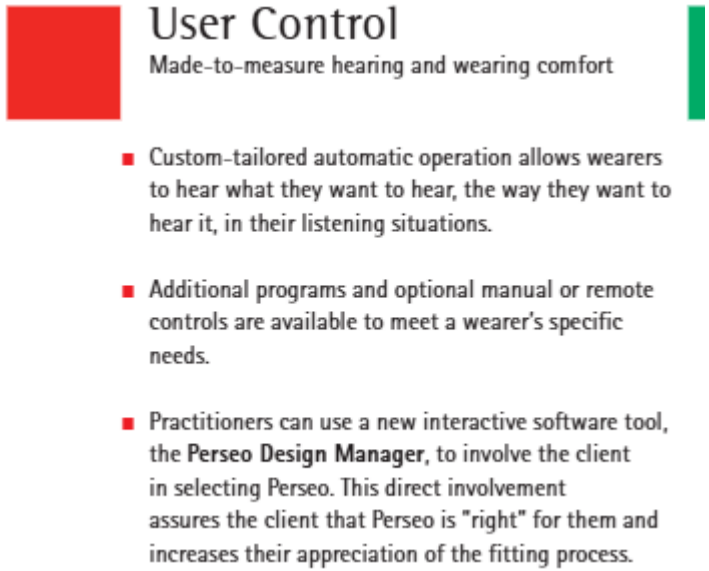
Claims	Prior Art
	design practices (see 47 CFR Part 15, Subpart C-Intentional Radiators). Anderson ’783 at 21:50–62 In the simplest case, the ASIC 845 reads data from the A/D 880, performs a multiplication of the data by a constant (read from the default parameter storage 870) to provide amplification, compares the result with maximum allowable values (read from the default parameter storage 870) and writes the result to the D/A 850. The ASIC 845 may perform other processing (e.g., adaptive volume control) as well. Although none of the remote processor and communication features are available in stand-alone mode, which uses pre-selected hearing aid parameter settings from the default parameter storage 870 in the earpiece, the earpiece provides a useful amplified audio path from the microphone to the speaker. Anderson ’783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the

Claims	Prior Art
	default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. Further, a POSITA would have been motivated to implement a threshold to the power gain based on the safety to a user. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
45. A hearing enhancement apparatus as recited in claim 29, wherein the apparatus includes a volume control that is configured to respond to a voice command of the user.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 29, wherein the apparatus includes a volume control that is configured to respond to a voice command of the user." Anderson '783 discloses using voice recognition and commands to operate the controls of the earpiece. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation.

Claims	Prior Art
	Anderson ’783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson ’783 at 6:8–25 The user's voice (and other signals in the ambient audio environment) is picked up by the earpiece wireless microphone 20, transmitted to the RPU 23 FM receiver 24, sent through the DPDT switch 25 to the microphone input of the handset 28 (the handset's microphone transducer may be removed) and transmitted on the secondary wireless link 29 to, e.g., the general subscriber telephone network. Signals from the secondary wireless link 29 are received by the handset 28, sent from the speaker output of the handset 28 (the handset's speaker may be removed) via the DPDT switch 25 to the signal enhancer 26, FM transmitter 27 and finally to the earpiece headset 21 receiver where the signals are converted to acoustic waves heard by the user. Note that the RPU 23 may also include straight-forward connections to a "personal digital assistant" computer, or voice-operated devices connected to the FM receiver 24 output and not shown in FIG. 2. Anderson ’783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other

Claims	Prior Art
	information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson ’783 at 25:15–27 To obtain solicited information, user requests are processed in a variety of means well known in the art, including inputs via one or more pushbuttons on the RPU and voice recognition computer programs implemented in the RPU electronics. Voice recognition can be used almost exclusively, if desired, thereby eliminating nearly all RPU pushbutton controls. Voice commands recognized by the RPU can cause the RPU to initiate actions such as changing hearing aid parameter settings (e.g., volume), or activate appliances and environmental controls (e.g., aids for the physically handicapped) in a distributed wireless network via the secondary wireless link. A POSITA would have been motivated to combine the DHA Systems with the teachings of Anderson’ 783. The Digital Hearing Aids of the DHA Systems include means modifying the output audio signals, including modification based on environmental noise. Phonak – Perseo Brochure at Page 11. Anderson ‘783 discloses a hearing aid configured to function with voice recognition. Anderson ‘783, Abstract. A POSITA would have understood that voice controls, as disclosed by Anderson ‘783, would further the DHA Systems’ goal of providing a more adjustable hearing aid system. Phonak – Online Interview re Perseo (April 7, 2003) at Page 2. A POSITA would have thus sought to use impose amplification limitations as described by Anderson ‘783 with the hearing aid system of Enzmann ‘555.

Claims	Prior Art
	A POSITA would have had a reasonable expectation of success in combining the DHA Systems and Anderson '783. Anderson '783's techniques are broadly applicable to hearing aid devices and were "well-known techniques" used in hearing aids—analogous to the DHA Systems' hearing aid system. Anderson '783, 1:5–18. Anderson '783 and the DHA Systems also share other analogous components, such as microphones, speakers, digital to analog converters, analog to digital converters, and wireless transmitters and receivers. Anderson '783 at 2:25-28, 16:28-37; Phonak – Online Interview re Perseo (April 7, 2003) at Page 9. Further, the DHA Systems are "optimized for speech understanding." Phonak – The Hearing Review Article re Perseo (Sep. 5, 2003) at Page 2. The DHA Systems and Anderson '789 are thus easily combined based on familiar components to allow for power amplification. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
46. A hearing enhancement apparatus as recited in claim 13, wherein the hearing enhancement apparatus is a headset.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein the hearing enhancement apparatus is a headset." *See* above at claim 12. A POSITA would have been motivated to combine the DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 12. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
47. A hearing enhancement apparatus as recited in claim 46, wherein the speaker is an ear speaker.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 46, wherein the speaker is an ear speaker." *See* above at claim 11. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre].

Claims	Prior Art
	A POSITA would have been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
48. A hearing enhancement apparatus as recited in claim 47, wherein the audio output signals are changed in view of a preference of the user stored in the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 47, wherein the audio output signals are changed in view of a preference of the user stored in the apparatus." The Digital Hearing Aids of the DHA Systems adjust audio parameters based on the user's hearing capabilities on an external personal manager system, including a user's preferences, which are then stored on the Digital Hearing Aids (e.g., "the hearing enhancement apparatus"). The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 7  User Control Made-to-measure hearing and wearing comfort ■ Custom-tailored automatic operation allows wearers to hear what they want to hear, the way they want to hear it, in their listening situations. ■ Additional programs and optional manual or remote controls are available to meet a wearer's specific needs. ■ Practitioners can use a new interactive software tool, the **Perseo Design Manager**, to involve the client in selecting Perseo. This direct involvement assures the client that Perseo is "right" for them and increases their appreciation of the fitting process.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 32 The Active Response Unit (ARU) allows the customer to classify loudness perception with the touch of a button. The PFG software then uses this loudness profile to customise all program algorithms in Claro hearing computers.  Phonak – Fitting Guide for MLxi and MLxi Baha at Page 5 Personal preference The MLxi/MLxi Baha comes with a personal preference of 0 dB, which corresponds to a 10 dB FM Advantage when connected to a hearing instrument. The 10 dB FM Advantage is automatically checked/adjusted every time MLxi starts. Usually, the 10 dB FM Advantage is well accepted by clients. However it is possible to reduce or increase the personal preference of the FM Advatage on MLxi/MLxi Baha. The range for this change is 8 dB louder or softer respectively and can be adjusted in 2 dB steps. Phonak – Fitting Guide for MLxi and MLxi Baha at Page 5 4.3 Fitting MLxi/MLxi Baha using inspiro With Dynamic FM inspiro it is possible to change some MLxi/MLxi Baha settings. Please select "Receiver options" in the inspiro menu. • Push button activation/deactivation – use the function "lock push button" • Change of personal preference – use the function "Set FM volume" • Activation/Deactivation of the beep tone – use the function "Set beep tone"

Claims	Prior Art
	Phonak – Media Release re Product Offerings in F2003/2004 at Page 2 The key breakthrough technology in Perseo is Personal*Logic*, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance has now a new level of intelligence beyond merely adapting to acoustic changes in the environment. Perseo is the first hearing system with customized automatic operation, as opposed to operation based on factory settings. It allows hearing professionals to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes. Phonak – Online Interview re Perseo (April 7, 2003) at Page 8 **Liz Brassine/Phonak:** All Perseo instruments, including the CIC, have 3 memories. Patients may access these memories via the standard TacTronic memory switch on the CIC. For the 23 dAZ, or any of the BTEs, they may also use either of the optional remote controls—the SoundPilot or WatchPilot. Phonak Perseo with PersonalLogic Article at Page 1  click for Flash animation The key breakthrough technology in Perseo is Personal*Logic*, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance now has a new level of intelligence beyond merely adapting according to acoustic changes in the environment. For the first time "how", "when" and "where" automatic instruments provide processing for noisy situations can be tuned to the wearer's preferences, and updated if preferences change with experience. Oticon – DigiFocus White Paper (1996) at Page 9 With DigiFocus you have an extremely flexible hearing instrument. By using the right tools you can define a personal, social and audiological profile for each individual patient. This enables you to utilize the capacity of DigiFocus to the fullest extent. The Human Link tools for DigiFocus include: Oticon – DigiFocus White Paper (1996) at Page 9 • The DigiFocus diary enables you to determine quickly when a hearing instrument needs adjustment • The fine-tuning recommendations help you to adjust the settings • OtiSet, a PC based software program, and the programming belt enable you to fit and fine tune DigiFocus while the client is wearing the instrument. This takes place without your patient being wired to the PC.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 1-0 OtiSet version 3.5 is a programming and fitting software module that complies with the hearing industry's standard NOAH platform. It runs on any PC in a Windows 3.11 environment. Together with Oticon's other Human Link tools, it provides everything you need to fit DigiFocus. OtiSet has been designed to make fitting easy while giving you relevant and context-sensitive audiological information. Underneath its simple and easy to use interface, OtiSet considers all the advanced knowledge on which DigiFocus is built. It relies on top audiologi-cal research, summarizing many years of work and field testing performed at Oticon's Eriksholm Research Centre in cooperation with hearing care professionals and audiological researchers worldwide. The new version of OtiSet fully supports DigiFocus, helping you to fit the exact needs of your patients. While using OtiSet, you are able to compare your patient's audiogram with the fitting range of all Oticon's hearing instruments. Based on the choice of instrument and available audiological data, OtiSet automatically recommends the initial control settings. During fitting, OtiSet gives you instant access to graphical representations that show how various speech and sound spectra perform as the controls are adjusted on screen. Oticon – DigiFocus White Paper (1996) at Page 10 *The OtiSet software is the single most important tool for fitting DigiFocus. Underneath its simple and easy to use interface, OtiSet sums up all of the advanced knowledge on which DigiFocus is built. By analyzing all of the available personal data, OtiSet automatically recommends the best suitable settings. In short, OtiSet enables you to draw on all the audiological knowledge available from Oticon.* Oticon – DigiFocus White Paper (1996) at Page 11 Many people find it uncomfortable to be wired to a computer. This "constricted" feeling can be avoided by using the OtiSet programming belt, which is worn on the shoulder. The programming belt provides cordless infrared communication between the PC and the hearing instrument while in the ear. Alternatively, you may use the HI-PRO interface for a wired solution. OtiSet offers a choice of three different views of the fitting. The Audiological View provides a visual guide to instrument performance in four typical sound environments. The Technical View illustrates traditional technical information such as coupler data and insertion gain at different input levels. With the Binaural View you are able to examine settings for both right and left instruments at the same time.

Claims	Prior Art
	To the extent DHA Systems do not explicitly disclose this claim limitation, Anderson '783 discloses changing the audio output signals based on stored user preferences (e.g., the user's hearing test results). The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson '783 at 2:40–59 Another object of this invention is to provide supplemental audio information (e.g. a verbal warning from the RPU that an earpiece battery is low) and communication services (e.g., cellular telephone and paging services) to the user via the hearing aid system. Such services are accessed in a manner that can be made imperceptible to a casual observer if desired. The RPU (which contains a digital signal processor or other computer) acts as one source of information, e.g., by using a synthesized voice message to provide the time of day, and the RPU can also be used to access a secondary wireless link to the general subscriber telephone network or voice paging services. User control of hearing aid parameters and requests for information are accomplished using pushbuttons located on the RPU (including pushbuttons suitable for data entry in a covert manner) or voice recognition. Many sensors and peripheral devices can reside in or be attached to the RPU by wired or wireless means, and can provide a variety of information for different applications (e.g., heart pulse rate) as audio in the user's earpiece. Anderson '783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for

Claims	Prior Art
	testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson '783 at 22:61–23:35 Details of normal system operation: During normal operation of the hearing aid with wireless remote processor, sounds from the ambient environment are picked up by a microphone 12 in the earpiece 10 and transmitted with other information (e.g., data representing the earpiece battery 860 voltage as obtained by an A/D 865 converter and transmitted under control of the earpiece ASIC 845 in the auxiliary bit of many successive replies via the reply data register 825) over a primary two-way wireless link 17 to the RPU 16, where the audio signals are enhanced according to the user's needs by the RPU DSP 948. Signal enhancement is achieved via any of a number of techniques well known in the art that use the capabilities of the general-purpose RPU DSP 948. The enhanced audio signals may be combined with other information (e.g., a synthesized voice, generated within the DSP 948, warning that the aforementioned earpiece battery voltage is low) and transmitted from the RPU 16 over the primary wireless link 17 to the earpiece 10, where they are converted by a speaker 15 to sounds that can only be heard by the user 11. Art auxiliary speaker can be supplied in the RPU 16 as a peripheral 950 device that allows people other than the user to hear the same sounds as those produced by the earpiece speaker 15, if desired (as, e.g., when a person other than the user wishes to use the system's optional cellular telephone capabilities). A different, optional secondary two-way wireless link (shown as part of the RPU in FIG. 9 as secondary wireless link circuitry 944, or connected to the RPU by a wired or other, e.g. infrared, wireless link 18 and shown as optional secondary wireless link circuitry 19 in FIG. 1) can be used for communication between the RPU and a cellular telephone system or other sources of information. An RPU keyboard suitable for covert data entry 72, or voice recognition capabilities in the RPU (implemented, e.g., using any of a number of techniques well known in the art that use the general-purpose RPU DSP 948), can be used to control hearing aid parameters (such as amplification level set by the RPU DSP 948) and telephone dialing functions (e.g., automatic dialing of a predefined telephone number using information stored in the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. Anderson '783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and

Claims	Prior Art
	RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 24. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
49. A hearing enhancement apparatus as recited in claim 48, wherein the audio output signals are changed based on audio sound in the environment of the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 48, wherein the audio output signals are changed based on audio sound in the environment of the apparatus." *See* above at claim 16. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
50. A hearing enhancement apparatus as recited in claim 49 further comprising a microphone	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 49 further comprising a microphone at least for receiving the audio sound in the environment of the apparatus."

Claims	Prior Art
at least for receiving the audio sound in the environment of the apparatus.	*See* above at claim 16. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
51. A hearing enhancement apparatus as recited in claim 50, wherein the microphone is a directional microphone.	DHA Systems expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 50, wherein the microphone is a directional microphone." The Digital Hearing Aids of the DHA Systems (e.g., the "hearing enhancement apparatus) include directional microphones. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 23 

Claims	Prior Art
	Phonak – Annual Report (2003–2004) at p. 12 Within the FM business segment, the Group continued to leverage existing key technology into new applications. With SmartLink, Phonak has achieved another industry first by allowing hearing instrument users to access other communications systems. SmartLink combines a remote control, a transmitter, a directional microphone system and a Bluetooth link to mobile phone all in one single device. Phonak also presented EduLink, an innovative FM device to assist the learning development of children with Auditory Processing Disorder (APD). EduLink was perceived very positively within the medical community and recent classroom tests show favourable results. Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5 **2- HandyMic TX3**  The microphone with a built-in transmitter, used primarily for adults. The multi-microphone technology of the HandyMic combines omni directional, directional, and super directional microphones with an FM transmitter. The compact HandyMic transmits the speaker's voice directly to the hearing instrument user's FM receiver. The HandyMic can be set up directly in front of the sound source, slipped into the speaker's shirt pocket, or aimed at the speaker manually. With an audio cable, the HandyMic can also be connected to a sound system. As with all other Phonak FM products, the HandyMic has a range of 7 to 15 meters (23 to 50 feet). For business meetings, round table discussions, family gatherings, in a car, on a noisy street, at home

Claims	Prior Art
	Phonak Campus S – Henry Article re Selection, Application and Integration of FM Systems at Page 5  The Phonak Campus **S** is a new addition to the Phonak product line - this multi-channel FM transmitter is developed for use in schools, universities and speech therapy. It is fully compatible with current Phonak FM products, and ready for operation with future generations of Phonak FM receivers. Campus **S** special features include a channel selector with digital display, an ergonomic user interface, a microphone with switchable directional / omni directional characteristics, handy storage for the microphone cable, connection to televisions, video recorders and radios, and an easily exchanged rechargeable battery. Phonak Campus-S-User-Manual at Page 7  ❶ To switch ON/OFF: Press the ⏻ button for 2 seconds. When the Campus S is switched ON, the LCD display shows the channel in use and the battery status. When the Campus S is switched off, the LCD display goes blank. ❷ For MiniMic MM8: Remove the windscreen from the microphone and ensure that the microphone switch is in either the ▼ (directional) or ▮ (omnidirectional) position.

Claims	Prior Art
	Phonak Campus-S-User-Manual at Page 13





E Switch on your Campus S and the microphone, then the audio equipment.

MiniMic MM8: This microphone allows you to talk directly to listeners while showing a video, for example. If you prefer not to speak, switch off (X) the microphone.

Should your audio equipment not have a 3.5 mm connector please ask your hearing care professional for adapters for 6.3 mm jacks, RCA/Cinch or SCART connectors.

Phonak – Collections 2002 Product List at Page 7



Adaptive digital AudioZoom (dAZ)

Active and adaptive separation of speech from noise
The Speech-to-Noise Ratio (SNR) can only be optimised if the noise is spatially separated from the speech signal with directional microphone technology. As a pioneer in multi-microphone technologies, Phonak introduced AudioZoom, a feature which significantly improves listening and understanding in noisy situations, enhancing user satisfaction. Now, Phonak goes a step further in the refinement of multi-microphone technology with Adaptive digital AudioZoom: it seeks, finds, and suppresses noise automatically.

Fully automatic, fully adaptive
With its unique spatial processing system, Phonak's Adaptive digital AudioZoom can detect noise not only from directly behind, but anywhere in the rear plane. Whether the hearing-impaired person is moving or the location of the noise source changes, the directional characteristic is constantly adapted to the listening situation. In this manner, the Adaptive digital AudioZoom automatically establishes the best possible SNR.

Fine-scale Noise Canceler (FNC)

Twenty-band noise control
Claro constantly monitors the Speech-to-Noise Ratio (SNR) in all 20 bands. If a poor SNR is measured in certain bands, the Fine-scale Noise Canceler will reduce gain only in those bands. The result of this precision noise control is a selective and intelligent improvement of the SNR with only a marginal influence on the speech signal.

Precise and selective
All frequency bands are separately analysed and controlled. Gain is reduced selectively only in those bands where noise is present. This high-resolution analysis and gain control makes it possible to suppress noise with extremely high accuracy. Neighboring frequency bands without noise remain unaffected.

Intelligent
The magnitude of gain reduction is not constant. In frequency bands with higher SNRs and in bands which are important for speech intelligibility, gain is reduced only slightly. This intelligent control algorithm reduces the masking and distractive effects of background noise. Important speech information is preserved.

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Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 12

Enhanced Signal-to-Noise Ratio
Phonak's zoom technology is the optimum solution for improving user satisfaction in noisy listening situations. Phonak utilises two separate microphones in its hearing computers with AudioZoom or miniZoom. The microphones are controlled by an electronic network to produce a directional or omnidirectional characteristic. By touching a key on the remote control or operating the switch on the instrument, the user can select the appropriate microphone mode: omnidirectional (wide-angle) or directional (zoom).

Phonak's electronically controlled multi-microphone technology delivers the best Signal-to-Noise Ratio (SNR).
The Signal-to-Noise Ratio is important for understanding speech in noisy surroundings. An improved SNR is crucial even for mild hearing loss. A hearing-impaired person with a hearing loss of 40 dB HL requires an average SNR improvement of +5 dB SNR. If the hearing loss is 70 dB HL, the required improvement is +9 dB SNR.

Phonak's zoom technology is available in the following models:

ITE
Aero 23 mZ
MicroZoom P2 AZ

BTE
Aero 211 AZ
Aero 311 AZ
Supero 413 AZ
Piconet2 P2 AZ
SonoForte2 P3 AZ
PowerZoom P4 AZ

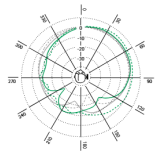
Supero
Often, power instruments differ from other hearing instruments only in terms of higher gain and greater output sound pressure levels. However, Supero was designed from scratch as a hearing instrument which addresses the needs of people with severe and profound hearing impairments. It features a specially robust case based on Phonak's patented 2K technology (optimised protection against moisture and dust), versatile fitting algorithms, flexible signal processing strategies, and unique output-limiting strategies.
Supero 412 is Phonak's most powerful instrument in terms of gain and MPO.

NovoForte E4
People with severe to profound hearing loss need maximum audibility, particularly in the low frequency range. The NovoForte E4 provides excellent low frequency gain with minimal distortion.

PowerZoom P4 AZ
The greater the hearing loss, the more effective a higher SNR. Phonak's PowerZoom P4 AZ achieves an average improvement of the Signal-to-Noise Ratio of 13.7 dB.
This instrument is designed for hearing-impaired people with severe sensorineural or combined hearing loss and a measurable hearing threshold of up to about 2 kHz.
The Phonak PowerZoom P4 AZ preserves loudness in the low frequency range in both hearing programs.

SonoForte2 P3 AZ
The SonoForte2 P3 AZ hearing computer is ideal for people with moderate to severe hearing loss. The AudioZoom feature can be directly programmed to the T position of the MTO switch.

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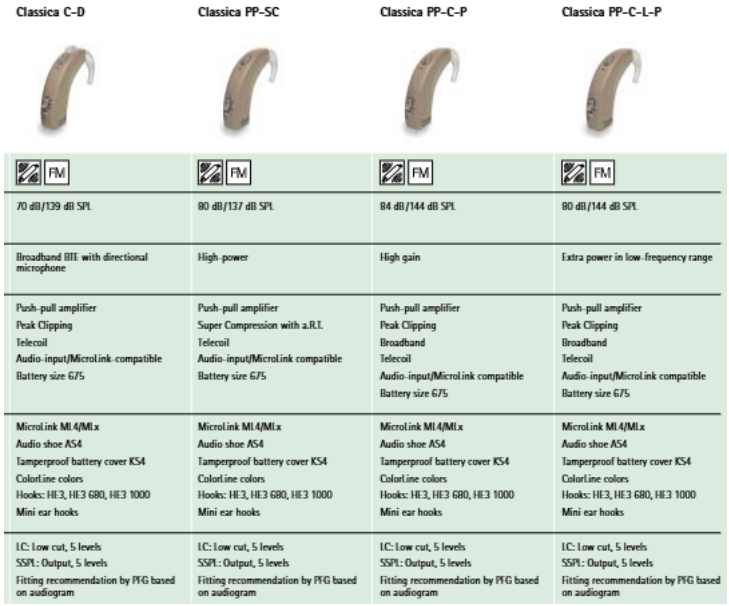
Directional characteristic
500 Hz
1000 Hz
2000 Hz
4000 Hz
Polar diagram for a BTE hearing instrument in the zoom mode, KEMAR measurement.

IngenioSpec EX2007
Apple v. IngenioSpec, IPR2026-00144
Page 399

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 24

BTE instruments	Supero 411*	PicoForte3 SC-D	PicoForte3 PP-SC
			
	FM	FM	FM
Peak values G max./OSPL 90	79 dB/142 dB SPL	64 dB/127 dB SPL	78 dB/133 dB SPL
Features	Digital high-power BTE	Directional microphone, switchable	High power
Description	dLimiting signal processing strategy 1 hearing program + "mute" Power Dynamic Control for maximum protection without gain loss Feedback manager TacTronic multi-function switch Customised signal tones for program confirmation and battery warning Telecoil Audio-input/MicroLink compatible Battery size 675	Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 13	Super Compression + a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 13
Options	MicroLink ML4/MLx Audio shoe AS4 Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE3, HE3 680, H3 1000	MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks	MicroLink ML5/MLx Audio shoe AS5A Tamperproof battery cover KS 5-3 ColorLine colors Hooks: HE2, HE2 680, H2 1000 Mini ear hooks
Programming	Programmable with PC (IBM-compatible) and HI-PRO programming interface PFG Software, version 8.0 or above	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 6 levels SSPL: Output, 6 levels Fitting recommendation by PFG based on audiogram

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 27

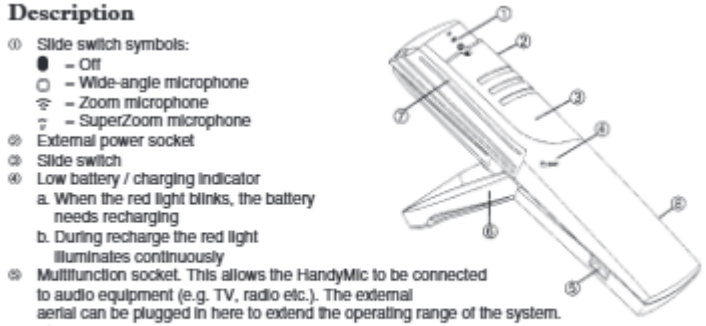


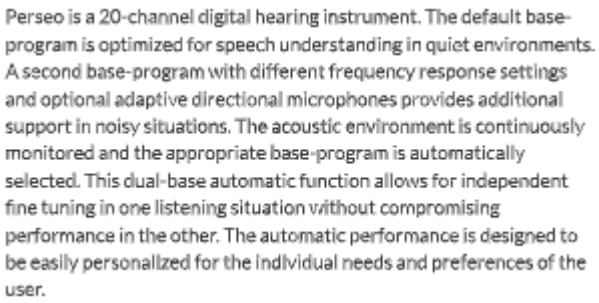
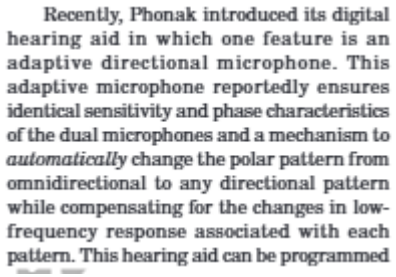
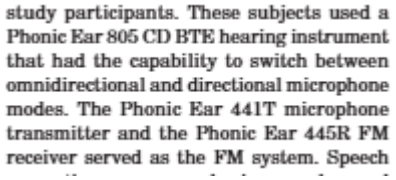
Classica C-D	Classica PP-SC	Classica PP-C-P	Classica PP-C-L-P
FM	FM	FM	FM
70 dB/139 dB SPL	80 dB/137 dB SPL	84 dB/144 dB SPL	80 dB/144 dB SPL
Broadband BTE with directional microphone	High-power	High gain	Extra power in low-frequency range
Push-pull amplifier Peak Clipping Telecoil Audio-input/MicroLink-compatible Battery size 675	Push-pull amplifier Super Compression with a.R.T. Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675	Push-pull amplifier Peak Clipping Broadband Telecoil Audio-input/MicroLink compatible Battery size 675
MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks	MicroLink MI 4/MI x Audio shoe AS4 Tamperproof battery cover KS4 ColorLine colors Hooks: HE3, HE3 680, HE3 1000 Mini ear hooks
LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram	LC: Low cut, 5 levels SSPL: Output, 5 levels Fitting recommendation by PFG based on audiogram

Phonak – Field Study News Article re PersonalLogic at Page 1

Introduction

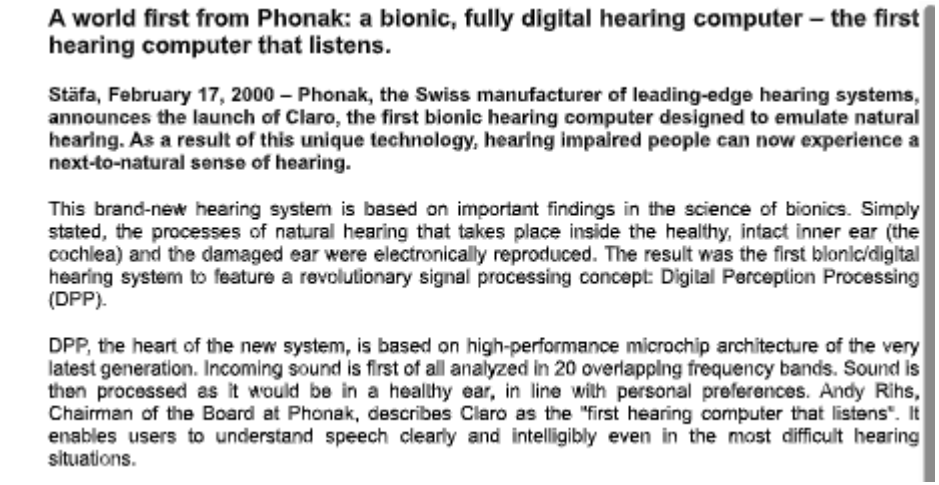
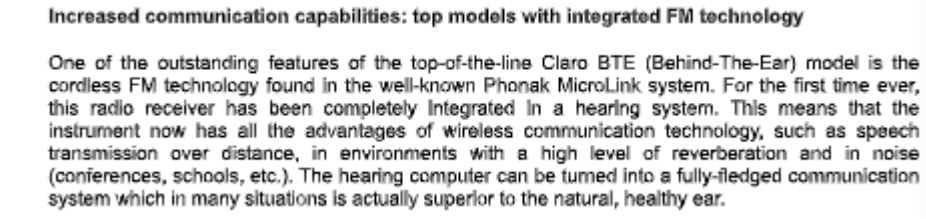
Hearing needs and preferences can be very individual, with marked differences from one person to the next in the same hearing situation. So, in addition to compensating for measured hearing loss, an advanced hearing system also must cater to specific personal requirements, and be customizable simply and effectively to individual client needs. The Perseo hearing system with its Personal*Logic* automatic function can be "tailored" to the client's needs as part of the fitting process. In Perseo, the default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. The automatic

Claims	Prior Art
	Phonak – Microlink User Guide at Page 9  **Description** ① Slide switch symbols: ● – Off ○ – Wide-angle microphone – Zoom microphone – SuperZoom microphone ② External power socket ③ Slide switch ④ Low battery / charging indicator a. When the red light blinks, the battery needs recharging b. During recharge the red light illuminates continuously ⑤ Multifunction socket. This allows the HandyMic to be connected to audio equipment (e.g. TV, radio etc.). The external aerial can be plugged in here to extend the operating range of the system. ⑥ Stand ⑦ Microphone ports ⑧ Plug-in frequency module Phonak – The Hearing Review Article re Adults' Use of FM Systems at Page 4 **Study Method** The study's 28 participants were all experienced users with behind-the-ear (BTE) hearing instruments. Of the 28 participants in the study, one patient was wearing analog aids, eight wore programmable, and 19 wore digital hearing aids. BTE devices used by the participants included: one Phonak analog power device; four Phonak 332 power AudioZoom; two Phonak 232 AudioZoom; two Phonak E-4s; three Siemens Prismas; three Siemens Signias; five Widex Senso's; four Resound BZ5s; one Oticon Digifocus; and three Phonak Claros. Twenty-two of the participants were binaural hearing instrument users and six were monaural hearing instrument users. Twenty participants were wearing devices with directional microphones. The majority of these patients utilized high-end technology devices with optimal SNR capabilities. They were already using exceptional devices that improved their hearing ability, but all were willing to try an FM system if there was the potential of improving their current benefit from the aids.

Claims	Prior Art
	Phonak – The Hearing Review Article re Perseo (Sep. 5, 2003) at Page 2  Perseo is a 20-channel digital hearing instrument. The default base-program is optimized for speech understanding in quiet environments. A second base-program with different frequency response settings and optional adaptive directional microphones provides additional support in noisy situations. The acoustic environment is continuously monitored and the appropriate base-program is automatically selected. This dual-base automatic function allows for independent fine tuning in one listening situation without compromising performance in the other. The automatic performance is designed to be easily personalized for the individual needs and preferences of the user. Valente - Effect of type of noise and loudspeaker array on the performance at 399  Recently, Phonak introduced its digital hearing aid in which one feature is an adaptive directional microphone. This adaptive microphone reportedly ensures identical sensitivity and phase characteristics of the dual microphones and a mechanism to *automatically* change the polar pattern from omnidirectional to any directional pattern while compensating for the changes in low-frequency response associated with each pattern. This hearing aid can be programmed Lewis – Speech perception in noise: directional microphones (2004) at Page 428  study participants. These subjects used a Phonic Ear 805 CD BTE hearing instrument that had the capability to switch between omnidirectional and directional microphone modes. The Phonic Ear 441T microphone transmitter and the Phonic Ear 445R FM receiver served as the FM system. Speech

Claims	Prior Art
	Lewis – Speech perception in noise: directional microphones (2004) at Page 429 (2) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the omnidirectional microphone mode; (3) binaural digital Phonak Claro 311 dAZ BTE hearing aids alone in the directional (adaptive) microphone mode; (4) monaural digital Phonak Claro 311 dAZ BTE HA utilized with one Phonak Microlink FM receiver with the EM attenuated (FM-only mode) and one Phonak Claro 311 dAZ BTE HA in the omnidirectional microphone mode worn on the opposite ear; and (5) binaural digital Phonak Claro 311 dAZ BTE hearing aids utilized with binaural Phonak Microlink FM receivers with the EM attenuated (FM-only mode). To the extent that DHA Systems do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems , those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
52. A hearing enhancement apparatus as recited in claim 46, wherein the audio output signals are changed in view of a preference of the user stored in the apparatus.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 46, wherein the audio output signals are changed in view of a preference of the user stored in the apparatus.” *See* above at claim 48. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 24. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
53. A hearing enhancement apparatus as recited in claim 46, wherein the audio output signals are changed based on audio sound in the environment of the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 46, wherein the audio output signals are changed based on audio sound in the environment of the apparatus." *See* above at claim 16. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
54. A hearing enhancement apparatus as recited in claim 53 further comprising a microphone at least for receiving the audio sound in the environment of the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 53 further comprising a microphone at least for receiving the audio sound in the environment of the apparatus." *See* above at claim 16. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
62. A hearing enhancement apparatus as recited in claim 13, wherein at least a portion of the hearing enhancement apparatus is in a head-mounted electronic device.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 13, wherein at least a portion of the hearing enhancement apparatus is in a head-mounted electronic device." The Digital Hearing Aids of the DHA Systems include electronics such as microchips and processors which are worn on a user's ear, and are thus examples of the claimed "head–mounted electronic device." The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak Claro – A World First from Phonak at Page 1  **A world first from Phonak: a bionic, fully digital hearing computer – the first hearing computer that listens.** **Stäfa, February 17, 2000 – Phonak, the Swiss manufacturer of leading-edge hearing systems, announces the launch of Claro, the first bionic hearing computer designed to emulate natural hearing. As a result of this unique technology, hearing impaired people can now experience a next-to-natural sense of hearing.** This brand-new hearing system is based on important findings in the science of bionics. Simply stated, the processes of natural hearing that takes place inside the healthy, intact inner ear (the cochlea) and the damaged ear were electronically reproduced. The result was the first bionic/digital hearing system to feature a revolutionary signal processing concept: Digital Perception Processing (DPP). DPP, the heart of the new system, is based on high-performance microchip architecture of the very latest generation. Incoming sound is first of all analyzed in 20 overlapping frequency bands. Sound is then processed as it would be in a healthy ear, in line with personal preferences. Andy Rihs, Chairman of the Board at Phonak, describes Claro as the "first hearing computer that listens". It enables users to understand speech clearly and intelligibly even in the most difficult hearing situations. Phonak Claro – A World First from Phonak at Page 1  **Increased communication capabilities: top models with integrated FM technology** One of the outstanding features of the top-of-the-line Claro BTE (Behind-The-Ear) model is the cordless FM technology found in the well-known Phonak MicroLink system. For the first time ever, this radio receiver has been completely integrated in a hearing system. This means that the instrument now has all the advantages of wireless communication technology, such as speech transmission over distance, in environments with a high level of reverberation and in noise (conferences, schools, etc.). The hearing computer can be turned into a fully-fledged communication system which in many situations is actually superior to the natural, healthy ear. Phonak Claro – Remote control WatchPilot and Claro dAZ at Page 1  **Claro from Phonak, the first bionic, fully digital hearing computer, sets new standards in hearing instrument technology. At the 45th International Congress of Hearing Aid Acousticians in Cologne (October 5 – 7) the Swiss company, whose name is synonymous with high-tech innovation, presents two more world-firsts: WatchPilot, a wristwatch with an integrated hearing system remote control, and Claro dAZ FM hearing computers, a fully digital hearing system with an integrated miniature radio receiver. At the same time, Phonak will be unveiling Claro 311 dAZ, the most powerful behind-the-ear instrument in the Claro line to date. "The new products represent major advances in hearing instrument technology," says Peter Pfluger, CEO of the Phonak Group. "We are giving hearing impaired individuals an improved quality of life and helping to turn the hearing instrument into a modern communication system."**

Claims	Prior Art
	Phonak Claro – World Premiere at Page 1 In market surveys hearing instrument users have repeatedly stressed the importance of hearing and understanding in noise as a top priority and the weakest point of the instruments currently available on the market. Hearing instrument users frequently complained of frustration over their instruments. Claro is Phonak's answer to the main worry of hearing instrument users. Hearing and understanding clearly again will be the order of the day once again for millions of individuals suffering from hearing loss. As Andreas Rihs puts it, Claro is "the first communication/hearing computer that actually listens for you!" Phonak Claro – World Premiere at Page 1 **Cutting-edge chip technology points the way forward** This phenomenal technical breakthrough is based on six years of intense research and development work during which it was possible for the first time ever to fully integrate psychoacoustic perception models of the ear. As a result, it has been possible to simulate the function of the so-called "20 critical bands" in the inner ear and to achieve an unprecedented natural hearing experience. This sophisticated, highly complex system goes by the name *Digital Perception Processing (DPP)* and is based on the most advanced chip generation currently available. The chip architecture is built around 0.25µm technology, which permits *Fast Fourier Transformation (FFT)* processes combined with very low power consumption. According to Andreas Rihs, it means there is still a great deal of potential for extending the chip's performance and this opens the door to some highly interesting developments on the same chip basis in the future. **The advent of a genuine communication/hearing computer** The impressive, state-of-the-art technology is combined with an exclusive, all-round communication concept based on the components *Digital Perception Processing (DPP), AutoSelect, Adaptive digital AudioZoom und Fine-scale Noise Canceler.* It provides a decisive boost to the power of the audiological solution and, with it, the benefits to the user. The Adaptive digital AudioZoom automatically locates and suppresses the main source of noise and at the same time clearly separates the voice of the person speaking within the listener's field of vision. The result of this is a positive signal-to-noise ratio on a scale that has never been achieved before. To round it off, the top model in the new Claro range is the first ever to feature the wireless FM technology found in the well-known MicroLink system and thus has all the advantages of wireless communication technology, such as speech transmission over distance in noisy surroundings (conferences, schools, etc.). As a result, the hearing computer has undergone a definitive transition to a communication/hearing computer, which in many situations is indisputably superior to the human ear.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 5



Elite

- Claro's digital sound processing with a human perspective (Digital Perception Processing)
- AutoSelect: Excellent speech intelligibility in any listening situation
- Adaptive digital AudioZoom
- Fine-scale Noise Canceler: High-resolution 20-band noise control

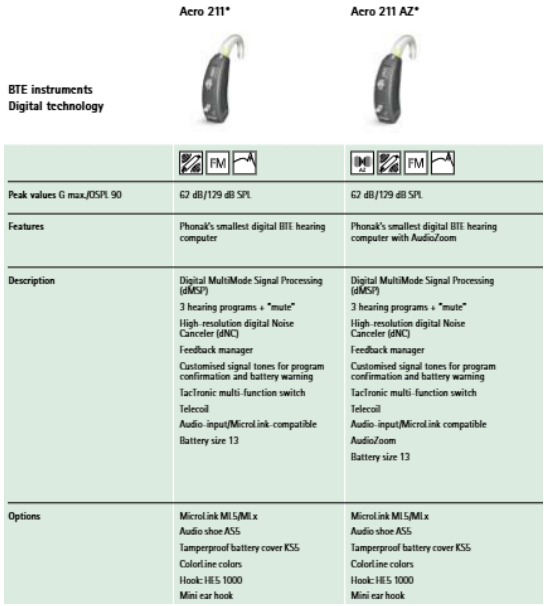
Digital

ITE	BTE	Remote controls
Claro 11	Claro 111 dAZ	SoundPilot FM
Claro 21 dAZ	Claro 211 dAZ	WatchPilot Elegance
Claro 22	Claro 311 dAZ	WatchPilot Classic
	Claro 111 dAZ FM	
	Claro 211 dAZ FM	
	Claro 311 dAZ FM	

Elite Line features:

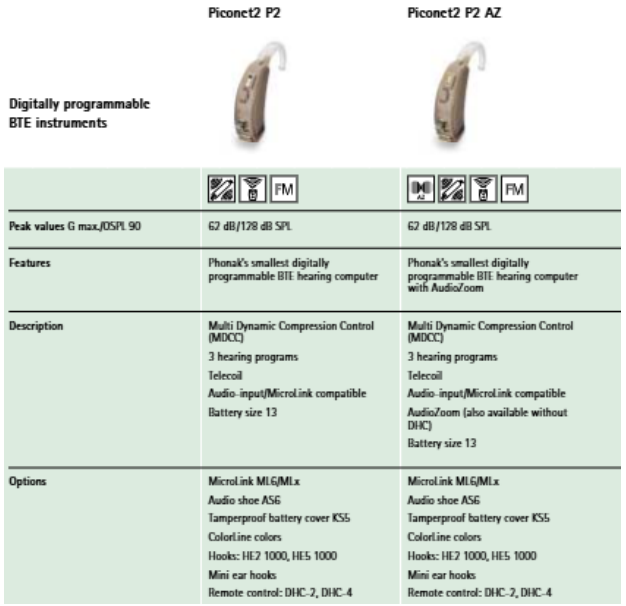
- Clear, natural sound with precise, fully automatic volume control
- Significantly improved speech intelligibility even in difficult listening situations
- Design innovations for all system components
- High level of user convenience with automatic hearing program selection
- Innovative high-tech solutions for Claro system control
- State-of-the-art hearing computers for the optimised solution to a wide range of hearing problems
- FM receiver fully integrated in the BTE case (Claro dAZ FM)

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 16



BTE instruments Digital technology	Acro 211*	Acro 211 AZ*
	FM	FM
Peak values G max/OSPL 90	62 dB/129 dB SPL	62 dB/129 dB SPL
Features	Phonak's smallest digital BTE hearing computer	Phonak's smallest digital BTE hearing computer with AudioZoom
Description	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink-compatible Battery size 13	Digital MultiMode Signal Processing (dMSP) 3 hearing programs + "mute" High-resolution digital Noise Canceler (dNC) Feedback manager Customised signal tones for program confirmation and battery warning TacTronic multi-function switch Telecoil Audio-input/MicroLink compatible AudioZoom Battery size 13
Options	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook	MicroLink MLS/MLx Audio shoe AS5 Tamperproof battery cover KS5 ColorLine colors Hook: HE5 1000 Mini ear hook

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 18



Digitally programmable BTE instruments	Piconet2 P2	Piconet2 P2 AZ
	FM	FM
Peak values G max/OSPL 90	62 dB/128 dB SPL	62 dB/128 dB SPL
Features	Phonak's smallest digitally programmable BTE hearing computer	Phonak's smallest digitally programmable BTE hearing computer with AudioZoom
Description	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible Battery size 13	Multi Dynamic Compression Control (MDCC) 3 hearing programs Telecoil Audio-input/MicroLink compatible AudioZoom (also available without DHC) Battery size 13
Options	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4	MicroLink ML6/MLx Audio shoe AS6 Tamperproof battery cover KS5 ColorLine colors Hooks: HE2 1000, HE5 1000 Mini ear hooks Remote control: DHC-2, DHC-4

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22

For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

With their Chip-on-Board technology and a number of new electronic components, Phonak's Value Class BTEs constitute a family of dependable, easy-to-service hearing instruments.

Mechanically programmable in up to nine settings.
These calibrated program switches offer reliable predictable performance.
Thus, the response curve and the dynamic characteristics of the instrument can be precisely adapted to the needs of the user.



AudioProgrammer



Oticon – DigiFocus Description at Page 1

> Inside each DigiFocus, the digital chips have the same processing power as a fast laptop computer. This power is used to analyse the incoming sound signal, and speech is extracted through a unique system called ASA - Adaptive Speech Alignment. ASA always makes speech audible, amplifying it as much as necessary without making it uncomfortably loud or distorted. Sounds are reproduced very naturally - making speech far easier to understand than with any other hearing instrument on the market.

Oticon – DigiFocus White Paper (1996) at Page 1

> DigiFocus is a fully digital hearing instrument built around the digital audio processor, DAP. This processor is designed to have a specific functionality and to comply with a series of physical, acoustical and audiological demands. □

Oticon – DigiFocus White Paper (1996) at Page 1

> In many areas digital technology has already become an integral part of our lives. Now it is also available for the hard of hearing. With size and battery consumption diminished, the DigiFocus hearing instrument has computing power equalling today's standard PCs. In this article you will get a description of the basic concepts of digital sound processing. □

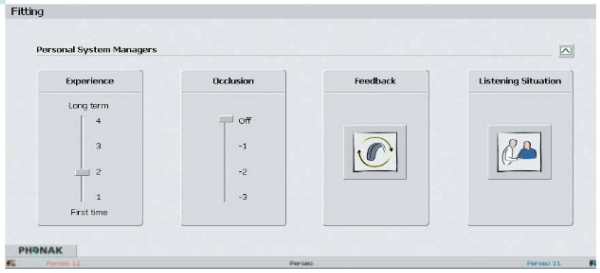
Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 2 *In many areas digital technology has already become an integral part of our lives. Now it is also available for the hard of hearing. With size and battery consumption diminished, the DigiFocus hearing instrument has computing power equalling today's standard PCs. In this article you will get a description of the basic concepts of digital audio processing.* Oticon – DigiFocus White Paper (1996) at Page 2 Manufacturers of hearing instruments have worked hard to overcome the troubles of size and battery consumption. With the thickness of digital microchips at only 1/100 of a human hair, this has now been accomplished in the world's first fully digital, at the ear hearing instrument - DigiFocus. Inside DigiFocus there is computing power available which equals that of a PC. Oticon – LA Time Article re THE GOODS: The Sound Wave of the Future (Nov. 10 1995) at 1 DigiFocus operates on two tiny new computer chips that have the processing power of a normal desktop computer. Traditional hearing instruments have only up to 10 adjustable parameters, but Oticon representatives say that their processor will give a maximum of 100 software-controlled adjustment parameters. And the device can be programmed by an audiologist while the hearing-impaired person is wearing it. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 What makes the new digital hearing instrument a true breakthrough is its flexibility in processing sound, he added. "Think of the difference between a radio with only bass and treble controls and a fully-featured studio mixer, which adjusts sounds in many different frequency bands. Because of the miniature computer in DigiFocus, sound can be split into seven frequency bands, each of which can be adjusted in several ways. These bands are then processed through two channels to automatically adjust for loudness levels and speech." To the extent DHA Systems do not explicitly disclose this claim limitation, Anderson '783 discloses storing standard functions for the hearing enhancement apparatus in a head–mounted electronic device (e.g., the hearing aid or earpiece). The following citations show examples of where Anderson '783 discloses this limitation.

Claims	Prior Art
	Anderson ’783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson ’783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants. Anderson ’783 at 1:21–28 In the prior art, a basic hearing aid without remote control is a self-contained earpiece comprising a microphone, speaker and associated processor electronics. In such hearing aids, the earpiece microphone converts acoustic waves into electrical representations of the acoustic waves, the electrical signals are amplified by the earpiece processor electronics and converted back into acoustic waves by the earpiece speaker. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary

Claims	Prior Art
	two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson '783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson '783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when

Claims	Prior Art
	the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. Anderson ’783 at 24:47–66 Morse code keys 956 or voice recognition capabilities implemented using the RPU DSP 948) in a manner that can be made imperceptible to a casual observer if desired. In this respect, the system acts as a "virtual handset" communication aid that replaces a conventional telephone handset in many applications (although users may additionally communicate with a conventional handset or speakerphone in the usual fashion). To accomplish the virtual handset function, the RPU 16 is equipped with optional secondary two-way wireless link circuitry 19 to communicate with a telephone or other communication network. The secondary wireless link is separate from, and does not interfere with, the primary wireless link 17 between the earpiece 10 and RPU 16. In applications where relatively high-power transmissions take place on the secondary link and the secondary link transmitter is integrated into the RPU, the RPU can be placed on a user's wrist or ankle away from vital organs to reduce any potential health risk relative to conventional wireless handsets. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
63. A hearing enhancement apparatus as recited in claim 62, wherein the apparatus comprises a volume control that is configured to respond to a voice command.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 62, wherein the apparatus comprises a volume control that is configured to respond to a voice command." *See* above at claim 45. A POSITA would have been motivated to combine the DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 45. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
75. A hearing enhancement apparatus as recited in claim 62, wherein the apparatus is configured to wirelessly couple to a cell phone.	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 62, wherein the apparatus is configured to wirelessly couple to a cell phone." *See* above at claim 4. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 1[pre]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann '555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 2. To the extent that DHA Systems, Anderson '783, and Enzmann '555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson '783, and Enzmann '555, those elements, as known to them or as disclosed by other prior art identified in the cover pleading..
76. A hearing enhancement apparatus as recited in claim 62, wherein based on at least a preference of the user, the power of a first range of frequencies of the audio output signals is increased, and the power of a	DHA Systems, Anderson '783, and Enzmann '555 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 62, wherein based on at least a preference of the user, the power of a first range of frequencies of the audio output signals is increased, and the power of a second range of frequencies of the audio output signals is not increased." The Digital Hearing Aids of the DHA Systems (e.g., the "hearing enhancement Apparatus") include capabilities to adjust hearing parameters based on the user's preferences, including the volume of frequency

Claims	Prior Art
second range of frequencies of the audio output signals is not increased.	ranges independent of other frequency ranges. The following citations show examples of where DHA Systems practice this limitation. Phonak – Perseo Brochure at Page 18 The art of the personal touch – Personal System Managers **PFG 8.1** provides a set of **Personal System Managers** to take care of the technical details behind common fitting issues, leaving the fitter free to take care of the wearer. This approach ensures that fitting is uncomplicated. It is always clear which controls should be used and how to use them.  The **Experience Manager** adjusts tonality and loudness to match each client's experience with hearing instruments. An effective and convenient control to set and adjust the client's hearing system as they become accustomed to their new world of sound. The **Occlusion Manager** eliminates the feeling of blocked ears experienced by some wearers. The dynamic **Feedback Manager** automatically identifies any bands at risk from feedback. Processing strategies are modified in these bands to prevent feedback while also increasing audibility for soft sounds. The result is easier listening without feedback. The **Listening Situation Manager** allows the fitter to program PersonalLogic according to the wearer's preference for when to trigger a change of base programs, and the desired degree of sound contrast between the base-programs. Additional personalization is available, if required, by directly programming either of the base programs.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 7



Adaptive digital AudioZoom (dAZ)

Fine-scale Noise Canceler (FNC)

Active and adaptive separation of speech from noise
The Speech-to-Noise Ratio (SNR) can only be optimised if the noise is spatially separated from the speech signal with directional microphone technology. As a pioneer in multi-microphone technologies, Phonak introduced AudioZoom, a feature which significantly improves listening and understanding in noisy situations, enhancing user satisfaction. Now, Phonak goes a step further in the refinement of multi-microphone technology with Adaptive digital AudioZoom: it seeks, finds, and suppresses noise automatically.

Fully automatic, fully adaptive
With its unique spatial processing system, Phonak's Adaptive digital AudioZoom can detect noise not only from directly behind, but anywhere in the rear plane. Whether the hearing-impaired person is moving or the location of the noise source changes, the directional characteristic is constantly adapted to the listening situation. In this manner, the Adaptive digital AudioZoom automatically establishes the best possible SNR.

Twenty-band noise control
Claro constantly monitors the Speech-to-Noise Ratio (SNR) in all 20 bands. If a poor SNR is measured in certain bands, the Fine-scale Noise Canceler will reduce gain only in those bands. The result of this precision noise control is a selective and intelligent improvement of the SNR with only a marginal influence on the speech signal.

Precise and selective
All frequency bands are separately analysed and controlled. Gain is reduced selectively only in those bands where noise is present. This high-resolution analysis and gain control makes it possible to suppress noise with extremely high accuracy. Neighboring frequency bands without noise remain unaffected.

Intelligent
The magnitude of gain reduction is not constant. In frequency bands with higher SNRs and in bands which are important for speech intelligibility, gain is reduced only slightly. This intelligent control algorithm reduces the masking and distractive effects of background noise. Important speech information is preserved.

7

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 33

PFG –
new perspectives
in fitting success





QuickGuide
The versatile, easy-to-use online tour through the PFG fitting process with access to all optional fitting tools.

Instrument selection wizard
This online assistant recommends the product that best matches the customer's needs.

Initial SoundCheck
This is an ideal tool for fast and simple fine tuning of sound quality. Three controls provide convenient gain and balance settings in the high- and low-frequency ranges.

Automatic fine tuning
Based on the customer's hearing perception, the software automatically computes the most suitable modifications.

Manual fine tuning
A high degree of fitting precision can be attained with this broad spectrum of parameters in an optimised display format.

Phonak Sound
The degree of fitting success can be dramatically improved by using these real-life sound clips. All sound examples can be saved on a computer as MP3 files; they are also available on a sound CD.

Proven PFG benefits
- One program for all Phonak hearing computers
- NOAH compatible or standalone version
- Detailed help system with in-depth scientific and technical information
- PFG training demo

Phonak MicroLink MLxS Product Information at Page 1

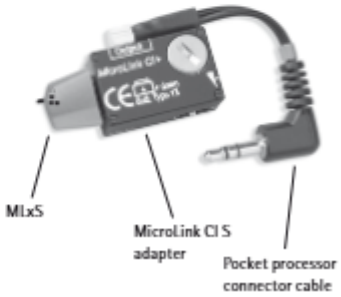
The MicroLink MLxS is the first miniaturized FM receiver with a digital frequency synthesizer for full multi-frequency flexibility. The receiver features fully automatic, non-contact frequency synchronization with either a WallPilot or the Campus S.

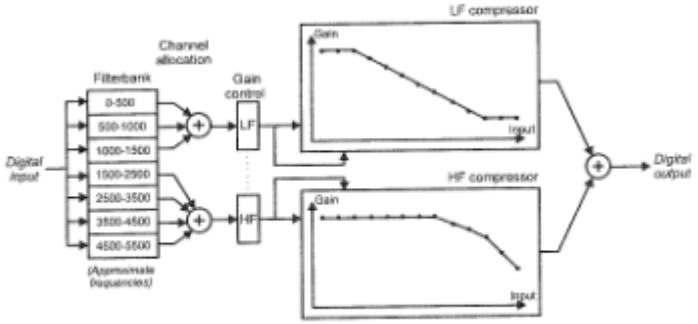
The MicroLink MLxS is compatible with all Phonak FM transmitters and the WallPilot, and is recommended for use with this equipment.

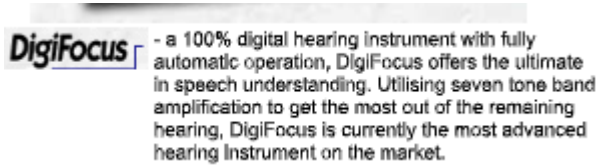
MLxS with BTE instrument

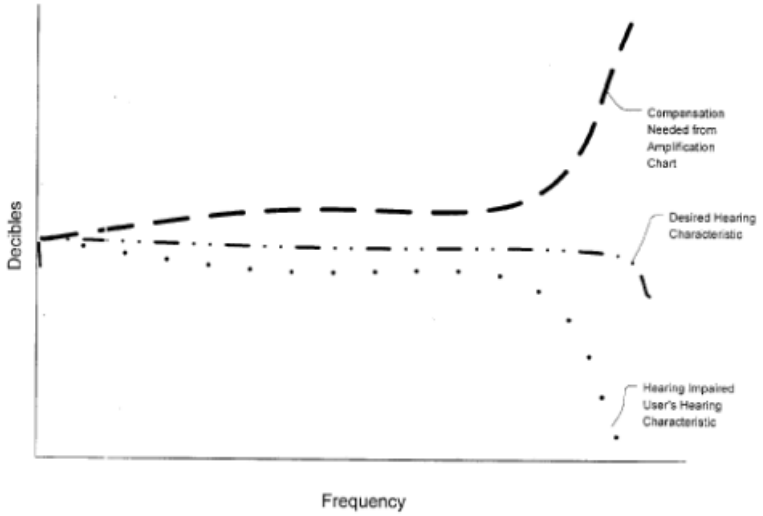


MLxS with adapter for CI pocket processor



Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Fig. 1  *Fig.1. DigiFocus - block diagram of the digital audio processor, DAP.* Oticon – DigiFocus White Paper (1996) at Page 4 The weighted band-pass signals are summed with two summators which create the low-pass and the high-pass channel of the hearing aid. The cut off frequency between the two channels corresponds to 1500 Hz, i.e. the three lower bands constitute the low-frequency channel and the four higher bands the high-frequency channel. The signals from the two channels are processed individually in two compressors operating independently of each other. Finally the two modified signals are summed into the output signal and sent to the receiver. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2 What makes the new digital hearing instrument a true breakthrough is its flexibility in processing sound, he added. "Think of the difference between a radio with only bass and treble controls and a fully-featured studio mixer, which adjusts sounds in many different frequency bands. Because of the miniature computer in DigiFocus, sound can be split into seven frequency bands, each of which can be adjusted in several ways. These bands are then processed through two channels to automatically adjust for loudness levels and speech."

Claims	Prior Art
	Oticon – Products Index at Page 1  To the extent DHA Systems do not explicitly disclose this claim limitation, Anderson '783 discloses adjusting the power of one frequency independent of the power of other frequencies. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. To the extent DHA Systems do not explicitly disclose this claim limitation, Enzmann '555 further discloses modifying signals based on a preprogrammed frequency mapping, which at least suggests an example of altering a "power of a first range of frequencies" without increasing a power of a second range of frequencies. The following citations show examples of where Enzmann '555 discloses this limitation. Enzmann '555 at FIG. 5

Claims	Prior Art
	 FIG. 5 Enzmann ’555 at [0027] FIG. 1 illustrates a conventional digital hearing aid. The conventional hearing aid comprises a microphone 105, an A/D converter 110, a digital signal audio processor (DSP) 120, a D/A converter 130 and a speaker 140. In operation, sounds, represented by an analog signal and/or ambient noise emitted from an outside source, is captured by the microphone 105 and converted to a digital signal by the A/D converter 110. The DSP 120 manipulates the converted signal in accordance with well-known techniques and sends a processed signal to the D/A converter 130. In the D/A converter 130, the processed signal is converted to an analog signal and output to the speaker 140. The speaker 140 is placed in or around the hearing impaired user's ear. Thus, the captured sounds have been captured, processed, and amplified and output to the user. Enzmann ’555 at [0028] The manipulating processes of the DSP 120 serves both to amplify the converted signal from the A/D converter 110 and correct any degraded signal areas so that an improved signal is sent to the speaker 140. The manipulation processes may also adjust the incoming signal based on a preprogrammed frequency mapping of the user's hearing characteristics.

Claims	Prior Art
	Enzmann ’555 at [0047] The speaker characteristic is changed according to deterioration due to use of the speaker of the aided ear bud over time. The ambient noise characteristic is usually dynamic and updated as the noise levels around the ear bud change. The method employed in fixing the incoming sounds from the TX/RX unit 260 is similar to methods commonly known in the production of Fast Fourier transforms, which are well known the art at this time. Enzmann ’555 at [0048] It should be appreciated that the characteristics represented in FIG. 5 are for illustrative purposes only. Each of the characteristics in FIG. 5 are device and user specific. Each of the characteristics can be set and calculated by information stored in the EEPROM 310. Enzmann ’555 at [0050] In operation, the aided ear bud initializes in the normal hearing aid mode. The ear bud operates in this mode until a validation code is received at the TX/ RX unit 260. Once the proper validation code is received at the TX/RX unit 260, a signal is sent from the TX/RX unit 260 to the digital switch 330 to close and allow communications to pass. Once the digital switch is closed, signals from the TX/RX unit 260 are fixed by the digital logic 320 using the complementary characteristics, as discussed above, and passed to the DSP audio processor 220. The DSP audio processor 220 then fixes and combines a reduced representation of the input from the microphone and outputs the combined signal to the user's speaker. The reduced signal 226 *b* is produced by decreasing the volume of the microphone signal such that the signal is small compared to the signal from the digital logic 320 when output to the user. The DSP audio processor 220 also outputs a second (truer) representation of the microphone signal to the wireless phone 270 such that the user can speak just as if they were speaking directly into the wireless phone 270. The user's voice would be captured by the microphone 205 and remotely output to the wireless phone 270. Enzmann ’555 at claim 5 The method of claim 2, wherein the activation states of the hearing aid comprises: a hearing aid mode, wherein the ambient noise is fixed by a DSP processor and out put directly to a user; and an ear bud mode, wherein the ambient noise is reduced in volume and mixed with a noise signal transmitted from the cellular phone. Enzmann ’555 at claim 6 The method of claim 5, wherein the noise signal transmitted from the cellular phone is fixed according to

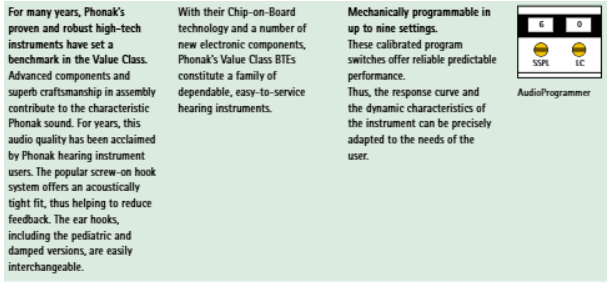
Claims	Prior Art
	desired characteristics prior to mixing with the ambient noise. Enzmann ’555 at claim 7 The method of claim 6, wherein the desired characteristics are determined by stored frequency maps, such that the frequency maps are created based on at least the user's hearing characteristics, the cellular telephone's operating characteristics and the ambient noise level. Enzmann ’555 at claim 13 A source control module comprising: a digital switch; an memory device; and a digital logic unit, wherein digital logic contained within is arranged to produce a compensation characteristic. Enzmann ’555 at claim 14 The source control module of claim 13, wherein the compensation characteristic is applied to input signals from an outside source to fix the input signals to an optimal format. Enzmann ’555 at claim 15 The source control module of claim 14, wherein the digital logic unit contains an amplification chart, the amplification chart comprising frequency maps indicating at least: a user's current hearing characteristics; a desired hearing characteristic; a cellular telephone operating characteristic; and a speaker characteristic indicative of the operation attributes of a speaker of a hearing aid. Enzmann ’555 at claim 16 The source control module of claim 14, wherein the compensation characteristic is made from a combination of the user's current hearing characteristics, the desired hearing characteristic, the cellular telephone operating characteristic and the speaker characteristic. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. A POSITA would have further been motivated to combine DHA Systems with the teachings of Enzmann ’555 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a].

Claims	Prior Art
	To the extent that DHA Systems, Anderson ’783, and Enzmann ’555 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems, Anderson ’783, and Enzmann ’555 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
77. A hearing enhancement apparatus as recited in claim 62, wherein the at least one hearing characteristic of the user is identified via measuring the user's hearing at least across a plurality of frequencies.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 62, wherein the at least one hearing characteristic of the user is identified via measuring the user's hearing at least across a plurality of frequencies.” *See* above at claim [30a]. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson ’783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. To the extent that DHA Systems and Anderson ’783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson ’783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
78. A hearing enhancement apparatus as recited in claim 77, wherein the hearing enhancement apparatus assists in measuring the user's hearing.	DHA Systems and Anderson ’783 expressly or inherently disclose “[a] hearing enhancement apparatus as recited in claim 77, wherein the hearing enhancement apparatus assists in measuring the user's hearing.” The Digital Hearing Aids of the DHA Systems (e.g., “the hearing enhancement apparatus”) are used to adjust hearing parameters based on the user’s hearing capabilities on an external personal manager system based on a hearing test conducted through the Digital Hearing Aids . The following citations show examples of where DHA Systems practice this limitation.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 5 The Science of PersonalLogic™ Phonak has applied knowledge from new research and past experience to add a new dimension of individualized logic to automatic hearing systems – PersonalLogic. Combining new and proven features, PersonalLogic optimizes the functioning, operation and fitting of hearing systems for each individual user. Thanks to PersonalLogic, Perseo takes customization to a level beyond "custom-fitted" related to individual hearing loss. The new digital system from Phonak is the first hearing system with customized automatic operation, as opposed to operation based on factory set, unchangeable rules. Now, Perseo gives hearing professionals control over automatic operation, allowing them to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes. Phonak – Perseo Brochure at Page 7 Convenience and Comfort Perseo is easier to wear and easier to fit ■ For true "wear and hear" convenience and comfort in all situations, Perseo automatic operation is managed by Phonak-exclusive PersonalLogic. ■ This breakthrough intelligence for automatic hearing instruments responds to acoustics, the listening situation and personal listening preferences. ■ Perseo is easily programmed for individual needs using the **Listening Situation Manager**. Clarity Enhanced performance in multiple listening situations ■ The **Clarity Component Enhancement** system realized in **Digital Perception Processing² (DPP²)** increases the clarity of speech and environmental sounds. ■ Rapid-tracking **Adaptive digital AudioZoom (dAZ)** is automatically activated to improve speech understanding in noisy situations. ■ For extra comfort and ease of listening, the **Fine-scale Noise Canceler** selectively reduces background noise in 20 channels. ■ Optional **MicroLink FM** provides the ultimate Speech-to-Noise Ratio enhancement.

Claims	Prior Art
	Phonak – Perseo Brochure at Page 10 PersonalLogic™ provides the right response for each wearer PersonalLogic and dual-base automatic provide professionals with the control over signal processing that is essential to enhance user satisfaction. ■ PersonalLogic is a new control system that continuously updates signal processing parameters in response to acoustic information, listening situation classification, the wearers' hearing status and listening preferences. ■ Two independently programmable base-programs are used as the basis for signal processing. PersonalLogic selects the appropriate base-program and continually adapts its signal processing parameters to suit individual wearer needs. Phonak – Perseo Brochure at Page 11 ■ With **dual-base automatic** the fitter has direct access to the two separate base-programs. Performance can be matched to each user's needs in quiet situations without disrupting performance in noisy situations and vice versa. The result is less fine-tuning effort than with single-base instruments. With **single-base automatic** time is wasted "juggling" a single set of fitting parameters while attempting to balance performance in multiple listening situations. ■ To further simplify fitting, PersonalLogic is pre-set according to typical needs and is easily re-programmed to individual preferences using the **Listening Situation Manager (LSM)**. Ensuring that an automatic hearing system responds correctly in noisy situations where there is no speech is an important consideration for safety and to eliminate feelings of isolation. The **LSM** provides this functionality with a single mouse click. Matching the system's sensitivity to noise with that of the client's, and controlling the auditory contrast between quiet and noisy settings is equally easy.

Claims	Prior Art
	Phonak – Collections 2002 Product List at Page 22



For many years, Phonak's proven and robust high-tech instruments have set a benchmark in the Value Class. Advanced components and superb craftsmanship in assembly contribute to the characteristic Phonak sound. For years, this audio quality has been acclaimed by Phonak hearing instrument users. The popular screw-on hook system offers an acoustically tight fit, thus helping to reduce feedback. The ear hooks, including the pediatric and damped versions, are easily interchangeable.

With their Chip-on-Board technology and a number of new electronic components, Phonak's Value Class BTEs constitute a family of dependable, easy-to-service hearing instruments.

Mechanically programmable in up to nine settings.
These calibrated program switches offer reliable predictable performance.
Thus, the response curve and the dynamic characteristics of the instrument can be precisely adapted to the needs of the user.

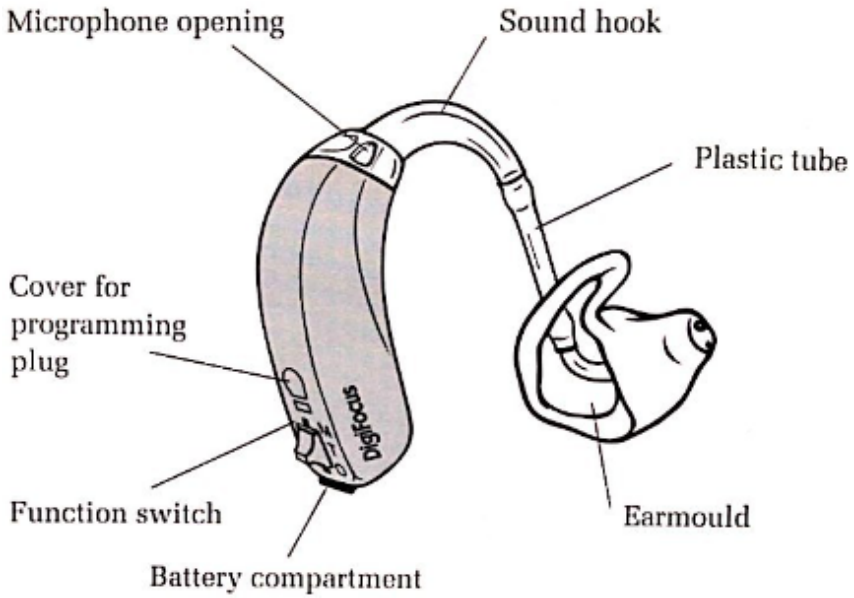
AudioProgrammer

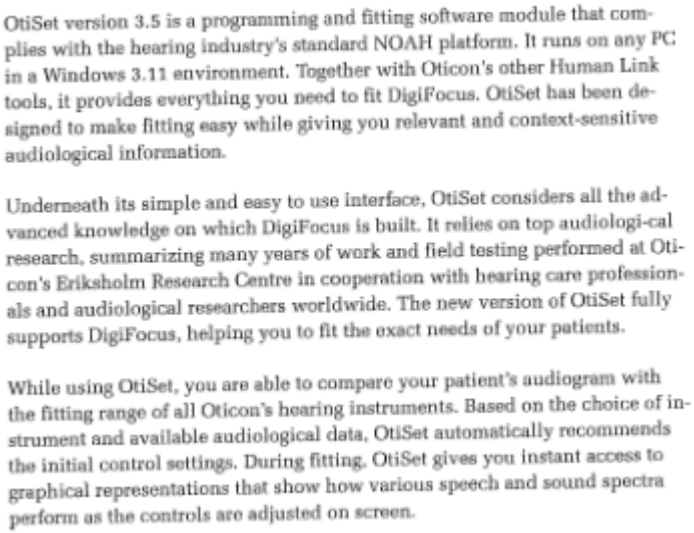
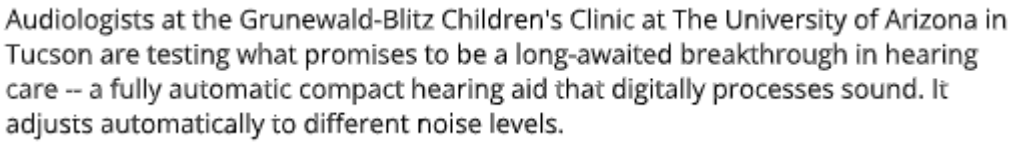
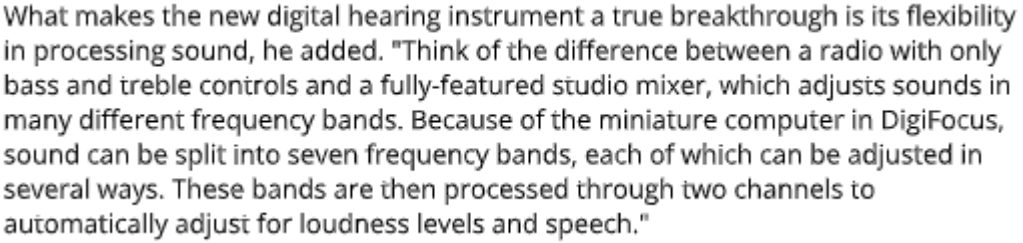


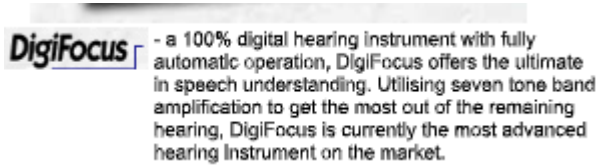
Phonak – Media Release re Product Offerings in F2003/2004 at Page 2

> The key breakthrough technology in Perseo is Personal*Logic*, the first ever automatic control system that is fitter programmable according to the tastes and preferences of each individual wearer. Automatic performance has now a new level of intelligence beyond merely adapting to acoustic changes in the environment. Perseo is the first hearing system with customized automatic operation, as opposed to operation based on factory settings. It allows hearing professionals to provide clients with a hearing system "custom-tailored" to their personal hearing requirements and tastes.

Claims	Prior Art
	Phonak – Online Interview re Perseo (April 7, 2003) at Page 2 Dave Fabry/Phonak: First of all, Perseo serves as the flagship hearing system in Phonak's hearing aid family, combining leading edge, innovative hardware with efficient, flexible, and user-friendly software in one package. We call it the art and science of hearing aid fitting, in that it enables both experienced and inexperienced clinicians to efficiently optimize hearing aid parameters for each and every patient at the initial fitting session. Furthermore, using a series of Personal System Managers, they enable the clinician to easily accommodate the patient's changing needs over time. Hearing solutions should be individual, and Perseo offers the ultimate in personalization to achieve that goal. Oticon – DigiFocus Compact User Instructional Brochure at Page 2 **Hearing instruments as individual as your hearing loss** You are in possession of some of the worlds most advanced hearing technology by through your new fully automatic, digital hearing instruments developed and manufactured by Oticon. These instruments have been carefully adjusted by your hearing care professional using a computer. This is designed to tailor the instruments' performance as close as possible to your needs and hearing loss. These sophisticated instruments should provide some improvements to your hearing ability almost immediately but for you to benefit fully from them will depend on you adapting to the new sound and learning to interpret it. This can take a little time. If you follow the instructions in this booklet on using your Oticon hearing instruments, you will gain the maximum possible help from them in achieving better hearing. The information about care and maintenance of your hearing instruments will help prolong their life and usefulness. We wish you well with your new instruments. We are confident that they will bring you success and improve the quality of your life.

Claims	Prior Art
	Oticon – DigiFocus Compact User Instructional Brochure at Page 4  Oticon – DigiFocus White Paper (1996) at Page 9 • The DigiFocus diary enables you to determine quickly when a hearing ir strument needs adjustment • The fine-tuning recommendations help you to adjust the settings • OtiSet, a PC based software program, and the programming belt enable you to fit and fine tune DigiFocus while the client is wearing the instrument. This takes place without your patient being wired to the PC.

Claims	Prior Art
	Oticon – DigiFocus White Paper (1996) at Page 1-0  OtiSet version 3.5 is a programming and fitting software module that complies with the hearing industry's standard NOAH platform. It runs on any PC in a Windows 3.11 environment. Together with Oticon's other Human Link tools, it provides everything you need to fit DigiFocus. OtiSet has been designed to make fitting easy while giving you relevant and context-sensitive audiological information. Underneath its simple and easy to use interface, OtiSet considers all the advanced knowledge on which DigiFocus is built. It relies on top audiologi-cal research, summarizing many years of work and field testing performed at Oticon's Eriksholm Research Centre in cooperation with hearing care professionals and audiological researchers worldwide. The new version of OtiSet fully supports DigiFocus, helping you to fit the exact needs of your patients. While using OtiSet, you are able to compare your patient's audiogram with the fitting range of all Oticon's hearing instruments. Based on the choice of instrument and available audiological data, OtiSet automatically recommends the initial control settings. During fitting, OtiSet gives you instant access to graphical representations that show how various speech and sound spectra perform as the controls are adjusted on screen. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2  Audiologists at the Grunewald-Blitz Children's Clinic at The University of Arizona in Tucson are testing what promises to be a long-awaited breakthrough in hearing care -- a fully automatic compact hearing aid that digitally processes sound. It adjusts automatically to different noise levels. Oticon – News Release re Audiologists Test Breakthrough In Hearing Care (June 19, 2006) at Page 2  What makes the new digital hearing instrument a true breakthrough is its flexibility in processing sound, he added. "Think of the difference between a radio with only bass and treble controls and a fully-featured studio mixer, which adjusts sounds in many different frequency bands. Because of the miniature computer in DigiFocus, sound can be split into seven frequency bands, each of which can be adjusted in several ways. These bands are then processed through two channels to automatically adjust for loudness levels and speech."

Claims	Prior Art
	Oticon – Products Index at Page 1  To the extent DHA Systems do not explicitly disclose this claim limitation, Anderson '783 discloses a system that measures (e.g., tests) a user's hearing. The following citations show examples of where Anderson '783 discloses this limitation. Anderson '783 at Abstract A hearing aid or audio communication system includes an earpiece (10) that can be hidden in the ear canal, and which communicates wirelessly with a remote processor unit, or RPU (16), that enhances audio signals and can be concealed under clothing. Sounds from the environment are picked up by a microphone (12) in the earpiece and sent with other information over a two-way wireless link (17) to the RPU (16). The wireless link (17) uses microwaves for component miniaturization. Furthermore, use of radar technology to implement the wireless link (17), with an RPU (16) interrogator and earpiece (10) transponder, reduces earpiece size and power, as no microwave oscillator is needed in the earpiece (10). Optional secondary wireless link circuitry (19) can be used between the RPU (16) and a cellular telephone system or other sources of information. Electronic voice recognition and response can control system operation. Anderson '783 at 1:5–18 The present invention is directed to hearing aids, and in particular to a hearing aid having an earpiece housing worn in or at the ear and a remote processor unit (RPU) worn by or located near the user that wirelessly receives signals from and transmits signals to the earpiece. The present invention is also directed to the use of hearing aid systems as wireless communication devices for hands-free cellular telephone and mobile radio communication "handsets," covert operation and control of hearing aids, hearing protection and noise cancellation simultaneous with binaural hearing aid functions, hearing test equipment, location of misplaced hearing aid system components and wireless cochlear implants.

Claims	Prior Art
	Anderson ’783 at 1:21–28 In the prior art, a basic hearing aid without remote control is a self-contained earpiece comprising a microphone, speaker and associated processor electronics. In such hearing aids, the earpiece microphone converts acoustic waves into electrical representations of the acoustic waves, the electrical signals are amplified by the earpiece processor electronics and converted back into acoustic waves by the earpiece speaker. Anderson ’783 at 1:50–65 The present invention uses an audio path that is different from the audio path used by devices in the prior art. The present invention uses a primary two-way wireless link (not a one-way link as in the prior art) between an earpiece worn in or at the user's ear and an RPU worn by or located near the user. In the present invention, audio signals from the environment are picked up by a microphone in the earpiece (not a hand-held microphone as used by wireless hearing aids in the prior art) and transmitted over the primary two-way wireless link to the RPU (instead of going to processor electronics contained in the earpiece, as in basic hearing aids known in the prior art), where the audio signals are enhanced according to the user's needs before transmission over the primary wireless link to the earpiece. Signal processing is performed in the RPU rather than the earpiece to take advantage of relaxed size and power constraints. Anderson ’783 at 2:20–39 It is an object of the present invention to provide a new and useful auditory aid for hearing-impaired persons (i.e., those having certain residual hearing) by removing audio signal enhancement functions from the earpiece and placing them in an RPU. Use of an RPU provides several advantages over systems that attempt to place all system capabilities within the earpiece. The RPU approach allows a simple earpiece design comprising a miniature low-power wireless transceiver, microphone and speaker. Note that the speaker is also known in the hearing aid art as a "receiver," but the term "speaker" is used here to avoid confusion (similarly, the term "talker," not "speaker," is used to describe a human producing vocal sounds). The resulting earpiece is extremely small, can be hidden from view in the ear canal if desired, and allows complete freedom of movement when a primary two-way wireless link to the RPU is used. Processing for all major system capabilities, such as amplification and other forms of signal enhancement, takes place in the RPU where size and power constraints are relaxed, leading to a cost-effective design. Anderson ’783 at 2:60–3:5 A further object of this invention is to provide some degree of protection for the residual hearing capability of a hearing-impaired user (or a non-impaired user who wishes to avoid impairment) in a

Claims	Prior Art
	wireless hearing aid system having the simultaneous capabilities of noise cancellation and binaural processing (e.g., directionality). Other objects of the invention are to provide a convenient means for testing a user's hearing capability without the need for additional equipment, to assist users in the location of misplaced hearing aid system components, and to provide profoundly deaf cochlear implant patients with a wireless system allowing improved freedom of movement compared to existing wire-connected systems. Anderson ’783 at 5:3–21 During normal operation, speech signals from a nearby talker (and other signals in the ambient audio environment) are picked up by the earpiece wireless microphone 20 and transmitted to the RPU FM receiver 24. The RPU FM receiver 24 output level may be adjusted using the RPU FM receiver 24 volume control. The resulting electrical waveform representing signals from the nearby talker travels through the DPDT switch 25, which is set to the lower position as shown in FIG. 2, to the signal enhancer 26. The signal enhancer 26 may be, for example, a voice changer device that varies the pitch of a received speech signal according to the setting of pushbutton controls located on the RPU signal enhancer 26. The speech signal's pitch can then be raised or lowered as desired to help compensate for a user's hearing loss relative to a particular talker's voice characteristics. The modified speech signal travels from the RPU signal enhancer 26 to the RPU FM transmitter 27, and finally to the earpiece headset 21 receiver where the signal is converted to acoustic waves heard by the user. Anderson ’783 at 22:11–61 Stand-alone earpiece operation: If an earpiece cannot communicate with an RPU for any reason, stand-alone earpiece operation as a CIC hearing aid is generally desirable. Examples include occasions where the RPU must be turned off by pushing the RPU power-off key 78 (e.g., situations where operation of wireless transmitters is prohibited such as aircraft takeoffs and classified military briefings), RPU battery or other RPU electronics failure, misplacement of an RPU, and primary wireless link 17 interference. Note that a microphone located in the earpiece 10 is preferred to a body-worn microphone, since only an earpiece microphone 12 can be used to provide the desired default CIC hearing aid function (earpiece microphones also provide superior audio localization capabilities as the microphone moves with the user's head, and provide reduced wind and clothing noise compared with body-worn microphones). Parameters that control the stand-alone earpiece operation are stored in the earpiece CIC default parameter storage 870, which is accessed by the ASIC 845 to implement the desired stand-alone functions as described earlier. CIC default parameters include, but are not limited to, settings for the nominal and maximum allowable earpiece volume. Other information contained in the default parameter storage 870 includes, but

Claims	Prior Art
	is not limited to, the communication address and L/R (left/right) selection bit. To ensure that the CIC default parameter storage information cannot be changed inadvertently, changes are only allowed when the earpiece is not in use as, for example, when the earpiece battery 860 is being charged. A battery charging detector 840, that is sensitive to the high-level magnetic induction fields commonly used for earpiece battery charging, indicates to the ASIC 845 that the default parameter storage 870 values may be changed upon receipt of an appropriate command from the RPU. Specifically, to change information in the earpiece CIC default parameter storage 870, a user first activates the earpiece battery charging system, e.g., by placing the earpiece in a recharger/storage tray well known in the art. The RPU keyboard 946 is then used to enter a command to the DSP 948 that indicates the user's desire to change information in the default parameter storage 870, followed by the new information to be stored. The DSP 948 causes the RPU to transmit an interrogation with a reserved address code to which all earpieces being charged within the communication range of the RPU are receptive. The information that is to ultimately be loaded into the earpiece default parameter storage 870 is then transmitted by the RPU using the auxiliary bit field of many successive interrogations, said interrogations are received by the earpiece, and the desired information is loaded into the CIC default parameter storage 870 under control of the ASIC 845. Anderson '783 at 25:15–27 To obtain solicited information, user requests are processed in a variety of means well known in the art, including inputs via one or more pushbuttons on the RPU and voice recognition computer programs implemented in the RPU electronics. Voice recognition can be used almost exclusively, if desired, thereby eliminating nearly all RPU pushbutton controls. Voice commands recognized by the RPU can cause the RPU to initiate actions such as changing hearing aid parameter settings (e.g., volume), or activate appliances and environmental controls (e.g., aids for the physically handicapped) in a distributed wireless network via the secondary wireless link. Anderson '783 at 27:4–24 Hearing test: The present invention allows hearing tests to be performed via the earpiece normally worn by the user, without the need for additional expensive test equipment. All signal generation capabilities necessary to perform hearing tests are available in the hearing aid system comprising an earpiece 10 and RPU 16. Specifically, the RPU DSP 948 can be used to generate tones of varying frequencies and amplitudes, as well as other signals known to be useful for hearing test purposes (e.g., nonsense syllables) that are converted to acoustic waves by the earpiece. Such tones are used to perform a hearing test that determines appropriate gain vs. frequency parameters for a program stored in the RPU DSP 948 that performs signal enhancement to compensate for the user's hearing loss. Note that the hearing test program

Claims	Prior Art
	that controls the RPU DSP 948 during the hearing test can be temporarily stored in the RPU DSP 948 for the duration of the test, then deleted upon completion of the test to allow re-use of RPU DSP 948 memory resources during normal operation. The hearing test program may be loaded into the RPU DSP 948 through the secondary wireless link 944 or a wired peripheral link 950. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim [8a]. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
79. A hearing enhancement apparatus as recited in claim 62, wherein information regarding the at least one hearing characteristic of the user is wirelessly received and stored in the hearing enhancement apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 62, wherein information regarding the at least one hearing characteristic of the user is wirelessly received and stored in the hearing enhancement apparatus." *See* above at claim 24. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 24. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
81. A hearing enhancement apparatus as recited in claim 62, wherein the hearing enhancement apparatus is configured to alter a power level of the audio output signals so as to suppress at least a sound level associated with the	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 62, wherein the hearing enhancement apparatus is configured to alter a power level of the audio output signals so as to suppress at least a sound level associated with the environment of the apparatus so as to provide noise cancellation." *See* above at claim 16. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16.

Claims	Prior Art
environment of the apparatus so as to provide noise cancellation.	To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
82. A hearing enhancement apparatus as recited in claim 81 further comprising a microphone configured to receive audio sound at the environment of the apparatus for determining the sound level associated with the environment of the apparatus.	DHA Systems and Anderson '783 expressly or inherently disclose "[a] hearing enhancement apparatus as recited in claim 81 further comprising a microphone configured to receive audio sound at the environment of the apparatus for determining the sound level associated with the environment of the apparatus." *See* above at claim 81. A POSITA would have been motivated to combine DHA Systems with the teachings of Anderson '783 to meet the claim limitations with reasonable expectation of success for the reasons described above with respect to claim 16. To the extent that DHA Systems and Anderson '783 do not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of DHA Systems and Anderson '783 those elements, as known to them or as disclosed by other prior art identified in the cover pleading.