

EXHIBIT B-2

Invalidity of 11,644,693 in view of Radar '349

WO 03/026349 (“Radar ’349” or “Radar”), filed on September 19, 2002, and published on March 27, 2003, qualifies as prior art to U.S. Patent No. 11,644,693 (“the ’693 patent”) at least under pre-AIA 35 U.S.C. §§ 102(a), (b), and (e). Radar ’349 is an international application publication that claims priority to U.S. application no. 09/957,344, published as U.S. patent publication no. 2003/0064746 (“Rader ’746”) and issued as U.S. patent no. 6,944,474 (“Rader ’474”), all of which qualify as prior art. Radar ’349, Rader ’746, and Rader ’474 all have corresponding disclosures, and citation herein to Radar ’349 includes and incorporates by reference citations to the corresponding disclosures in Rader ’746 and Rader ’474. Radar anticipates or, alone or with other references, renders obvious one or more of the Asserted Claims of the ’693 patent. To the extent IngenioSpec contends Radar does not disclose one or more limitations of the claims, it would have been obvious to combine Radar 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 of the ’693 patent invalid. The chart below illustrates how the Asserted Claims of the ’693 patent are invalid in view of Radar and/or additional secondary references listed below, including but not limited to the prior art identified in Defendant’s Invalidity Contentions.

- U.S. Patent No. 7,187,960 (“Abreu” or “Abreu ’960”) was filed on April 22, 2003, claims priority to a provisional application filed on April 22, 2002, and published on March 25, 2004, and is thus prior art under at least 35 U.S.C. §§102(a) and (e).
- U.S. Patent No. 7,620,433 (“Bodley” or “Bodley ’433”) was filed on January 15, 2003, published on July 15, 2004, and issued on November 17, 2009, and is thus prior art under at least 35 U.S.C. §§102(a) and (e).
- U.S. Patent No. 7,046,230 (“Zadesky” or “Zadesky ’230”) was filed on July 1, 2002, published on April 24, 2003, and issued on May 16, 2006, and is thus prior art under at least 35 U.S.C. §§102(a), (b), and (e).
- U.S. Patent No. 6,671,379 (“Nemirovski” or “Nemirovski ’379”) was filed on July 31, 2001, and issued on December 30, 2003, and is thus prior art under at least 35 U.S.C. §§102(a), (b), and (e).
- U.S. Patent No. 7,150,526 (“Jannard” or “Jannard ’526”) was filed on July 28, 2003, published on August 19, 2004, and issued on December 19, 2006, and is thus prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e).
- WIPO Publication No. 2004/093490A1 (“Hollemans” or “Hollemans ’490”) was filed on April 15, 2004, and claims priority to a PCT application filed on April 18, 2003, and is thus prior art under at least 35 U.S.C. §§102(a) and (e).
- U.S. Patent Publication No 2005/0136839A1 (“Seshadri ’839” or “Seshadri”) was filed on October 27, 2004, claims priority to a provisional application filed on May 28, 2003, and published on June 23, 2005, and is thus prior art under at least 35 U.S.C. §102(e).
- U.S. Patent Publication No 2005/0226446A1 (“Luo ’446” or “Luo”), filed on April 8, 2004 and published on October 13, 2005, and is thus prior art under at least 35 U.S.C. §102(e).
- U.S. Patent No. 7,010,332B1 (“Irvin ’332” or “Irvin”), filed on February 21, 2000, was patented on March 7, 2006, and is thus prior art under at least 35 U.S.C. §102(e).
- U.S. Patent Publication No. 2005/0058313 (“Victorian” or “Victorian ’313”) was filed on September 11, 2003, and published on March 17, 2005, and is thus prior art under at least 35 U.S.C. §§102(a) and (e).

- U.S. Pat. No. 6,373,942 (“Braund”) was filed on April 7, 2000 and issued on April 16, 2002, and is thus prior art under at least 35 U.S.C. §§ 102 (a), (b), and (e).
- U.S. Pat. No. 7,979,035 (“Griffin”) was filed on Dec. 4, 2007 with a priority claim to Nov. 7, 2000, and is thus prior art under at least 35 U.S.C. § 102 (e).
- U.S. Pub. No. 2003/0068057 (“Miller”) was filed on Oct. 6, 2001 and published on Apr. 10, 2003, and is thus prior art under at least 35 U.S.C. §§ 102 (a), (b), and (e).
- U.S. Pat. No. 4,955,729 (“Marx”) was filed on Mar. 29, 1988 and issued on Sep. 11, 1990, and is thus prior art under at least 35 U.S.C. §§ 102 (a), (b), and (e).
- U.S. Pat. No. 7,542,012 (“Kato”) was filed on June 16, 2005 with a priority claim to Dec. 22, 2003 and issued on Jun. 2, 2009, and is thus prior art under at least 35 U.S.C. § 102(e).

With respect to the proposed modifications to Radar, 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.

The chart below illustrates how the asserted claims of the ’693 patent are anticipated by Radar and/or would have been obvious in view of Abreu, Bodley, Zadesky, Nemirovski, Jannard, and/or additional secondary references. The excerpts cited herein are exemplary. 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. Defendant reserves the right to further supplement this chart.

Defendant expressly reserves the right to rely on additional prior art references to demonstrate that certain features were well known in the art and would have been obvious to a POSITA as of the effective filing date of the ’693 patent, e.g., to the extent the references cited in the accompanying chart are argued or found not to expressly teach or suggest such features. For example, use of directional microphones in headworn devices, e.g., for voice recognition, receipt of audio commands, sensing of environmental sounds, and noise cancellation were well known features, and it would have been obvious to a POSITA to combine them with those of Radar for the reasons set forth below. For example, Braund discloses well-known aspects of using a microphone for voice recognition (see, e.g., Braund at 3:47-58, 6:23-27, 8:55-61) and rechargeable battery features (see, e.g., Braund at 9:6-7), as recited in at least claims 17, 25, 26, 52, 83, and 72. Griffin discloses well-known aspects of directional microphones for noise cancellation (see, e.g., Griffin at 4:21-39) and rechargeable battery features (see, e.g., 4:21-5:8, 9:26-33), as recited in at least claims 6-12, 17, 50, 51, 53, 61, and 64-72, 25, 26, 52, and 72. Miller discloses well-known aspects of directional microphones for noise cancellation (see, e.g., Miller at paras. [0044]-[0045], [0062]), as recited in at least claims 6-12, 17, 50, 51, 53, 61, and 64-72. Other well-known features include use of sensors in, on, or with headworn devices, e.g., to determine if/when headworn devices were being worn. For example, Marx discloses well-known aspects of using sensor data to determine if a device is being worn and modifying operation of the device based on that determination (see, e.g., 3:34-4:12), as recited in at least claims 23, 54, 55, 56, 57, and 73. For further example, Kato discloses well-known aspects of including an accelerometer in a head worn device (see, e.g., 35:3-9), as recited in at least claim 30.

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 ’693 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 ’693 patent, the claims are invalid for at least the reasons set forth herein.

Claims	Prior Art
1[pre]. A personal audio system operable to at least generate customized audio output, comprising:	To the extent that the preamble is found to be limiting, Radar ’349 expressly or inherently discloses “[a] personal audio system operable to at least generate customized audio output.” For example, Radar discloses a personal communication device, such as a mobile phone 200, wirelessly communicating with one or more accessories, such as headphones 10. This system implements techniques for “enhancing sound based upon an individual’s hearing profile,” including by using signal processing “to accommodate for lost functionality of the cochlea suggested by the hearing profile” of the system’s user. <i>See, e.g., id.</i> at [0001]; [0007]; FIG. 2. The hearing profile of the user is used to produce “customized audio products” based on the user’s impairment. <i>See id.</i> at [0003]. The following citations show examples of where Radar discloses this limitation. Radar ’349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar ’349 at [0017] Fig. 1 is a conceptual block diagram showing the sound processing in a personal communication device according to the present invention.

Claims	Prior Art
	Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized audio 107, which enhances the user's reception of the audio product. Radar '349 at [0030] Next generation mobile phones are incorporating features that intersect with the functionality of a small computer, music player, and organizer, and include processing resources for customizing the audio as shown in Fig. 1. Radar '349 at [0034] Fig. 2 is a simplified diagram of a mobile phone 200, representative of personal communication devices according to the present invention. The mobile phone 200 includes an antenna 201 and a radio frequency RF receiver/transmitter 202, by which the phone 200 is coupled to a wireless communication medium, according to one or more of a variety of protocols. The receiver/transmitter 202 is coupled to baseband and digital signal processor DSP processing section 203, in which the audio signals are processed and call signals are managed. A codec 204, including analog to digital and digital to analog converters, is coupled to the processing section 203. A microphone 205 and a speaker 206 are coupled to the codec 204. Radar '349 at [0035] Read only program memory 207 stores instructions, parameters and other data for execution by the processing section 203. In addition, a read/write memory 208 stores instructions, parameters and other data for use by the processing section 203. There may be multiple types of read/write memory on the device 200, such as non volatile read/write memory 208 (flash memory or EEPROM for example) and volatile read write memory 209 (DRAM or SRAM for example), as shown in Fig. 2. Other embodiments include removable memory modules in which instructions, parameters and other data for use by the processing section 203 are stored.

Claims	Prior Art
	Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0069] Once the hearing profile is acquired and stored for future use, the audio data can be customized or personalized either at the network system resource and transmitted to the phone, or delivered then personalized at a processor on the mobile phone.

Claims

Prior Art

Radar '349 at FIG. 1

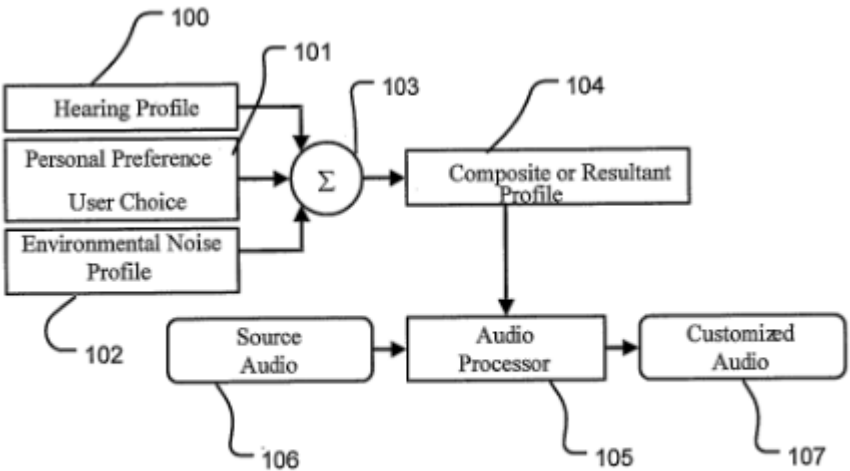


FIG. 1

Radar '349 at FIG. 2

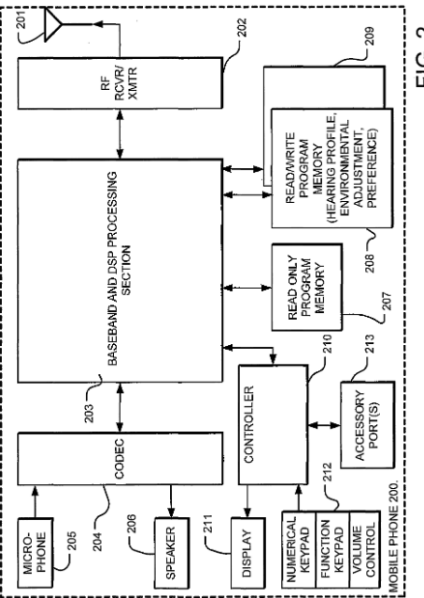
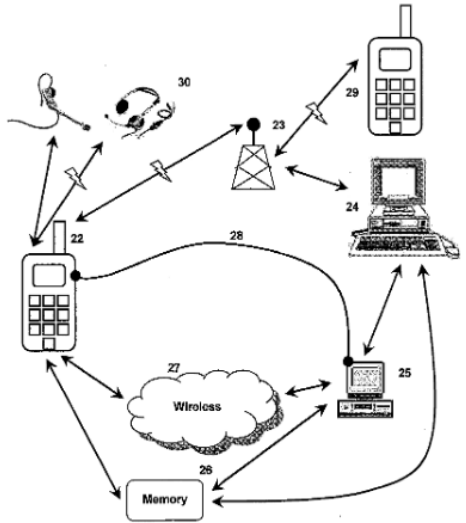


FIG. 2

Claims	Prior Art
	To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a pair of ear buds, each configured to be placed in an ear of a user; and	Radar '349 expressly or inherently discloses “a pair of ear buds, each configured to be placed in an ear of a user.” The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0031] The term “personal communication device,” of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural

Claims	Prior Art
	headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0068] • Use monaural earpiece • User binaural earpiece

Claims	Prior Art
	Radar '349 at FIG. 5 (e.g., showing an earbud attached to an over-ear support)  FIG. 5 A POSITA would understand binaural headphones to include one earpiece for each ear. It was also well known by the priority date of the '693 patent that earbuds were included in available headphones. <i>See, e.g.</i>, accessories 10. To the extent not expressly disclosed in Radar, it would have been obvious to the POSITA that the earpieces of the headphones could be ear buds that can be placed in the ear of a user. By the priority date of the '693 patent, ear buds were a well-known and ubiquitous component and/or type of headphones. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a mobile communication device at least for supporting audio output, the mobile communication device configured to store at least a hearing profile associated with the user, the stored hearing profile associated with the user at least	Radar '349 expressly or inherently discloses “a mobile communication device at least for supporting audio output, the mobile communication device configured to store at least a hearing profile associated with the user, the stored hearing profile associated with the user at least characterizes hearing impairment regarding the user's ability to hear.” For example, Radar discloses a personal communication device including an audio processor that can apply a hearing profile to a source audio stream to produce customized audio for the user and memory for storing the user's profile.

Claims	Prior Art
characterizes hearing impairment regarding the user's ability to hear,	The following citations show examples of where Radar discloses this limitation. Radar '349 at Abstract A mobile phone or other personal communication device includes resources applying measures of an individual's hearing profile (100), personal choice profile (101), and induced hearing loss profile, separately or in combination, to build the basis of sound enhancement. Radar '349 at [0001] The present invention relates the field of sound enhancement for mobile phones and other products which produce audio for users, and more particularly to techniques for enhancing sound based upon an individual's hearing profile, based upon environmental factors like noise-induced hearing impairment, and based on personal choice. Radar '349 at [0006] Mobile phones are inherently personal communication devices. Radar '349 at [0007] The invention disclosed herein is designed to enhance the reception of audio by the listener using a personal communication device, based upon measuring a person's hearing impairment, environmental factors which are modeled as induced hearing loss, and personal choice, and then utilizing signal processing to accommodate for lost functionality of the cochlea suggested by the hearing profile, and to enhance the sound based upon environmental factors, like background noise, and personal choice. Radar '349 at [0008] According to the present invention, a mobile phone or other personal communication device includes resources applying measures of an individual's hearing profile, personal choice profile, and induced hearing loss profile, separately or in combination, to build the basis of sound enhancement. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic

Claims	Prior Art
	applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0011] In one embodiment, a personal communication device includes control circuitry which applies a composite profile in processing the audio signals, where the composite profile comprises a set of parameters based upon more than one of the hearing profile of the user, the user preference related hearing, and environmental noise factors. In various embodiments, the control circuitry applies more than one of the hearing profile of the user, the user preference related hearing, and environmental noise factors independently in processing the audio signals. Such processing may be done in series by the control circuitry, or in parallel. Radar '349 at [0014] According to one embodiment of the invention, the personal communication device comprises a mobile phone including an antenna. In this embodiment, the transmitter/receiver comprises a radio coupled to the antenna, and the communication medium is wireless. Radar '349 at [0017] Fig. 1 is a conceptual block diagram showing the sound processing in a personal communication device according to the present invention. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized

Claims	Prior Art
	audio 107, which enhances the user's reception of the audio product. Radar '349 at [0029] In one preferred embodiment, the personal communication device is a mobile phone. Radar '349 at [0030] Next generation mobile phones are incorporating features that intersect with the functionality of a small computer, music player, and organizer, and include processing resources for customizing the audio as shown in Fig. 1. Radar '349 at [0031] The term "personal communication device," of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0034] Fig. 2 is a simplified diagram of a mobile phone 200, representative of personal communication devices according to the present invention. The mobile phone 200 includes an antenna 201 and a radio frequency RF receiver/transmitter 202, by which the phone 200 is coupled to a wireless communication medium, according to one or more of a variety of protocols. The receiver/transmitter 202 is coupled to baseband and digital signal processor DSP processing section 203, in which the audio signals are processed and call signals are managed. A codec 204, including analog to digital and digital to analog converters, is coupled to the processing section 203. A microphone 205 and a speaker 206 are coupled to the codec 204.

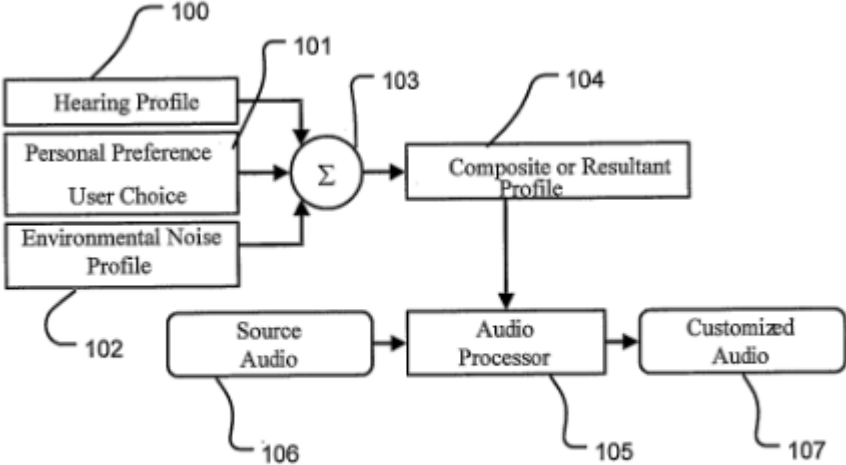
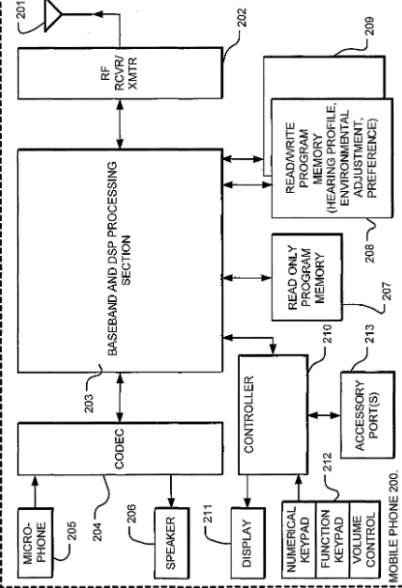
Claims	Prior Art
	Radar '349 at [0035] Read only program memory 207 stores instructions, parameters and other data for execution by the processing section 203. In addition, a read/write memory 208 stores instructions, parameters and other data for use by the processing section 203. There may be multiple types of read/write memory on the device 200, such as non volatile read/write memory 208 (flash memory or EEPROM for example) and volatile read write memory 209 (DRAM or SRAM for example), as shown in Fig. 2. Other embodiments include removable memory modules in which instructions, parameters and other data for use by the processing section 203 are stored. Radar '349 at [0037] In this embodiment of the present invention, the composite or resultant hearing profile 104 of Fig. 1 is stored in the read/write program memory 208. In addition, instructions for algorithms are stored in the memory 207-209 for use in applying the profile information during the processing of the audio signals. Radar '349 at [0038] At any given frequency, the threshold of audibility of a tone can be elevated by a hearing loss at that frequency and by masking of that frequency by competing noise. For normal hearing listeners, the amount of masking at any frequency can be calculated by filtering the amount of noise power out of an auditory filter centered at the frequency of interest. When someone has a hearing loss, there are two factors that can affect audibility at that frequency: the hearing loss and the masking from the noise. Accurately determining the combined result of these two effects is important in order to properly set the parameters of the signal processing algorithm that compensates for reduced audibility. Given the spectral density of a noise, the masked threshold can be calculated for someone with normal hearing by the application of normal auditory filters. The masked threshold of someone with a hearing impairment will depend on the combination of the masking level of the noise and the level of the impairment at each frequency. The threshold from the combined effect (TH_{tot}) should be predictable from the threshold due to the impairment (TH_i) and the masked threshold for normals (TH_m). In alternative systems, the threshold due to impairment TH_i could be replaced by, or supplemented with, a threshold parameter TH_e provided in response to information about a users personal choice, where the subscript “c” represents personal choice for profile. Radar '349 at [0047] Fig. 3 is a schematic representation of possible methods of acquiring a hearing profile with sub-components of an entire mobile phone system. The mobile phone 1 can be used to present acoustic

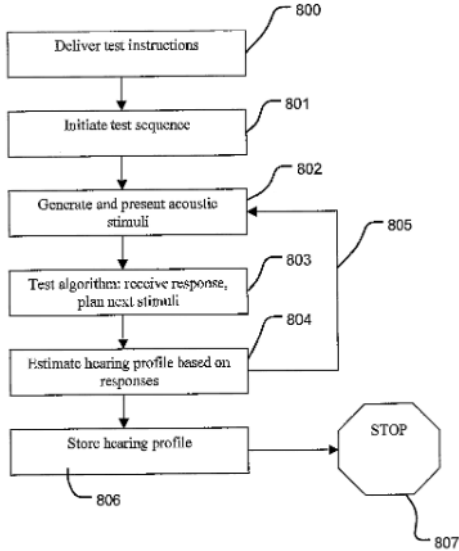
Claims	Prior Art
	stimuli, obtain user feedback, and calculate the hearing profile of an individual using only on-board memory and processing systems. Mobile phones communicate with remote systems or other phones through cellular transceivers 2. Another method for presenting acoustic stimuli would be through the use of a remote system 3 for generation of stimuli and possibly reception of user feedback. Acoustic stimuli presentation and user response could be managed at either the mobile phone 1 or at the remote system 3 in any combination. Radar '349 at [0048] The processing system 4 shown in Fig. 3 may be computation resources that are not on board the mobile phone, but may be in close proximity. Examples could be a base station for a handset mounted in an automobile, a telematics system that communicates to the handheld unit, or a mobile computer (or PDA) with processing resources independent of the systems of the mobile phone. The processing system of 4 could have the hearing profile of the listener pre-loaded or transmitted to it by a data source 5. Once the profile is transferred to the processing system 4, the hearing profile could be transferred to the mobile phone via a wireless local transfer 7, presentation of a PIN (personal identification number) to a user to type in or transfer of a PIN 8 into the mobile phone 1, or through a direct (such as via a wire) connection 9. Independently of a processing system 4, a hearing profile could be transferred to the mobile phone 1 by a memory storage medium 6, or through the transmission system incorporating the remote system 3, the transceiver system 2, and wireless transmission to the resources of the mobile phone 1 for incorporation of the profile into the memory or audio processor of the mobile phone 1. Protocols such as the Wireless Short Message Service SMS which is in common use with mobile phones, can be used for downloading programs and data to support the loading of a hearing profile on a phone or other personal communication device. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the present invention. The process includes delivering test instructions to the person from whom the hearing profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block

Claims	Prior Art
	801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them • User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli • telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer • Use monaural earpiece • User binaural earpiece • Phone to free field transducer for acoustic stimuli • Hold phone and use internal speaker in speaker phone mode

Claims	Prior Art
	• Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803) • Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor • At network system resources • Store hearing profile (806) • Profile Stored Automatically • Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal mobile phone data storage • Network system resources store profile at central location and associate profile with phone identification

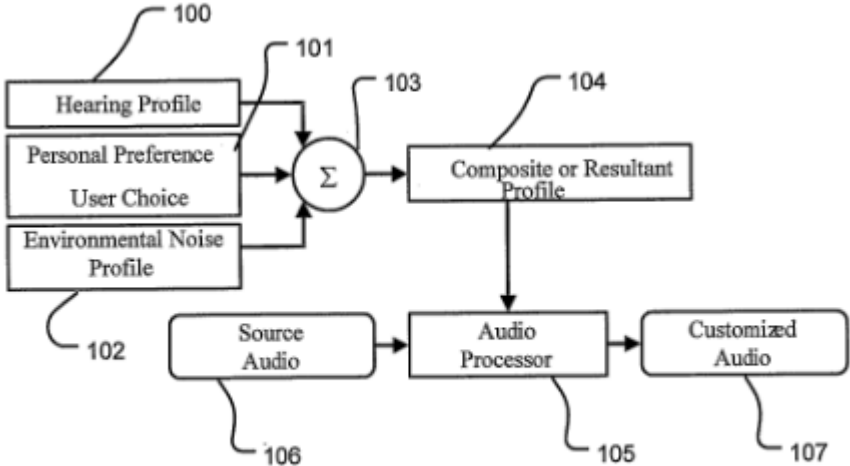
Claims	Prior Art
	• User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone Radar '349 at [0069] Once the hearing profile is acquired and stored for future use, the audio data can be customized or personalized either at the network system resource and transmitted to the phone, or delivered then personalized at a processor on the mobile phone. Radar '349 at [0072] A system is provided, suitable for use with wireless communication or portable entertainment devices, that compensates for the apparent hearing loss that is known to manifest itself when listening in a noisy environment. This system is of great interest especially for wireless communication devices because wireless usage patterns naturally include environments that are substantially noisier than the environments typical in traditional PSTN (Public Switched Telephone Network) usage. Such noisy environments include public social environments (restaurants, bars), in-automobile environments, public transportation environments (subways, trains, airports) and other common situations (shopping locations and city/traffic noise).

Claims	Prior Art
	Radar '349 at FIG. 1  FIG. 1 Radar '349 at FIG. 2  FIG. 2

Claims	Prior Art
	Radar '349 at FIG. 8  <pre> graph TD 800[Deliver test instructions] --> 801[Initiate test sequence] 801 --> 802[Generate and present acoustic stimuli] 802 --> 803[Test algorithm: receive response, plan next stimuli] 803 -- 805 --> 802 803 --> 804[Estimate hearing profile based on responses] 804 --> 806[Store hearing profile] 806 --> 807{STOP} </pre> FIG. 8 A POSITA would understand a hearing profile that accommodates for lost cochlea functionality to characterize hearing impairment regarding the user's ability to hear. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] the mobile communication device configured to produce audio output signals customized for the user based on at least the stored hearing profile associated with the user such that the customized audio output signals at least compensate for the hearing impairment regarding the user's ability to hear,	Radar '349 expressly or inherently discloses “the mobile communication device configured to produce audio output signals customized for the user based on at least the stored hearing profile associated with the user such that the customized audio output signals at least compensate for the hearing impairment regarding the user's ability to hear.” For example, Radar discloses that the processor applies the profile information during the processing of audio signals to generate customized audio that provides an accommodation for the user's lost functionality of his or her cochlea. The following citations show examples of where Radar discloses this limitation.

Claims	Prior Art
	Radar '349 at [0006] Mobile phones are inherently personal communication devices. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0011] In one embodiment, a personal communication device includes control circuitry which applies a composite profile in processing the audio signals, where the composite profile comprises a set of parameters based upon more than one of the hearing profile of the user, the user preference related hearing, and environmental noise factors. In various embodiments, the control circuitry applies more than one of the hearing profile of the user, the user preference related hearing, and environmental noise factors independently in processing the audio signals. Such processing may be done in series by the control circuitry, or in parallel. Radar '349 at [0017] Fig. 1 is a conceptual block diagram showing the sound processing in a personal communication device according to the present invention. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized audio 107, which enhances the user's reception of the audio product.

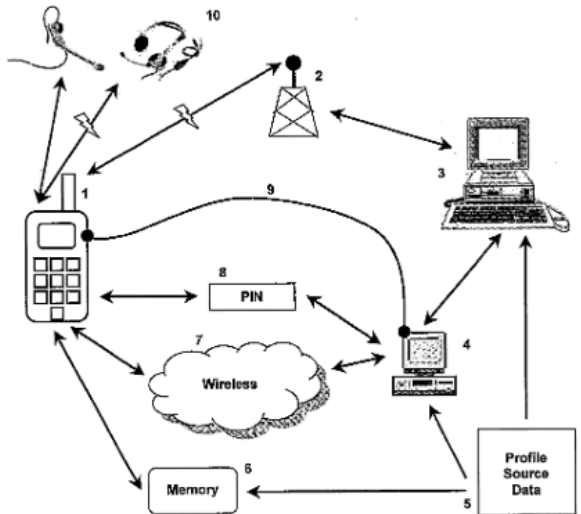
Claims	Prior Art																																																												
	Radar '349 at [0037] In this embodiment of the present invention, the composite or resultant hearing profile 104 of Fig. 1 is stored in the read/write program memory 208. In addition, instructions for algorithms are stored in the memory 207-209 for use in applying the profile information during the processing of the audio signals. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at Table 1 TABLE 1 <table><tr><td>Hearing profile acquisition</td><td>A</td><td>Test algorithm local</td><td>Sound generation local</td></tr><tr><td></td><td>1</td><td></td><td></td></tr><tr><td></td><td>A2</td><td>Test algorithm local</td><td>Sound generation remote</td></tr><tr><td></td><td>A3</td><td>Test algorithm remote</td><td>Sound generation remote</td></tr><tr><td></td><td>A4</td><td>Test algorithm remote</td><td>Sound generation local</td></tr><tr><td></td><td>A5</td><td>Choice matrix</td><td>Sound generation local</td></tr><tr><td></td><td>A6</td><td>Choice matrix</td><td>Sound generation remote</td></tr><tr><td>Profile transfer and storage</td><td>B1</td><td>No user interaction</td><td>Local storage</td></tr><tr><td></td><td>B2</td><td>User interaction</td><td>Local storage</td></tr><tr><td></td><td>B3</td><td>Transfer to remote</td><td>Local storage</td></tr><tr><td></td><td>B4</td><td>Transfer to local</td><td>Remote storage</td></tr><tr><td></td><td>B5</td><td>User interaction</td><td>Remote storage</td></tr><tr><td></td><td>B6</td><td>No user interaction</td><td>Remote storage</td></tr><tr><td>Customization of audio data</td><td>C1</td><td>Remote customization</td><td>Delivery to local</td></tr><tr><td></td><td>C2</td><td>Generic audio delivery</td><td>Customization locally</td></tr></table> Radar '349 at [0063] Customization of audio data can be accomplished by using systems remote from the mobile phone, and delivering the customized or personalized audio to the mobile phone for playback. The alternative is to deliver unprocessed audio to the mobile phone, and use the resources of the mobile phone or an accessory to personalize the audio.	Hearing profile acquisition	A	Test algorithm local	Sound generation local		1				A2	Test algorithm local	Sound generation remote		A3	Test algorithm remote	Sound generation remote		A4	Test algorithm remote	Sound generation local		A5	Choice matrix	Sound generation local		A6	Choice matrix	Sound generation remote	Profile transfer and storage	B1	No user interaction	Local storage		B2	User interaction	Local storage		B3	Transfer to remote	Local storage		B4	Transfer to local	Remote storage		B5	User interaction	Remote storage		B6	No user interaction	Remote storage	Customization of audio data	C1	Remote customization	Delivery to local		C2	Generic audio delivery	Customization locally
Hearing profile acquisition	A	Test algorithm local	Sound generation local																																																										
	1																																																												
	A2	Test algorithm local	Sound generation remote																																																										
	A3	Test algorithm remote	Sound generation remote																																																										
	A4	Test algorithm remote	Sound generation local																																																										
	A5	Choice matrix	Sound generation local																																																										
	A6	Choice matrix	Sound generation remote																																																										
Profile transfer and storage	B1	No user interaction	Local storage																																																										
	B2	User interaction	Local storage																																																										
	B3	Transfer to remote	Local storage																																																										
	B4	Transfer to local	Remote storage																																																										
	B5	User interaction	Remote storage																																																										
	B6	No user interaction	Remote storage																																																										
Customization of audio data	C1	Remote customization	Delivery to local																																																										
	C2	Generic audio delivery	Customization locally																																																										

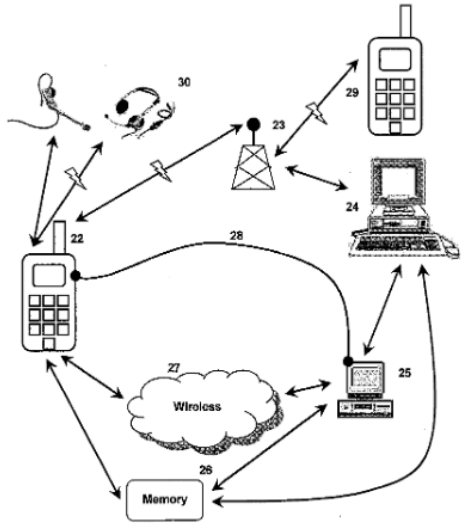
Claims	Prior Art
	Radar '349 at [0069] Once the hearing profile is acquired and stored for future use, the audio data can be customized or personalized either at the network system resource and transmitted to the phone, or delivered then personalized at a processor on the mobile phone. Radar '349 at FIG. 1  FIG. 1 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] the mobile communication device configured to produce the customized audio output signals using at least signal amplification, and	Radar '349 expressly or inherently discloses “the mobile communication device configured to produce the customized audio output signals using at least signal amplification,” for example, by disclosing that the signal processing algorithm used to produce customized audio “replicates the compressive function of the healthy cochlea,” where compression is “functionally an automatic gain control (AGC) within the personal communication device.” The following citations show examples of where Radar discloses this limitation.

Claims	Prior Art
	Radar '349 at [0045] The effect environmental noise on auditory perception is to reduce the dynamic range available for sounds above the masking level of the environmental noise and to cause abnormal loudness perception of sound heard simultaneously with the noise. Sound ID's Full Frequency Dynamic Compression (FFDC) replicates the compressive function of the healthy cochlea, compressing sound such that the audio signal is no longer distorted in the auditory system and perception is restored to normal. Radar '349 at [0046] Compression is functionally an automatic gain control (AGC) within the personal communication device, where the gain reduces as the signal level increases. In order to properly compensate for reduced audibility from the environmental noise, the compression processes the signal in the same way that the cochlea's AGC processes sound in a quiet environment. The input-output function of such a compressor when measured with a quasi-steady-state pure-tone will have a compressive region that has a slope less than or equal to one over a wide dynamic input range (>40 dB), with possible linear regions below and above the compressive region. The gain and compression ratio can vary with frequency and will be monotonic with the noise power in that frequency region. The slope of the compressive region can have values that restore loudness perception to normal in that frequency region, and will have slopes that range from 1 (no compression) to $1/3$ (3:1 compression). Because the amount of gain added at any frequency is a function of the power of the signal in that frequency region, the compressor calculates power and applies gain using auditory filter bandwidths that replicate normal critical bands in human hearing. The AGC may be implemented using software executed by a processor in the personal communication device, or by dedicated circuits, or by a combination of these techniques. A POSITA would understand that at the time of the invention, compression was a well-known and ubiquitous audio signal processing operation for reducing dynamic range that includes both reducing loud signals and amplifying quiet signals. A POSITA would also understand that automatic gain control is a common technique for regulating amplifiers to control the amplitude of an output signal. Because of this, a POSITA would understand the signal processing performed by Radar's mobile phone to use at least signal amplification. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[1e] the mobile communication device configured to transmit the customized audio output signals to the pair of ear buds,	Radar '349 expressly or inherently discloses “the mobile communication device configured to transmit the customized audio output signals to the pair of ear buds,” for example by disclosing that the personal communication device provides customized audio to the user, for example, through accessories 10, which include headsets. <i>See, e.g., id.</i> at [0060]. A POSITA would therefore understand that Radar’s mobile phone provides the customized audio to binaural headphones including a pair of ear buds, as explained above for element [1a]. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various embodiments of the present invention. Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized audio 107, which enhances the user’s reception of the audio product. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage

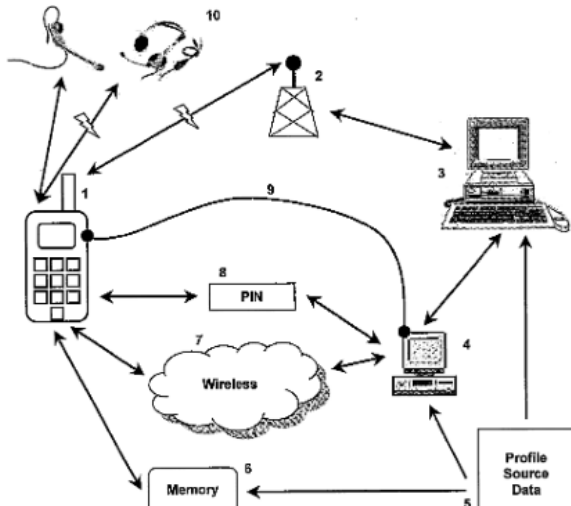
Claims	Prior Art
	device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0063] Customization of audio data can be accomplished by using systems remote from the mobile phone, and delivering the customized or personalized audio to the mobile phone for playback. The alternative is to deliver unprocessed audio to the mobile phone, and use the resources of the mobile phone or an accessory to personalize the audio.

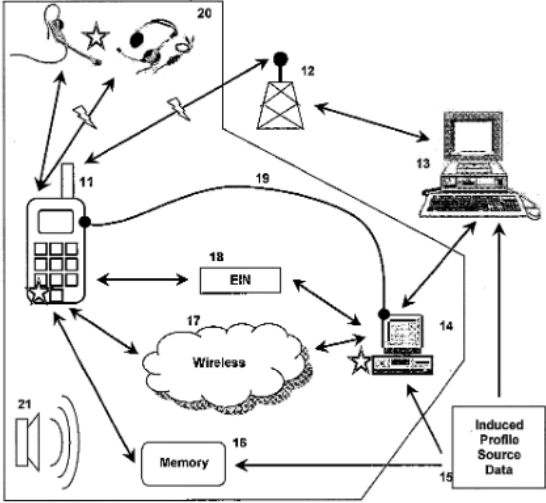
Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1f] wherein each of the ear buds is configured to receive at least a portion of the customized audio output signals transmitted by the mobile communication device, and	Radar '349 expressly or inherently discloses “wherein each of the ear buds is configured to receive at least a portion of the customized audio output signals transmitted by the mobile communication device.” For example, as described above for element [1e], Radar discloses that binaural headphones can be connected to a mobile phone via an accessory port, and that the mobile phone can produce customized audio that is presented to the user through those headsets. <i>See e.g. id.</i>, at [0060]. A POSITA would have understood that each earpiece (e.g., ear bud) of a pair of headphones receives at least a portion of the audio signals transmitted by the mobile phone, for example, in view of Radar’s disclosure that the headphones can be binaural and that customized audio is presented to the user via the accessories. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile

Claims	Prior Art
	generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various embodiments of the present invention. Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized audio 107, which enhances the user's reception of the audio product. Radar '349 at [0031] The term "personal communication device," of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The

Claims	Prior Art
	accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0063] Customization of audio data can be accomplished by using systems remote from the mobile phone, and delivering the customized or personalized audio to the mobile phone for playback. The alternative is to deliver unprocessed audio to the mobile phone, and use the resources of the mobile phone or an accessory to personalize the audio.

Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

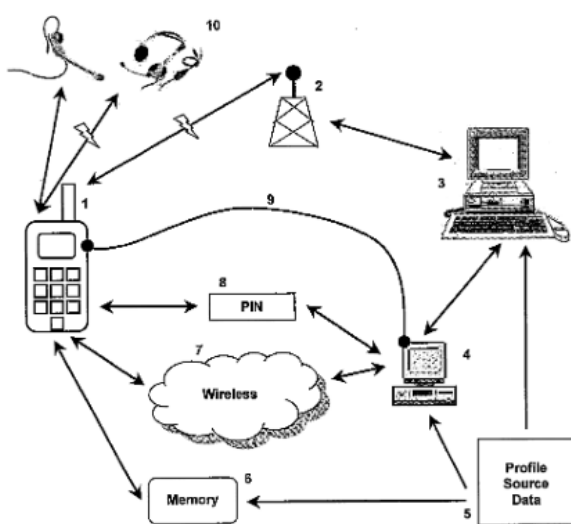
Claims	Prior Art
	Radar '349 at FIG. 5 FIG. 5 To the extent that Radar '349 does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1g] wherein each of the ear buds is configured to generate at least a portion of the customized audio output for the user in accordance with at least the portion of the customized audio output signals being received.	Radar '349 expressly or inherently discloses “wherein each of the ear buds is configured to generate at least a portion of the customized audio output for the user in accordance with at least the portion of the customized audio output signals being received.” For example, Radar discloses that a headset used with a personal communication device includes a speaker, and that binaural headphones can be used. A POSITA would have understood a pair of binaural headphones to include two speakers (i.e., one for each ear) and that each ear bud of a pair of binaural headphones generates at least a portion of the customized audio provided to the headphones. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal

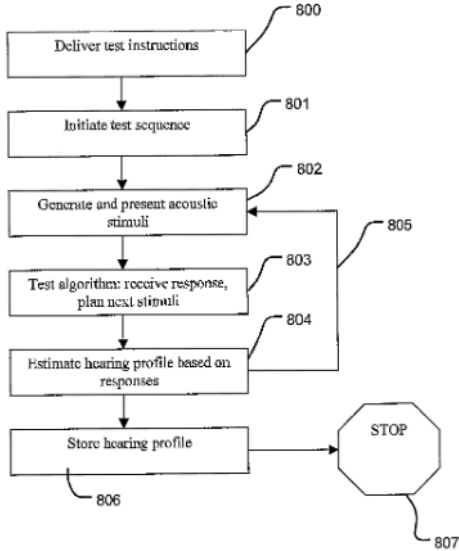
Claims	Prior Art
	speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets.

Claims	Prior Art
	A POSITA would understand the speakers to generate audio output corresponding to the audio signals that the speaker receives as input, because this is the function of a speaker. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. A personal audio system as recited in claim 1, wherein the mobile communication device is configured to establish the hearing profile for the user.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the mobile communication device is configured to establish the hearing profile for the user,” for example, by disclosing that the mobile phone can be used to “present acoustic stimuli, obtain user feedback, and calculate the hearing profile of an individual using only on-board memory and processing systems.” <i>See, e.g., id.</i> at [0047]. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition. Radar '349 at [0047] Fig. 3 is a schematic representation of possible methods of acquiring a hearing profile with sub-components of an entire mobile phone system. The mobile phone 1 can be used to present acoustic stimuli, obtain user feedback, and calculate the hearing profile of an individual using only on-board memory and processing systems. Mobile phones communicate with remote systems or other phones through cellular transceivers 2. Another method for presenting acoustic stimuli would be through the use of a remote system 3 for generation of stimuli and possibly reception of user feedback. Acoustic stimuli presentation and user response could be managed at either the mobile phone 1 or at the remote system 3 in any combination. Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the present invention. The process includes delivering test instructions to the person from whom the hearing profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block

Claims	Prior Art
	801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them • User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli • telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer • Use monaural earpiece • User binaural earpiece • Phone to free field transducer for acoustic stimuli • Hold phone and use internal speaker in speaker phone mode

Claims	Prior Art
	• Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803) • Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor • At network system resources • Store hearing profile (806) • Profile Stored Automatically • Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal mobile phone data storage • Network system resources store profile at central location and associate profile with phone identification

Claims	Prior Art
	• User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
	Radar '349 at FIG. 8  FIG. 8 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
3. A personal audio system as recited in claim 2, wherein the hearing profile for the user is established by the mobile communication device at least via generating audio tones and outputting such to one or more of the ear buds and receiving a user indication corresponding to the user's ability to hear the generated audio tones.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 2, wherein the hearing profile for the user is established by the mobile communication device at least via generating audio tones and outputting such to one or more of the ear buds and receiving a user indication corresponding to the user's ability to hear the generated audio tones,” for example, by disclosing that the mobile phone presents acoustic stimuli, which a POSITA would understand to include audio tones, to the user, for example, via the binaural earpieces, to calculate the hearing profile. The user then provides a “subject response,” for example via a user interface of the phone, which a POSITA would understand to correspond to the user’s ability to hear the generated acoustic stimuli. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0007] The invention disclosed herein is designed to enhance the reception of audio by the listener using a personal communication device, based upon measuring a person’s hearing impairment, environmental

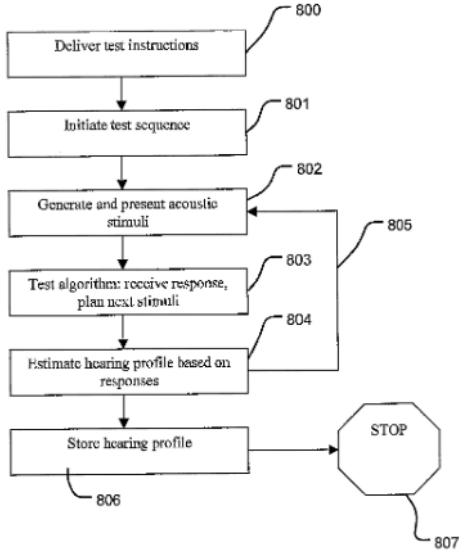
Claims	Prior Art
	factors which are modeled as induced hearing loss, and personal choice, and then utilizing signal processing to accommodate for lost functionality of the cochlea suggested by the hearing profile, and to enhance the sound based upon environmental factors, like background noise, and personal choice. Radar '349 at [0013] In yet another embodiment, the device includes resources for obtaining a hearing profile for a user from a remote source, such as a server coupled to the communication medium. Alternatively, the device may include resources to prompt a user to provide information specifying the hearing profile of the user. In addition, the device may include resources for prompting the user to enter user preference information. In various embodiments, this device includes resources to prompt a user to provide information for use in defining a hearing profile, such as by prompting the user through a hearing test, in which audio stimuli used in the test are produced using transducers, such as the speaker on the device, a speaker attached to the device, or a speaker in a headset coupled to the device. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0036] The controller 210 is coupled to the processing section 203. User input concerning call set up and management, and concerning use of the hearing profile, user preference and environmental noise factors is received via the input devices 212 and optionally via accessories. User interaction is enhanced, and the user is prompted to interact, using the display 211 and optionally other accessories. Input may also be received via the microphone 205 supported by voice recognition programs, and user interaction and prompting may utilize the speaker 206 for various purposes.

Claims	Prior Art
	Radar '349 at [0047] Fig. 3 is a schematic representation of possible methods of acquiring a hearing profile with sub-components of an entire mobile phone system. The mobile phone 1 can be used to present acoustic stimuli, obtain user feedback, and calculate the hearing profile of an individual using only on-board memory and processing systems. Mobile phones communicate with remote systems or other phones through cellular transceivers 2. Another method for presenting acoustic stimuli would be through the use of a remote system 3 for generation of stimuli and possibly reception of user feedback. Acoustic stimuli presentation and user response could be managed at either the mobile phone 1 or at the remote system 3 in any combination. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0055] The personal choice of an individual may be important in setting customization parameters for delivery of enhanced audio. Similar to the audio delivery section to follow, the creation of personal choice of audio requires generation of example audio sections to allow the user to choose preferences. Fig. 5 schematically shows audio delivery and use for a mobile phone. The audio sources described are used alone or in various combinations to present the user with audio selections upon which preference decisions may be made. Several interactive user interface methods of obtaining user preference are applied by the mobile phone, or other system, including the two alternative forced choice test protocol, the three alternative forced choice test 'protocol, matrix navigation test protocols, or staircase test protocols to get user feedback of preference. Radar '349 at [0056] Two alternative forced choice (2AFC) test protocols involve presentation of two audio choices, and forcing the user to select the one which sounds better. This choice could be followed by other 2AFC presentations, or upon satisfactory determination of preference setting the preference profile to the last selection of the user. Three alternative forced choice (3AFC) presents the user with three alternatives, two

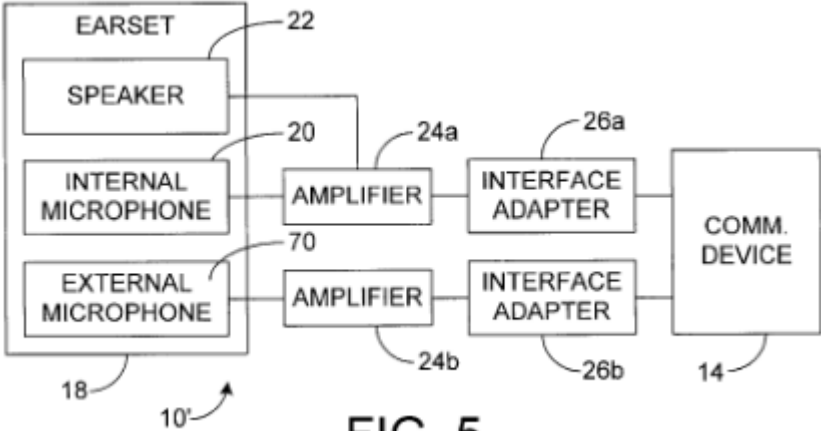
Claims	Prior Art
	of which are the same and the third which is different. Again, navigation through the forced choices will allow, at the conclusion of the test, determination of the user's preference profile. Radar '349 at [0061] Fig. 6 conceptually shows a mobile phone product (or other personal communication device) design space including the intersection of the three variables - hearing profile acquisition, profile transfer and storage, and customization of audio data - that define the possible means of personalization of audio. Fig. 3 illustrates several unique ways in which a hearing profile may be obtaining using the mobile phone system, the first variable of Fig. 6. As shown in Table 1 below, there are two distinct components of obtaining the hearing profile: (1) test algorithm or choice matrix location, and (2) sound generation location. Including separation of a test algorithm from a choice matrix, the combination of these variables leaves six methods for acquisition of a hearing profile. The other two variables in the design space for personalization are the transfer and storage of a hearing profile, and the customization of audio data. Radar '349 at [0063] Customization of audio data can be accomplished by using systems remote from the mobile phone, and delivering the customized or personalized audio to the mobile phone for playback. The alternative is to deliver unprocessed audio to the mobile phone, and use the resources of the mobile phone or an accessory to personalize the audio. Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the present invention. The process includes delivering test instructions to the person from whom the hearing profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block 801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them

Claims	Prior Art
	• User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli • telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer • Use monaural earpiece • User binaural earpiece • Phone to free field transducer for acoustic stimuli • Hold phone and use internal speaker in speaker phone mode • Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803)

Claims	Prior Art
	• Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor • At network system resources • Store hearing profile (806) • Profile Stored Automatically • Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal mobile phone data storage • Network system resources store profile at central location and associate profile with phone identification • User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone

Claims	Prior Art
	Radar '349 at FIG. 8  <pre> graph TD 800[Deliver test instructions] --> 801[Initiate test sequence] 801 --> 802[Generate and present acoustic stimuli] 802 --> 803[Test algorithm: receive response, plan next stimuli] 803 -- 805 --> 802 803 --> 804[Estimate hearing profile based on responses] 804 --> 806[Store hearing profile] 806 --> 807{STOP} </pre> FIG. 8 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
4. A personal audio system as recited in claim 1, wherein the signal amplification is frequency-dependent amplification.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the signal amplification is frequency-dependent amplification.” For example, as discussed above for element [1d], Radar discloses that the signal processing algorithm used to produce customized audio “replicates the compressive function of the healthy cochlea,” where compression is “functionally an automatic gain control (AGC) within the personal communication device,” and that the “gain and compression ratio can vary with frequency.” <i>See, e.g., id.</i> at [0045]–[0047]. A POSITA would therefore understand that the relative amounts of compression and gain (and thus the amount of amplification) of a signal depends on frequency. <i>See</i> above at claim [1d]. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
5[pre]. A personal audio system as recited in claim 1, wherein each of the earbuds includes a speaker, and	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein each of the earbuds includes a speaker,” for example, as explained above for element [1a], e.g., by disclosing that a headset to be used with a personal communication device can include a speaker and be a pair of binaural headphones. Ear buds were commonly used in or as headphones by the effective filing date of the '693 patent, and a POSITA would understand Radar to disclose a pair of ear buds (i.e., one for each of the user's two ears), where each ear bud includes a speaker. <i>See above at claim [1a].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[5a] wherein the at least a portion of the customized audio output being generated by each of the ear buds is generated by the corresponding speaker.	Radar '349 expressly or inherently discloses “wherein the at least a portion of the customized audio output being generated by each of the ear buds is generated by the corresponding speaker.” For example, as discussed above, Radar discloses binaural headphones, and that the headphones include a speaker, and a POSITA would understand the headphones to include a speaker for each ear. Given that Radar's headphones are binaural, a POSITA would have understood that at least a portion of the of the customized audio generated by each ear bud of the headphones is generated by its corresponding speaker. <i>See above at claim [1g].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
6. A personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises an array of microphones configured for directional audio pickup.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises an array of microphones configured for directional audio pickup.” For example, Radar discloses a headset with a microphone: Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control

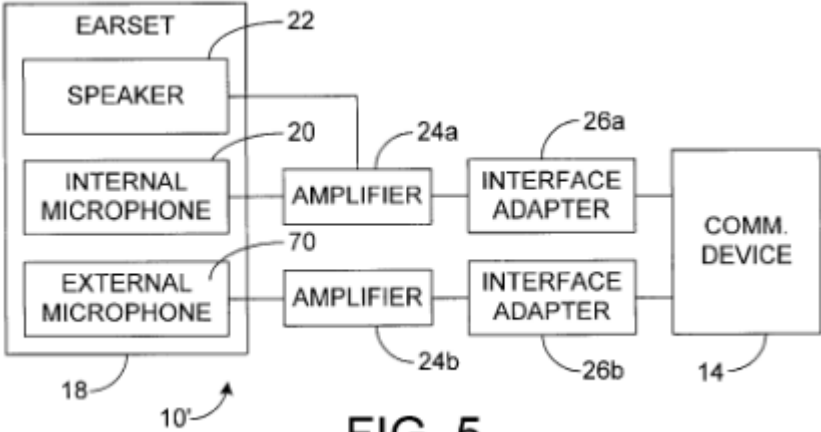
Claims	Prior Art
	circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. To the extent that Radar is found not to disclose a microphone array for directional audio pickup, Nemirovski expressly or inherently discloses it. The following citations show examples of where Nemirovski discloses this limitation. Nemirovski '379 at FIG. 5  FIG. 5 Nemirovski '379 at 3:6–23 The present invention is directed to a communication system, including a communications device and an ear microphone, or earset, assembly. The communications system allows a user to speak with a remotely located person. The ear microphone assembly, also referred to herein as an earset, includes a microphone and a speaker supported by a housing. The housing is retained by the ear of the user and allows for hands free use of the communication system while carrying on a conversation with the remotely located person. The microphone is directed towards the ear canal of the user and detects sounds emanating or coming out of the ear (or air pressure changes occurring within the ear) to accurately and reliably detect the speech of the user. The position of the microphone may also help to reduce detection of externally generated sounds. The ear microphone assembly allows for separation of a speech input device for a cellular, or wireless, telephone from an RF transceiver of the telephone.

Claims	Prior Art
	Nemirovski '379 at 9:45–60 FIG. 5 is a block diagram that illustrates a system 10' for detecting speech of the user. The system 10' includes the earset 18 having the internal microphone 20, the speaker 22 and amplifier 24a as described in greater detail above. In addition, the earset 18 of the system 10' has the external microphone 70. As one skilled in the art will appreciate, the use of the external microphone 70 is optional. The external microphone 70 is disposed on the housing 30 (FIG. 3) and generally points away from the person wearing the earset 18. As a result, the external microphone 70 detects air pressure changes located outside the ear. These air pressure changes are mainly the result of externally generated noise (other people's speech, environmental noise, etc.) and, in part, to the speech of the person wearing the earset 18, when the speech travels from the mouth of the user and through the air to the external microphone 70. A POSITA would have been motivated to combine Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success. Radar discloses a sound enhancement system that includes a communication device and a headset. Radar describes the communication device in detail but does not provide specific details of the headset, aside from the fact that the headset can include a microphone and speaker. Accordingly, the POSITA would have looked to Nemirovski to fill in the missing details of the headset, since Nemirovski discloses an earset that can communicate with a communication device similar to the ones described in Radar. Nemirovski's earset also includes analogous and familiar components to those described in Radar (e.g., microphones and speakers). Nemirovski's earset therefore would have been readily combinable with Radar's system by the POSITA with a reasonable expectation of success. This limitation would have been known to a person having ordinary skill in the art at the time of the invention and/or rendered obvious in view of Nemirovski. For example, Nemirovski discloses an earset having an internal microphone and an external microphone. <i>See</i> Nemirovski at 9:46-50, FIG. 5. A POSITA would have combined Radar's headset with Nemirovski's multiple microphone teachings to improve speech detection and noise cancellation, among the other reasons discussed in this chart. Nemirovski's internal microphone is "directed towards the ear canal of the user and detects sounds emanating or coming out of the ear (or air pressure changes occurring within the ear) to accurately and reliably detect the speech of the user." <i>See</i> Nemirovski at 3:15-18. The external microphone "generally points away from the person wearing the earset" and detects air pressure changes outside of the ear that result from "externally generated noise (other people's speech, environmental noise, etc.)" as well as "the speech of the person wearing the earset." <i>See id.</i> at 9:53-58. Thus, in the combination, a first microphone (the internal microphone) picks up audio from a user and a second microphone (the external microphone) picks up audio generated outward away from the user. A POSITA would have understood this array of microphones, as well as each of the individual microphones, to be configured for directional audio pickup based on their placement. Nemirovski teaches that the internal

Claims	Prior Art
	microphone is directed toward the ear canal to detect user-generated sounds while being shielded from external noise, whereas the external microphone is oriented away from the user to detect environmental sounds. <i>See id.</i> at 9:19-35. Although the microphones themselves may be omnidirectional, the microphones are <i>configured</i> for directional audio pickup by their positions relative to the ear and the apparatus. <i>See id.</i> at 3:34-36, 7:13-14, 9:43-44. For example, the internal microphone is “shielded from environmental noise” by the housing and the user’s head, which directionally blocks external sound, while the external microphone directionally detects ambient sound outside the ear “[a]s a result” of its outward orientation. <i>See id.</i> at 7:8-14, 9:51-55. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
7. A personal audio system as recited in claim 6, wherein direction of the directional audio pickup is in front of the user.	Radar ’349 in view of Nemirovski ’379 expressly or inherently discloses “[a] personal audio system as recited in claim 6, wherein direction of the directional audio pickup is in front of the user,” for example, because Nemirovski discloses that the internal microphone 20 is configured to be directed towards the ear canal of the user in order to detect speech of the user. <i>See id.</i> at 3:15-18. The POSITA would understand the internal microphone 20 to pick up audio in front of the user, since speech of the user is audible in front of the user. <i>See above at claim 6.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
8. A personal audio system as recited in claim 6, wherein direction of the directional audio pickup is outward from the user.	Radar ’349 in view of Nemirovski ’379 expressly or inherently discloses “[a] personal audio system as recited in claim 6, wherein direction of the directional audio pickup is outward from the user.” For example, Nemirovski discloses that the external microphone 70 “generally points away from the person wearing the earset.” <i>See id.</i> at 9:53-58. A POSITA would understand that a microphone pointing away from a user would pick up audio outward from the user. <i>See above at claim 6.</i>

Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
9. A personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises a plurality of microphones configured for audio pickup.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises a plurality of microphones configured for audio pickup.” For example, as described above for claim element [7a], Nemirovski discloses an earset having an internal microphone 20 and an external microphone 70. <i>See id.</i> at 9:46-50, FIG. 5. <i>See above at claim 6.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
10[pre]. A personal audio system as recited in claim 9, wherein the plurality of microphones includes at least:	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 9, wherein the plurality of microphones includes at least,” for the same reasons discussed above for claim 9. <i>See above at claim 6.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[10a] a first microphone configured to receive audio pickup from the user; and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “a first microphone configured to receive audio pickup from the user.” For example, as described above for claim element [7a], Nemirovski discloses an internal microphone 20 that is “directed towards the ear canal of the user and detects sounds

Claims	Prior Art
	emanating or coming out of the ear (or air pressure changes occurring within the ear) to accurately and reliably detect the speech of the user.” <i>See id.</i> at 3:15-18. <i>See above at claim 6.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[10b] a second microphone configured to receive audio pickup outward away from the user.	Radar ’349 in view of Nemirovski ’379 expressly or inherently discloses “a second microphone configured to receive audio pickup outward away from the user.” For example, as described above for claim element [7a], Nemirovski discloses an external microphone 70 that “generally points away from the person wearing the earset” and detects air pressure changes outside of the ear that result from “externally generated noise (other people’s speech, environmental noise, etc.).” <i>See id.</i> at 9:53-58. <i>See above at claim 6.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
11. A personal audio system as recited in claim 10, wherein the audio pickup from at least the second microphone is used at least for noise cancelation.	Radar ’349 in view of Nemirovski ’379 expressly or inherently discloses “[a] personal audio system as recited in claim 10, wherein the audio pickup from at least the second microphone is used at least for noise cancelation.” The following citations show examples of where Nemirovski ’379 discloses this limitation.

Claims	Prior Art
	Nemirovski '379 at FIG. 5  FIG. 5 Nemirovski '379 at 2:59–60 FIG. 5 is a block diagram of an ear microphone assembly according to another aspect of the invention; and Nemirovski '379 at 3:6–23 The present invention is directed to a communication system, including a communications device and an ear microphone, or earset, assembly. The communications system allows a user to speak with a remotely located person. The ear microphone assembly, also referred to herein as an earset, includes a microphone and a speaker supported by a housing. The housing is retained by the ear of the user and allows for hands free use of the communication system while carrying on a conversation with the remotely located person. The microphone is directed towards the ear canal of the user and detects sounds emanating or coming out of the ear (or air pressure changes occurring within the ear) to accurately and reliably detect the speech of the user. The position of the microphone may also help to reduce detection of externally generated sounds. The ear microphone assembly allows for separation of a speech input device for a cellular, or wireless, telephone from an RF transceiver of the telephone. Nemirovski '379 at 4:27–41 The communications system 10 includes an ear microphone assembly, or earset 18, having a microphone 20 and a speaker 22 supported by a housing 30 (FIG. 3). The physical arrangement of the earset 18 will be described in more detail below. The microphone 20 is used to detect sounds emanating or coming from

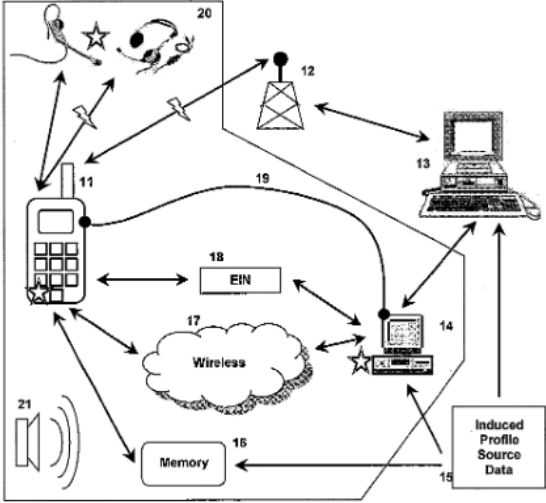
Claims	Prior Art
	the ear (sometimes referred to as air pressure changes within the ear) of the user that result from speech of the user. The microphone 20 converts those detections into an electrical signal. The electrical signal is optionally amplified by an amplifier 24. Next, the amplified electrical signal is received by the communication device 14 via an appropriate interface adapter 26. The interface adapter 26 can be, for example, a jack or other electrical connector received by a corresponding receptacle of the communication device 14. Nemirovski '379 at 9:33–39 The external microphone 70 is disposed on a exterior portion 72 of the housing 30 and is pointed away from the wearer of the earset 18 assembly. The external microphone 70 can be secured to the housing 30 with adhesive and can be disposed in a recess defined by the exterior portion 72. Similar to the internal microphone 20, the external microphone 70 is small (e.g., less than two mm in size). Nemirovski '379 at 9:45–60 FIG. 5 is a block diagram that illustrates a system 10' for detecting speech of the user. The system 10' includes the earset 18 having the internal microphone 20, the speaker 22 and amplifier 24a as described in greater detail above. In addition, the earset 18 of the system 10' has the external microphone 70. As one skilled in the art will appreciate, the use of the external microphone 70 is optional. The external microphone 70 is disposed on the housing 30 (FIG. 3) and generally points away from the person wearing the earset 18. As a result, the external microphone 70 detects air pressure changes located outside the ear. These air pressure changes are mainly the result of externally generated noise (other people's speech, environmental noise, etc.) and, in part, to the speech of the person wearing the earset 18, when the speech travels from the mouth of the user and through the air to the external microphone 70. Nemirovski '379 at 10:8–13 The unique signals generated by the internal and external microphone 20, 70 can be used to distinguish between user produced speech and externally produced sounds. In alternative configurations of the system 10', the system 10' can be adapted to cancel externally generated noise from the detections of the internal microphone 20. Nemirovski '379 at 10:14–26 When the user speaks both the internal microphone 20 and the external microphone 70 detects the speech. Sounds generated by a source other than the user (e.g., another person speaking, a passing vehicle,

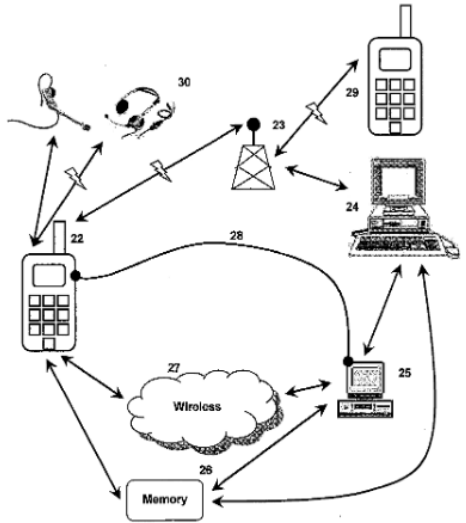
Claims	Prior Art
	machinery, the hum of an air conditioner or computer, etc.) will be referred to herein as noise. Both the external microphone 70 and the internal microphone 20 detect the noise. Accordingly, the communication device 14 (or other processing circuit) can be programmed to isolate the user's speech by identifying (i.e., separating) the speech component and the noise component. As a result, a relatively noise-free speech signal can be produced which can be transmitted to the communication network 12 by the communication device 14. Nemirovski '379 at 10:27–47 In one embodiment, signal separation can be made by solving equations 1 and 2, identified below, for a sound component signal (“S”) and a noise component signal (“N”). An impulse response of the internal microphone (F_{MI}) and an impulse response of the external microphone (F_{ME}) reflect the sensitivity of the microphones, the frequency response of the microphones, resonating characteristics of the ear and housing, etc. Y_I represents the overall signal produced by the internal microphone and Y_E represents the overall signal produced by the external microphone. Assuming that the entire system is linear (the system features are additive and homogeneous), the system can be represented by equations 1 and 2 as follows (the asterisk, or “*”, represents a convolution operator): [Equation] $F_{ME} * S + F_{ME} * N = Y_E \quad \text{Eq. 2}$ By using the output signals Y_I and Y_E and the known impulse responses F_{MI} and F_{ME}, the two equations can be solved in real time for the two unknown signals S and N. In view of these disclosures, a POSITA would understand that the audio picked up by Nemirovski’s second (external) microphone is used for noise cancelation. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
12. A personal audio system as recited in claim 11, wherein at least a portion of the audio pickup from the second microphone is	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 11, wherein at least a portion of the audio pickup from the second microphone is subtracted from the audio pickup from the first microphone.” For example, Nemirovski discloses that a communication device or other processing circuit can produce a “relatively noise-free speech signal” by “isolat[ing] the user’s speech by identifying (i.e., separating) the speech component and the noise component.” <i>Id.</i> at 10:20-25. The

Claims	Prior Art
subtracted from the audio pickup from the first microphone.	processing circuit can separate the speech and noise components by analyzing the signals produced by the internal microphone and the external microphone. <i>Id.</i> at 10:27-44. The externally generated noise is then “cancel[ed]...from the detections of the internal microphone.” <i>Id.</i> at 10:12-13. The audio picked up by Nemirovski’s external microphone is “mainly the result of externally generated noise (other people’s speech, environmental noise, etc.).” <i>Id.</i> at 9:55-57. The externally generated noise is also the portion of the detected audio that is “cancel[ed]...from the detections of the internal microphone.” <i>Id.</i> at 10:12-13. A POSITA would understand this cancellation process to disclose that at least a portion of the audio picked up by the external microphone (the externally generated noise) is subtracted from the audio picked up by the internal microphone. <i>See</i> above at claim 11. Nemirovski teaches “cancel[ing] externally generated noise from the detections of the internal microphone 20” to produce a “relatively noise-free speech signal.” <i>See</i> Nemirovski at 10:8-26, 10:48-58. For instance, in the below linear system, the internal and external microphone audio signals (Y_I and Y_E, respectively) each include a sound component S (user speech) and a noise component N (ambient noise such as from passing vehicles and machinery) picked up by the microphones: $F_{MI} * S + F_{MI} * N = Y_I \quad (\text{Eq. 1})$ $F_{ME} * S + F_{ME} * N = Y_E \quad (\text{Eq. 2})$ <i>See</i> 10:28-47. The terms F_{MI} and F_{ME} represent the impulse responses of the internal and external microphones, respectively. (<i>see id.</i> at 10:30-34). The linear system is solved for the speech component S and the ambient noise component N, such that the noise component (<i>e.g.</i>, including a portion of the audio detected by the external microphone) can be subtracted from the microphone signals (<i>e.g.</i>, including audio detected by the internal microphone), thus isolating the speech component. <i>See id.</i> at 10:20-26. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
13. A personal audio system as recited in claim 12, wherein each of the ear buds includes at least a speaker and is configured to generate at least a portion of the customized audio output for the user via the speaker.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 12, wherein each of the ear buds includes at least a speaker and is configured to generate at least a portion of the customized audio output for the user via the speaker,” for example, for the same reasons discussed above for claim elements [5pre] and [5a]. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0031] The term “personal communication device,” of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural

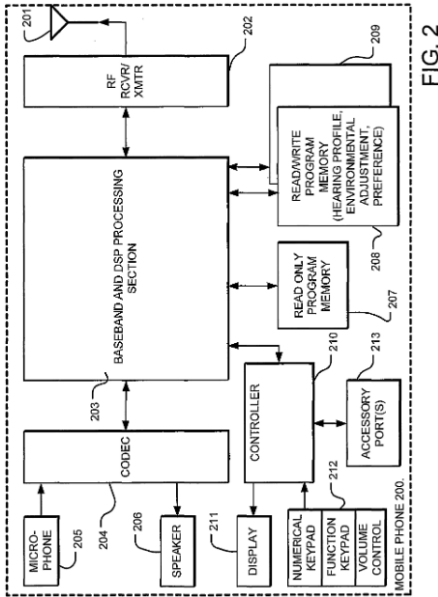
Claims	Prior Art
	headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0068] • Use monaural earpiece • User binaural earpiece

Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
14. A personal audio system as recited in claim 1, wherein the mobile communication device is or includes a mobile phone.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the mobile communication device is or includes a mobile phone.” The following citations show examples of where Radar discloses this limitation. Radar '349 at Abstract A mobile phone or other personal communication device includes resources applying measures of an individual's hearing profile (100), personal choice profile (101), and induced hearing loss profile, separately or in combination, to build the basis of sound enhancement.

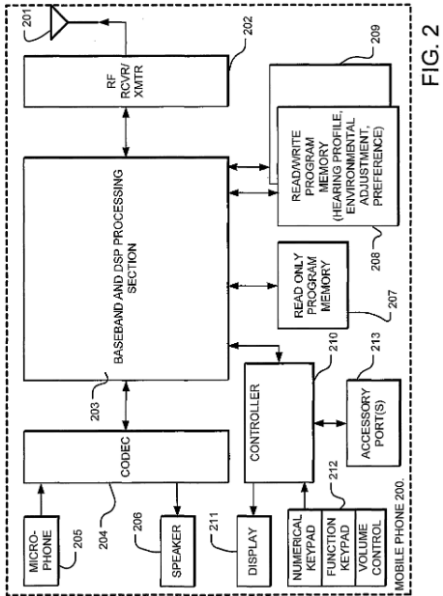
Claims	Prior Art
	Radar '349 at [0001] The present invention relates the field of sound enhancement for mobile phones and other products which produce audio for users, and more particularly to techniques for enhancing sound based upon an individual's hearing profile, based upon environmental factors like noise-induced hearing impairment, and based on personal choice. Radar '349 at [0006] Mobile phones are inherently personal communication devices. Radar '349 at [0008] According to the present invention, a mobile phone or other personal communication device includes resources applying measures of an individual's hearing profile, personal choice profile, and induced hearing loss profile, separately or in combination, to build the basis of sound enhancement. Radar '349 at [0014] According to one embodiment of the invention, the personal communication device comprises a mobile phone including an antenna. In this embodiment, the transmitter/receiver comprises a radio coupled to the antenna, and the communication medium is wireless. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0029] In one preferred embodiment, the personal communication device is a mobile phone. Radar '349 at [0030] Next generation mobile phones are incorporating features that intersect with the functionality of a small computer, music player, and organizer, and include processing resources for customizing the audio as shown in Fig. 1.

Claims	Prior Art
	Radar '349 at [0031] The term “personal communication device,” of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0034] Fig. 2 is a simplified diagram of a mobile phone 200, representative of personal communication devices according to the present invention. The mobile phone 200 includes an antenna 201 and a radio frequency RF receiver/transmitter 202, by which the phone 200 is coupled to a wireless communication medium, according to one or more of a variety of protocols. The receiver/transmitter 202 is coupled to baseband and digital signal processor DSP processing section 203, in which the audio signals are processed and call signals are managed. A codec 204, including analog to digital and digital to analog converters, is coupled to the processing section 203. A microphone 205 and a speaker 206 are coupled to the codec 204.

Claims	Prior Art
	Radar '349 at FIG. 2  To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
15. A personal audio system as recited in claim 1, wherein the customized audio output includes music.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the customized audio output includes music.” The following citations show examples of where Radar discloses this limitation. Radar '349 at [0030] Next generation mobile phones are incorporating features that intersect with the functionality of a small computer, music player, and organizer, and include processing resources for customizing the audio as shown in Fig. 1. Radar '349 at [0031] The term “personal communication device,” of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of

Claims	Prior Art
	audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
16. A personal audio system as recited in claim 1, wherein the customized audio output includes a voice conversation.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the customized audio output includes a voice conversation.” The following citations show examples of where Radar discloses this limitation. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0031] The term “personal communication device,” of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication

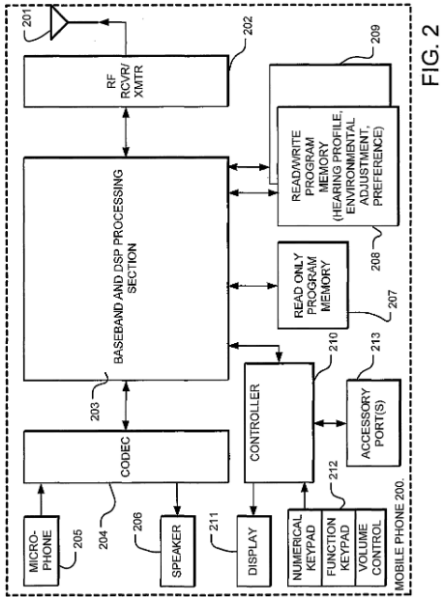
Claims	Prior Art
	devices. Radar '349 at [0034] Fig. 2 is a simplified diagram of a mobile phone 200, representative of personal communication devices according to the present invention. The mobile phone 200 includes an antenna 201 and a radio frequency RF receiver/transmitter 202, by which the phone 200 is coupled to a wireless communication medium, according to one or more of a variety of protocols. The receiver/transmitter 202 is coupled to baseband and digital signal processor DSP processing section 203, in which the audio signals are processed and call signals are managed. A codec 204, including analog to digital and digital to analog converters, is coupled to the processing section 203. A microphone 205 and a speaker 206 are coupled to the codec 204. Radar '349 at [0036] The controller 210 is coupled to the processing section 203. User input concerning call set up and management, and concerning use of the hearing profile, user preference and environmental noise factors is received via the input devices 212 and optionally via accessories. User interaction is enhanced, and the user is prompted to interact, using the display 211 and optionally other accessories. Input may also be received via the microphone 205 supported by voice recognition programs, and user interaction and prompting may utilize the speaker 206 for various purposes.

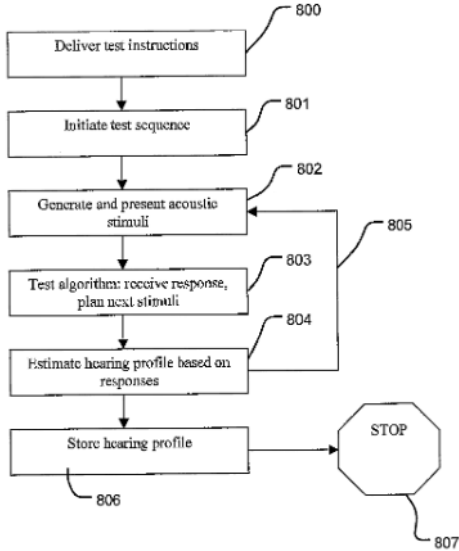
Claims	Prior Art
	Radar '349 at FIG. 2  A POSITA would have understood call signals to include voice conversations held over the mobile phone. To the extent that Radar '349 does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] A personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises a plurality of microphones configured for audio pickup,	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises a plurality of microphones configured for audio pickup,” for example, in view of the same disclosures set forth above for claim 6. For example, Radar discloses that a headset can include a microphone. <i>See id.</i> at [0009]. The microphone can be used to pick up audio, for example, to sense environmental noise. To the extent not expressly disclosed in Radar, it would have been obvious to a POSITA that Radar’s headset could include more than one microphone in order to pick up audio that more completely and accurately represents the headset’s surroundings and/or the intended audio, for example, to aid in acquiring the intended audio and/or improving its accuracy. <i>See</i> above at claim 6.

Claims	Prior Art
	To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] wherein at least one of the microphones is configured to pick up an audio command, and	Radar '349 expressly or inherently discloses “wherein at least one of the microphones is configured to pick up an audio command,” for example, by disclosing that the system can support voice recognition programs. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0036] The controller 210 is coupled to the processing section 203. User input concerning call set up and management, and concerning use of the hearing profile, user preference and environmental noise factors is received via the input devices 212 and optionally via accessories. User interaction is enhanced, and the user is prompted to interact, using the display 211 and optionally other accessories. Input may also be received via the microphone 205 supported by voice recognition programs, and user interaction and prompting may utilize the speaker 206 for various purposes. Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the present invention. The process includes delivering test instructions to the person from whom the hearing

Claims	Prior Art
	profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block 801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them • User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli • telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer • Use monaural earpiece • User binaural earpiece • Phone to free field transducer for acoustic stimuli

Claims	Prior Art
	• Hold phone and use internal speaker in speaker phone mode • Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803) • Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor • At network system resources • Store hearing profile (806) • Profile Stored Automatically • Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal mobile phone data storage

Claims	Prior Art
	• Network system resources store profile at central location and associate profile with phone identification • User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone Radar '349 at FIG. 2  FIG. 2 is a block diagram of a mobile phone 200. The diagram shows the following components and their interconnections: 201: An antenna connected to the RF RCVR/XMITR. 202: RF RCVR/XMITR (Radio Frequency Receiver/Transmitter) connected to the BASEBAND AND DSP PROCESSING SECTION. 203: BASEBAND AND DSP PROCESSING SECTION, which is bidirectionally connected to the CODEC and the CONTROLLER. 204: CODEC, connected to the MICROPHONE (205) and the SPEAKER (206). 205: MICROPHONE, connected to the CODEC. 206: SPEAKER, connected to the CODEC. 207: CONTROLLER, connected to the BASEBAND AND DSP PROCESSING SECTION, the CODEC, and the ACCESSORY PORT(S) (213). 208: READ ONLY PROGRAM MEMORY, connected to the CONTROLLER. 209: READ/WRITE PROGRAM MEMORY (HEARING PROFILE, ENVIRONMENTAL ADJUSTMENT, PREFERENCE), connected to the CONTROLLER. 210: DISPLAY, connected to the CONTROLLER. 211: NUMERICAL KEYPAD, FUNCTION KEYPAD, and VOLUME CONTROL, connected to the CONTROLLER. 212: ACCESSORY PORT(S), connected to the CONTROLLER. The entire system is labeled as MOBILE PHONE 200.

Claims	Prior Art
	Radar '349 at FIG. 8  <pre> graph TD 800[Deliver test instructions] --> 801[Initiate test sequence] 801 --> 802[Generate and present acoustic stimuli] 802 --> 803[Test algorithm: receive response, plan next stimuli] 803 --> 804[Estimate hearing profile based on responses] 804 --> 806[Store hearing profile] 806 --> 807{STOP} subgraph 805 802 803 804 end </pre> FIG. 8 To the extent not expressly disclosed in Radar, it would have been obvious to the POSITA for a microphone in Radar's headset to pick up the voice commands, for example, because the Radar headset provides inputs to the mobile phone. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] wherein the mobile communication device is configured to induce an operation or action based on the audio command.	Radar '349 expressly or inherently discloses "wherein the mobile communication device is configured to induce an operation or action based on the audio command," for example, by disclosing that voice recognition of a command can cause the mobile phone to initiate a test sequence for determining a hearing profile for a user. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition.

Claims	Prior Art
	Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the present invention. The process includes delivering test instructions to the person from whom the hearing profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block 801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them • User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli • telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer

Claims	Prior Art
	• Use monaural earpiece • User binaural earpiece • Phone to free field transducer for acoustic stimuli • Hold phone and use internal speaker in speaker phone mode • Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803) • Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor • At network system resources • Store hearing profile (806) • Profile Stored Automatically

Claims	Prior Art
	• Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal mobile phone data storage • Network system resources store profile at central location and associate profile with phone identification • User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone Radar '349 at FIG. 8 <pre> graph TD 800[Deliver test instructions] --> 801[Initiate test sequence] 801 --> 802[Generate and present acoustic stimuli] 802 --> 803[Test algorithm: receive response, plan next stimuli] 803 -- 805 --> 802 803 --> 804[Estimate hearing profile based on responses] 804 --> 806[Store hearing profile] 806 --> 807{STOP} </pre> FIG. 8

Claims	Prior Art
	Seshadri '839 at [0042] Input module 128, which may be a keypad, touch screen, voice recognition circuit, or other like user interfaces, receives user commands and produces digital command messages 124 there from. Such digital command messages 124 includes, but are not limited to, packet size, synchronization information, frequency hopping initiation information, timeslot allocation information, link establishment information, piconet address information, fast-forward, play, pause, volume adjust, record, stop and rewind. Seshadri '839 at [0047] Detachable ear-piece 156 and microphone 154 may have on-chip operations to support call conferencing, call waiting, flash, and other features associated with telephones. These functions may be accessed and reviewed by a user interface 158 and display 160 within host device 152 or a user interface and display located on either detachable ear-piece 156 or microphone 154. The user interface and display, located on either the host device or detachable ear-piece 156 and microphone 154 may have a display and button(s) that may be used to program device, perform directory functions including selecting number to call, view caller ID, initiate call waiting, or initiate call conferencing. Additionally, circuitry within the ear-piece 156 and microphone 154 may enable voice activated dialing. The actual voice recognition could be performed within ear-piece 156, microphone 154, or host device 152. Thus, ear-piece 156 and microphone 154 may act to initiate calls and receive calls. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18. A personal audio system as recited in claim 1, wherein the customized audio output signals are produced based on amplifying or attenuating different frequency bands differently according to at least the stored hearing profile.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the customized audio output signals are produced based on amplifying or attenuating different frequency bands differently according to at least the stored hearing profile.” For example, as discussed above for claim 4, Radar discloses that the gain and compression ratio used by the digital signal processor of a mobile phone can vary with frequency. A POSITA would understand varying gain and compression with frequency to include amplifying or attenuating different frequency bands differently based on the hearing profile, since gain and compression relate to the amount by which a signal is amplified or attenuated. <i>See above at claims [1b], [1d].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
19. A personal audio system as recited in claim 1, wherein the hearing profile associated with the user is self-determined by the user.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein the hearing profile associated with the user is self-determined by the user.” <i>See</i> above at claim [3]. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0002] Typically hearing profile assessments are made by professional audiologists using calibrated and specialized equipment. Therefore, hearing profile assessments have been relatively difficult to obtain and expensive. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition. Radar '349 at [0035] Read only program memory 207 stores instructions, parameters and other data for execution by the processing section 203. In addition, a read/write memory 208 stores instructions, parameters and other data for use by the processing section 203. There may be multiple types of read/write memory on the device 200, such as non volatile read/write memory 208 (flash memory or EEPROM for example) and volatile read write memory 209 (DRAM or SRAM for example), as shown in Fig. 2. Other embodiments include removable memory modules in which instructions, parameters and other data for use by the processing section 203 are stored. Radar '349 at [0047] Fig. 3 is a schematic representation of possible methods of acquiring a hearing profile with sub-components of an entire mobile phone system. The mobile phone 1 can be used to present acoustic stimuli, obtain user feedback, and calculate the hearing profile of an individual using only on-board memory and processing systems. Mobile phones communicate with remote systems or other phones through cellular transceivers 2. Another method for presenting acoustic stimuli would be through the use of a remote system 3 for generation of stimuli and possibly reception of user feedback. Acoustic stimuli

Claims	Prior Art
	presentation and user response could be managed at either the mobile phone 1 or at the remote system 3 in any combination. Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the present invention. The process includes delivering test instructions to the person from whom the hearing profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block 801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them • User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli

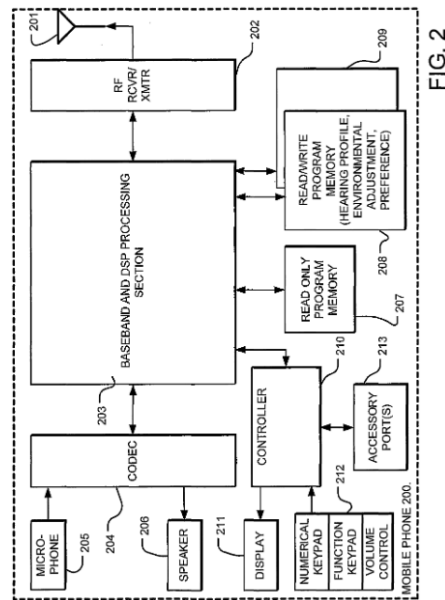
Claims	Prior Art
	• telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer • Use monaural earpiece • User binaural earpiece • Phone to free field transducer for acoustic stimuli • Hold phone and use internal speaker in speaker phone mode • Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803) • Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor

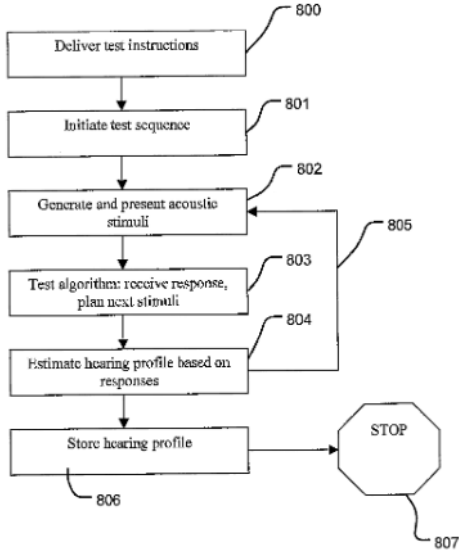
Claims	Prior Art
	• At network system resources • Store hearing profile (806) • Profile Stored Automatically • Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal mobile phone data storage • Network system resources store profile at central location and associate profile with phone identification • User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone

Claims

Prior Art

Radar '349 at FIG. 2



Claims	Prior Art
	Radar '349 at FIG. 8  <pre> graph TD 800[Deliver test instructions] --> 801[Initiate test sequence] 801 --> 802[Generate and present acoustic stimuli] 802 --> 803[Test algorithm: receive response, plan next stimuli] 803 -- 805 --> 802 803 --> 804[Estimate hearing profile based on responses] 804 --> 806[Store hearing profile] 806 --> 807{STOP} </pre> FIG. 8 A POSITA would understand a hearing profile determined using only a mobile phone (<i>see, e.g.</i> [0047]) to be self-determined, especially in light of Radar’s disclosure that prior art systems are “relatively difficult to obtain and expensive” because they are “made by professional audiologists using calibrated and specialized equipment.” <i>See id.</i> at [0002]. In addition, a POSITA would have understood that the user was the person providing feedback in response to the test and, thus, that the test results relied on the user’s own indication of audio tone detection. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
20[pre]. A personal audio system as recited in claim 1,	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 1., for example, for the same reasons discussed above for claim element [1pre]. <i>See</i> above at claim 1[pre].

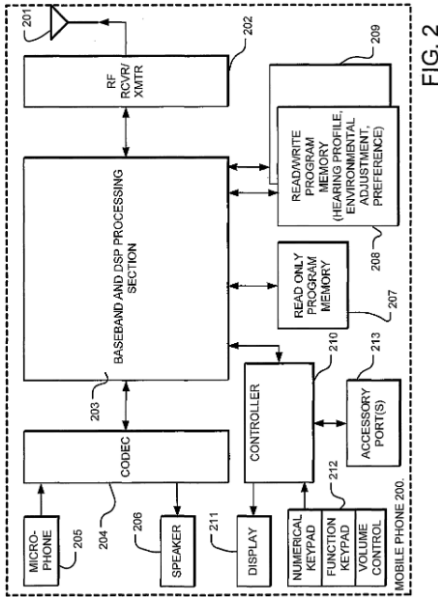
Claims	Prior Art
	To the extent that Radar '349 does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[20a] wherein the mobile communication device includes computing capabilities and a storage device, the storage device storing at least a software program executed by the mobile communication device to enable the user to establish the hearing profile associated with the user, and	Radar '349 expressly or inherently discloses “wherein the mobile communication device includes computing capabilities and a storage device, the storage device storing at least a software program executed by the mobile communication device to enable the user to establish the hearing profile associated with the user,” for example, by disclosing that a mobile phone can be used to establish a hearing profile “using only on-board memory and processing systems.” <i>See id.</i> at [0047]. <i>See above at claim 1[b].</i> The following citations show examples of where Radar discloses this limitation. Radar '349 at Abstract A mobile phone or other personal communication device includes resources applying measures of an individual's hearing profile (100), personal choice profile (101), and induced hearing loss profile, separately or in combination, to build the basis of sound enhancement. Radar '349 at [0001] The present invention relates the field of sound enhancement for mobile phones and other products which produce audio for users, and more particularly to techniques for enhancing sound based upon an individual's hearing profile, based upon environmental factors like noise-induced hearing impairment, and based on personal choice. Radar '349 at [0002] Typically hearing profile assessments are made by professional audiologists using calibrated and specialized equipment. Therefore, hearing profile assessments have been relatively difficult to obtain and expensive. Radar '349 at [0006] Mobile phones are inherently personal communication devices. Radar '349 at [0008] According to the present invention, a mobile phone or other personal communication device includes

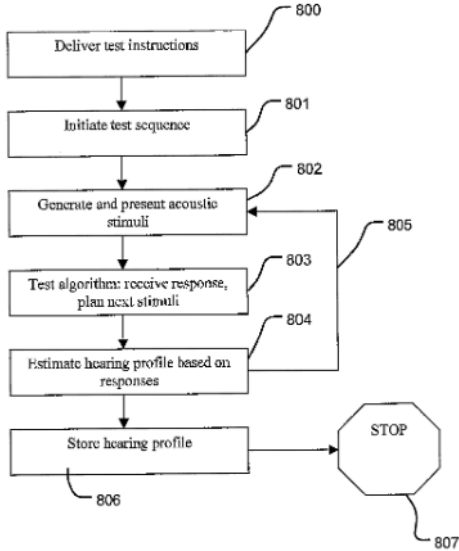
Claims	Prior Art
	resources applying measures of an individual's hearing profile, personal choice profile, and induced hearing loss profile, separately or in combination, to build the basis of sound enhancement. Radar '349 at [0014] According to one embodiment of the invention, the personal communication device comprises a mobile phone including an antenna. In this embodiment, the transmitter/receiver comprises a radio coupled to the antenna, and the communication medium is wireless. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0024] Fig. 8 is a flow chart of basic components in a process for personal hearing profile acquisition. Radar '349 at [0029] In one preferred embodiment, the personal communication device is a mobile phone. Radar '349 at [0030] Next generation mobile phones are incorporating features that intersect with the functionality of a small computer, music player, and organizer, and include processing resources for customizing the audio as shown in Fig. 1. Radar '349 at [0031] The term "personal communication device," of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital

Claims	Prior Art
	image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0034] Fig. 2 is a simplified diagram of a mobile phone 200, representative of personal communication devices according to the present invention. The mobile phone 200 includes an antenna 201 and a radio frequency RF receiver/transmitter 202, by which the phone 200 is coupled to a wireless communication medium, according to one or more of a variety of protocols. The receiver/transmitter 202 is coupled to baseband and digital signal processor DSP processing section 203, in which the audio signals are processed and call signals are managed. A codec 204, including analog to digital and digital to analog converters, is coupled to the processing section 203. A microphone 205 and a speaker 206 are coupled to the codec 204. Radar '349 at [0035] Read only program memory 207 stores instructions, parameters and other data for execution by the processing section 203. In addition, a read/write memory 208 stores instructions, parameters and other data for use by the processing section 203. There may be multiple types of read/write memory on the device 200, such as non volatile read/write memory 208 (flash memory or EEPROM for example) and volatile read write memory 209 (DRAM or SRAM for example), as shown in Fig. 2. Other embodiments include removable memory modules in which instructions, parameters and other data for use by the processing section 203 are stored. Radar '349 at [0047] Fig. 3 is a schematic representation of possible methods of acquiring a hearing profile with sub-components of an entire mobile phone system. The mobile phone 1 can be used to present acoustic stimuli, obtain user feedback, and calculate the hearing profile of an individual using only on-board memory and processing systems. Mobile phones communicate with remote systems or other phones through cellular transceivers 2. Another method for presenting acoustic stimuli would be through the use of a remote system 3 for generation of stimuli and possibly reception of user feedback. Acoustic stimuli presentation and user response could be managed at either the mobile phone 1 or at the remote system 3 in any combination. Radar '349 at [0068] Fig 8. illustrates a process for hearing profile acquisition, according to one exemplary embodiment of the

Claims	Prior Art
	present invention. The process includes delivering test instructions to the person from whom the hearing profile is to be acquired (block 800) . Next, a test sequence is initiated based upon the instructions (block 801). Next, the process involves generating and presenting acoustic stimuli to the user (block 802). The algorithm next receives the user response and plans in the next stimuli for the test (block 803). The hearing profile is estimated based upon the responses (block 804). The process loops as indicated by line 805, until an end of the test is reached. The hearing profile is stored in the final step (block 806), and the algorithm stops (block 807). For each of these major steps of hearing profile acquisition, there are several example embodiments provided in outline form as follows: • Deliver test instructions (800) • Voice based instruction • Call a phone number to a remote system • User dials a phone number that has been communicated to them • User punches in a pre-programmed quick dial number • Number automatically comes up on power up • Sales representative communicated instructions • Written • Paper instruction • Printed off of a computer • Screen of phone • Information transferred over mobile data link as text or graphics • Text or graphics created by internal phone software • Initiate test sequence (801) • User push logical or physical button on phone to initiate upon prompting • Voice recognition of a command at a remote site • Voice recognition of a command on the mobile phone • Starts automatically after phone is turned on for the first time • Generate and present acoustic stimuli (802) • At DSP or other acoustic processor on a mobile phone • Generate at a remote system location and present over: • mobile web as data transfer to mobile phone to present stimuli • telephone transfer as circuit switched or packet switched data • Phone to ear coupling for acoustic stimuli • Hold phone next to ear and use built-in transducer • Use monaural earpiece • User binaural earpiece

Claims	Prior Art
	• Phone to free field transducer for acoustic stimuli • Hold phone and use internal speaker in speaker phone mode • Hold phone and use external speaker in speaker phone mode • Consumer interface for prompts to guide user interaction • Prompt via voice or control signals • From storage in phone and generated in phone • From mobile web as data transfer to the phone to generate prompt • From telephone call by generating voice commands • Screen interaction • Screen prompts from data storage in phone • Screen prompts from mobile web data transferred to phone as needed • Test algorithm: receive response, plan next stimuli (803) • Test algorithm location for planning next stimuli • Local on the phone from data storage on the phone • Local on the phone transferred over mobile web link to the phone • Remote on a local system connected to the phone (local PC, for example) • Remote on network system resources • Receive subject response • User interface of phone, either physical or logical buttons • Voice recognition at the network system resources • Voice recognition by processor on the phone • External device, possibly located at sales location or home • Store subject response • Locally in DSP or other processor or onboard data memory • At network system resources • Interpret response and adjust signal level • Local in DSP or other processor • At network system resources • Estimate hearing profile based on responses (804) • Locally in DSP or other processor • At network system resources • Store hearing profile (806) • Profile Stored Automatically • Local algorithm writes hearing profile into internal mobile phone data storage • Network system resources sends data to handset that is interpreted by DSP and stored into internal

Claims	Prior Art
	mobile phone data storage • Network system resources store profile at central location and associate profile with phone identification • User prompted to store hearing profile • Local processor of phone prompts with a code to user • Via voice command • Via presentation to screen of phone • User inputs code and sequence to store profile • Network system resources prompts with a code to user • Via voice command • Operator or technical representative sends code • Automated generation of voice response • Via presentation to screen of phone through data transfer to phone Radar '349 at FIG. 2  FIG. 2 is a block diagram of a mobile phone 200. The diagram shows the following components and their interconnections: 201: An antenna connected to the RF/RX/MTR block. 202: RF/RX/MTR (Radio Frequency/Receive/Transmit) block. 203: BASEBAND AND DSP PROCESSING SECTION, connected to 202 and 204. 204: CODEC, connected to 203 and 205. 205: MICROPHONE, connected to 204. 206: SPEAKER, connected to 204. 207: READ ONLY PROGRAM MEMORY, connected to 203. 208: READ/WRITE PROGRAM MEMORY (HEARING PROFILE, ADJUSTMENT, PREFERENCE), connected to 203. 209: CONTROLLER, connected to 203, 207, and 208. 210: DISPLAY, connected to 209. 211: NUMERICAL KEYPAD, connected to 209. 212: FUNCTION KEYPAD, connected to 209. 213: VOLUME CONTROL, connected to 209. 214: ACCESSORY PORT(S), connected to 209. The entire system is labeled as MOBILE PHONE 200.

Claims	Prior Art
	Radar '349 at FIG. 8  <pre> graph TD 800[Deliver test instructions] --> 801[Initiate test sequence] 801 --> 802[Generate and present acoustic stimuli] 802 --> 803[Test algorithm: receive response, plan next stimuli] 803 -- 805 --> 802 803 --> 804[Estimate hearing profile based on responses] 804 --> 806[Store hearing profile] 806 --> 807{STOP} </pre> FIG. 8 A POSITA would understand in view of these disclosures that the read only program memory 207 includes software to be executed by processing section 203 to enable a user to establish a hearing profile. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[20b] wherein the mobile communication device is configured to establish the hearing profile associated with the user via the software program executed by the mobile communication device based on the user interacting with the software program via the mobile communication device.	Radar '349 expressly or inherently discloses “wherein the mobile communication device is configured to establish the hearing profile associated with the user via the software program executed by the mobile communication device based on the user interacting with the software program via the mobile communication device,” for example, in view of the disclosures and explanation provided above for claim element [20a]. For example, Radar discloses that a user can interact with the mobile phone, such as via a user interface of the phone, to provide a response to acoustic stimuli provided by the mobile phone during hearing profile acquisition. <i>See above at claim [20a].</i>

Claims	Prior Art
	To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
21. A personal audio system as recited in claim 20, wherein the software program at least interactively guides the user to establish the hearing profile for the user.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 20, wherein the software program at least interactively guides the user to establish the hearing profile for the user.” For example, Radar discloses that hearing profile acquisition includes generating and presenting acoustic stimuli to a user and receiving a user response and that presenting the acoustic stimuli to the user includes presenting “prompts to guide user interaction” via an interface. <i>See id.</i> at [0047]; [0068]. <i>See above at claims [20a]; [20b].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
22. A personal audio system as recited in claim 21, wherein the software program at least interactively guides the user to establish the hearing profile for the user by at least causing various audio tones to be output to the user via at least one of the earbuds, prompting the user to provide a hearing input with respect to one or more of the various audio tones being output, and receiving the hearing user input pertaining to one or more of the various audio tones being output.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 21, wherein the software program at least interactively guides the user to establish the hearing profile for the user by at least causing various audio tones to be output to the user via at least one of the earbuds, prompting the user to provide a hearing input with respect to one or more of the various audio tones being output, and receiving the hearing user input pertaining to one or more of the various audio tones being output,” for example, in view of the disclosures cited above for claim 3. For example, Radar discloses that acquiring a hearing profile includes generating and presenting acoustic stimuli to the user, such as via a mobile phone. <i>See id.</i> at [0047]. A POSITA would understand that the acoustic stimuli could include various audio tones. An interface provides “prompts to guide user interaction” with the mobile device in response to the acoustic stimuli. <i>Id.</i> at [0068]. The user then provides a response, for example via a user interface of the mobile phone. <i>Id.</i> <i>See above at claims 3, 21.</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[23a] A personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises a radiation	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 1, wherein at least one of the earbuds in the pair of earbuds comprises a radiation detector configured to capture radiation data.”

Claims	Prior Art
detector configured to capture radiation data; and	The following citations show examples of where Abreu discloses this limitation. Abreu '960 at 6:28–38 Head-mounted structures are structures mounted on the head or neck for positioning sensors on the end of the tunnel and include head bands with accessories that are adjacent to the tunnel, visors, helmets, headphone, structures wrapping around the ear and the like. For the purpose of this description TempAlert is referred herein as a system that measures temperature in the BTT area and has means to report the measured value and that can incorporate alarm means that are activated when certain levels are reached. Support structures yet include any article that has sensing means in which said sensing means are positioned at the end of the tunnel. Abreu '960 at 10:49–55 The apparatus of the invention include a temperature sensor located in the medial canthal pad. For temperature measurement the sensing system is located on a skin area that includes the medial canthal corner of the eye and upper eyelid. The sensor in the medial canthal pad is preferably positioned on the skin adjacent to the medial canthal area (medial corner of the eye). Abreu '960 at 32:29–45 In accordance with this exemplary embodiment for temperature measurement, the thermal energy emitted by the BTT is sensed by the temperature sensor 102 such as a miniature thermistor which produces a signal representing the thermal energy sensed. The signal is then converted to digital information and processed by processor 106 using standard processing for determining the temperature. The following citations show examples of where Luo discloses this limitation. Luo '446 at [0036] The invention generally relies on shining light having a particular wavelength on human skin as well as the reflectance properties of human skin. The surface reflection of the human skin occurs at the surface of the epidermis and is approximately independent of the lighting wavelength and independent of human race. In the infrared (IR) range the wavelengths that can be used are greater than 800 nano-meters and the surface reflectance of human skin is more or less constant and close to 50%. The same hold true for orange and red light in the visible light range, namely wavelengths between approximately 600 and 800 nano-meters can be used, although the surface reflectance for darker skin is reduced for shorter wavelengths. Surface reflectance for dark skin is approximately 25% at 700 nano-meters. In the embodiments shown herein, the energy of choice in the sensor unit 18 is preferably infrared (IR) energy.

Claims	Prior Art
	However, long wavelength visible light energy can also be used as discussed below. The following citations show examples of where Irvin '332 discloses this limitation. For example, Irvin discloses that its proximity sensor 220 can be an “active or passive [infrared] sensor,” which a POSITA would have understood to include a detector for detecting capturing infrared radiation data (<i>i.e.</i>, an amount of infrared radiation detected by the infrared sensor). <i>See</i> Irvin at 6:22-24. A POSITA would have combined Irvin’s proximity sensor 220 with Radar’s headset, such that the headset includes the proximity sensor. Irvin '332 at 6:3–33 FIG. 4C illustrates the power control circuit 210 coupled with a contact switch functioning as the sensor 220. The contact switch includes a first and second contact connected to the power control circuit 210, and connecting member 222 actuated when the user places the wireless headset 100 on their body. When actuated, the connecting member 222 places the first and second contacts of sensor 220 in electrical connection. Ideally, the sensor 220, when configured as a contact sensor, is placed in the earpiece 130, in the retaining member 140, or in the retaining pad 150 shown in FIG. 1B. Preferably, when sensor 220 is configured as a contact-based proximity sensor, the contacting element of sensor 220 is sealed in a manner that minimizes contaminant ingress. In some embodiments, the contact sensor may be actuated by the user resiliently expanding the retaining member 140 or other element of the wireless headset 100 for mounting upon their body. FIG. 4D illustrates the power control circuit 210 coupled with a proximity sensor 220 not based on mechanical actuation. The proximity sensor 220 may be an active or passive IR sensor, may be a resistive or other type of thermal sensor, or may be an acoustic sensor. As a proximity sensor, sensor 220 provides indication that a user has placed the wireless headset 100 upon their body. As such, any of the foregoing or other presence sensing techniques may be used to implement sensor 220. Preferably, when configured as a proximity sensor, sensor 220 requires minimal power and provides a sensor output signal based on proximity to the user's body. Depending upon the sensing technology chosen, the control circuit 210 may be required to periodically stimulate sensor 220 to generate a detection response. A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success. Radar discloses a system for enhancing audio to be output to a user, for example via headphones. The POSITA would have understood that customizing audio would be a futile waste of resources if the headphones that provide the output to the user are not being worn. Thus, it would have been obvious to the POSITA to incorporate the radiation detector of Abreu or Luo or Irvin to determine if the headphones are being worn in order to conserve computing resources.

Claims	Prior Art
	Moreover, Radar and Abreu or Luo or Irvin would have been readily combinable because both references disclose systems that include a head-worn component that supports audio output. The head-worn components share similar features, such as microphones and speakers. Thus, combining Radar and Abreu or Irvin or Luo involves combining known components to obtain predictable results. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[23b] first electronic circuitry electrically connected to the radiation detector, the first electronic circuitry configured to process at least the radiation data captured by the radiation detector,	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “first electronic circuitry electrically connected to the radiation detector, the first electronic circuitry configured to process at least the radiation data captured by the radiation detector.” The following citations show examples of where Abreu discloses this limitation. Alternatively, Abreu '960 discloses eyeglasses that can include, among other sensors, a temperature sensor and using the temperature sensor for sensing thermal radiation emitted by a wearer. Abreu '960 at 6:36–40, 32:39–43. The POSITA would understand Abreu's temperature sensor to be a radiation detector that is configured to capture thermal radiation data. Abreu '960 also discloses that the eyeglasses “can be incorporated with a detecting system to send a signal if the eyeglasses were removed or if the temperature sensor is not capturing signals in a proper manner.” Abreu '960 at 15:57–60. Abreu '960 at 6:28–38 Head-mounted structures are structures mounted on the head or neck for positioning sensors on the end of the tunnel and include head bands with accessories that are adjacent to the tunnel, visors, helmets, headphone, structures wrapping around the ear and the like. For the purpose of this description TempAlert is referred herein as a system that measures temperature in the BTT area and has means to report the measured value and that can incorporate alarm means that are activated when certain levels are reached. Support structures yet include any article that has sensing means in which said sensing means are positioned at the end of the tunnel. Abreu '960 at 10:49–55 The apparatus of the invention include a temperature sensor located in the medial canthal pad. For temperature measurement the sensing system is located on a skin area that includes the medial canthal corner of the eye and upper eyelid. The sensor in the medial canthal pad is preferably positioned on the

Claims	Prior Art
	skin adjacent to the medial canthal area (medial corner of the eye). Abreu '960 at 15:57–60 The eyeglasses can be incorporated with a detecting system to send a signal if the eyeglasses were removed or if the temperature sensor is not capturing signals in a proper manner. Abreu '960 at 18:56–59 The present invention preferably includes all functions in a miniature semiconductor chip, which as an integrated circuit, incorporates sensor, processing and transmitting units and control circuits. Abreu '960 at 32:29–45 In accordance with this exemplary embodiment for temperature measurement, the thermal energy emitted by the BTT is sensed by the temperature sensor 102 such as a miniature thermistor which produces a signal representing the thermal energy sensed. The signal is then converted to digital information and processed by processor 106 using standard processing for determining the temperature. The following citations show examples of where Luo discloses this limitation. Luo '446 at [0034] In general, the location sensor module 18 and the hearing aid module 24 communicate via a bi-directional information signal 42. The hearing aid module 24 polls the location sensor module 18 via the bi-directional signal 42, on preferably a periodic basis, to determine whether the hearing aid 10 is in the ear of the hearing aid user. In this case, the bi-directional signal 42 acts as a polling signal. In response to polling done via the bi-directional information signal 42, the location sensor module 18 probes the outer environment of the hearing aid 10 and returns location information via the bi-directional location signal 42. In this case, the bi-directional signal 42 acts as a location information signal. If the location information indicates that the hearing aid 10 is in the ear of the hearing aid user (i.e. the in-the-ear case), the hearing aid 10 operates in full-function mode. If the location information indicates that the hearing aid 10 is not in the ear of the hearing aid user (i.e. the out-of-the-ear case), the hearing aid 10 operates in sleep mode. In sleep mode, the hearing aid 10 can essentially be considered to be off. Luo '446 at [0035]

Claims	Prior Art
	There are several general scenarios for the location of the hearing aid. In the first scenario, the hearing aid 10 is not in the ear of the user and the hearing aid 10 is in sleep mode. In this case, the location sensor module 18 is polled and the location information indicates that the hearing aid 10 is not in the ear of the hearing aid user and the hearing aid 10 continues to operate in sleep mode. In the second scenario, the hearing aid 10 has just been inserted into the ear of the hearing aid user and the hearing aid 10 was previously in sleep mode. In this case, the location sensor module 18 is polled and the location information indicates that the hearing aid 10 is in the ear of the hearing aid user. The hearing aid 10 then moves into full-function mode. In the third scenario, the hearing aid 10 is in full-function mode and is being taken out of the ear of the hearing aid user. The location sensor module 18 is polled and the location information indicates that the hearing aid 10 is no longer in the ear of the hearing aid user. The hearing aid 10 then moves into sleep mode. The following citations show examples of where Irvin discloses this limitation. For example, Irvin teaches that electronic circuitry processes data received from sensor 220 (<i>e.g.</i>, an infrared proximity sensor indicating the distance to the user's head) to enable or disable the headset's electronic circuitry based on whether the headset is being worn. <i>See</i> Irvin at 4:3-10, 4:39-49, 6:20-33; FIG. 4D. A communications circuit 230 transitions to an active state 620 after the sensor 220 indicates a stimulus (<i>e.g.</i>, infrared radiation data indicating that the device is worn); and transitions to an inactive state 610 or a sleep state 720 after the indication is no longer provided. <i>See id.</i> at 8:11-9:39, FIG. 6, FIG. 7. A POSITA would have understood that in the combination with Radar, the electronic circuitry would electrically connect to the sensor, to receive the sensor's electrical signals. Irvin '332 at 6:3–33 FIG. 4C illustrates the power control circuit 210 coupled with a contact switch functioning as the sensor 220. The contact switch includes a first and second contact connected to the power control circuit 210, and connecting member 222 actuated when the user places the wireless headset 100 on their body. When actuated, the connecting member 222 places the first and second contacts of sensor 220 in electrical connection. Ideally, the sensor 220, when configured as a contact sensor, is placed in the earpiece 130, in the retaining member 140, or in the retaining pad 150 shown in FIG. 1B. Preferably, when sensor 220 is configured as a contact-based proximity sensor, the contacting element of sensor 220 is sealed in a manner that minimizes contaminant ingress. In some embodiments, the contact sensor may be actuated by the user resiliently expanding the retaining member 140 or other element of the wireless headset 100 for mounting upon their body. FIG. 4D illustrates the power control circuit 210 coupled with a proximity sensor 220 not based on

Claims	Prior Art
	mechanical actuation. The proximity sensor 220 may be an active or passive IR sensor, may be a resistive or other type of thermal sensor, or may be an acoustic sensor. As a proximity sensor, sensor 220 provides indication that a user has placed the wireless headset 100 upon their body. As such, any of the foregoing or other presence sensing techniques may be used to implement sensor 220. Preferably, when configured as a proximity sensor, sensor 220 requires minimal power and provides a sensor output signal based on proximity to the user's body. Depending upon the sensing technology chosen, the control circuit 210 may be required to periodically stimulate sensor 220 to generate a detection response. The POSITA would understand that the “detecting system” in Abreu is necessarily electrically connected to the temperature sensor in order to be able to send signals if the temperature sensor is not capturing signals in a proper manner. The POSITA would also understand the “detecting system” incorporated into the eyeglasses to include electronic circuitry for processing data captured by the temperature sensor. A POSITA would have been motivated to combine the teachings of Radar and Abreu to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [23a]. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[23c] wherein the first electronic circuitry is configured to determine whether the earbud is being worn by a user based on at least the processed radiation data.	Radar ’349 in view of Abreu ’960 or Luo ’446 or Irvin ’332 expressly or inherently discloses “wherein the first electronic circuitry is configured to determine whether the earbud is being worn by a user based on at least the processed radiation data.” <i>See above at claim [23b].</i> Abreu ’960 discloses a detecting system that sends a signal if the eyeglasses were removed or if the temperature sensor is not capturing signals in a proper manner.” Abreu ’960 at 10:49–50, 32:39–43, 15:57–60. For example, Abreu ’960 discloses eyeglasses that can include, among other sensors, a temperature sensor for sensing thermal radiation emitted by a wearer. Abreu ’960 at 6:36–40, 32:39–43. The POSITA would understand Abreu’s temperature sensor to be a radiation detector that is configured to capture thermal radiation data. Abreu ’960 at 15:57–60 The eyeglasses can be incorporated with a detecting system to send a signal if the eyeglasses were

Claims	Prior Art
	removed or if the temperature sensor is not capturing signals in a proper manner. Abreu '960 at 18:56–59 The present invention preferably includes all functions in a miniature semiconductor chip, which as an integrated circuit, incorporates sensor, processing and transmitting units and control circuits. Abreu '960 at 44:61–67 The present invention includes means for directing preferably near-infrared energy into the surface of the skin at the end of the BTE tunnel, means for analyzing and converting the reflectance or back scattered spectrun into the concentration of the substance measured and support means for positioning the light source and detector means adjacent to the surface of the skin at the BTE tunnel site. The following citations show an example of where Luo discloses this limitation. Luo '446 at [0034] In general, the location sensor module 18 and the hearing aid module 24 communicate via a bi-directional information signal 42. The hearing aid module 24 polls the location sensor module 18 via the bi-directional signal 42, on preferably a periodic basis, to determine whether the hearing aid 10 is in the ear of the hearing aid user. In this case, the bi-directional signal 42 acts as a polling signal. In response to polling done via the bi-directional information signal 42, the location sensor module 18 probes the outer environment of the hearing aid 10 and returns location information via the bi-directional location signal 42. In this case, the bi-directional signal 42 acts as a location information signal. If the location information indicates that the hearing aid 10 is in the ear of the hearing aid user (i.e. the in-the-ear case), the hearing aid 10 operates in full-function mode. If the location information indicates that the hearing aid 10 is not in the ear of the hearing aid user (i.e. the out-of-the-ear case), the hearing aid 10 operates in sleep mode. In sleep mode, the hearing aid 10 can essentially be considered to be off. Luo '446 at [0035] There are several general scenarios for the location of the hearing aid. In the first scenario, the hearing aid 10 is not in the ear of the user and the hearing aid 10 and is in sleep mode. In this case, the location sensor module 18 is polled and the location information indicates that the hearing aid 10 is not in the ear of the hearing aid user and the hearing aid 10 continues to operate in sleep mode. In the second scenario, the hearing aid 10 has just been inserted into the ear of the hearing aid user and the hearing aid 10 was

Claims	Prior Art
	previously in sleep mode. In this case, the location sensor module 18 is polled and the location information indicates that the hearing aid 10 is in the ear of the hearing aid user. The hearing aid 10 then moves into full-function mode. In the third scenario, the hearing aid 10 is in full-function mode and is being taken out of the ear of the hearing aid user. The location sensor module 18 is polled and the location information indicates that the hearing aid 10 is no longer in the ear of the hearing aid user. The hearing aid 10 then moves into sleep mode. Luo '446 at [0036] The invention generally relies on shining light having a particular wavelength on human skin as well as the reflectance properties of human skin. The surface reflection of the human skin occurs at the surface of the epidermis and is approximately independent of the lighting wavelength and independent of human race. In the infrared (IR) range the wavelengths that can be used are greater than 800 nano-meters and the surface reflectance of human skin is more or less constant and close to 50%. The same hold true for orange and red light in the visible light range, namely wavelengths between approximately 600 and 800 nano-meters can be used, although the surface reflectance for darker skin is reduced for shorter wavelengths. Surface reflectance for dark skin is approximately 25% at 700 nano-meters. In the embodiments shown herein, the energy of choice in the sensor unit 18 is preferably infrared (IR) energy. However, long wavelength visible light energy can also be used as discussed below. The following citations show an example of where Irvin '332 discloses this limitation. <i>See also</i> above at claim element [22b]. Irvin '332 at 2:20–34 The wireless headset serves as a communication accessory to a base unit, such as a cellular telephone. When not in use, the wireless headset reverts to an inactive state and draws essentially no power. A power control circuit imparts automatic enabling capability to the wireless headset. Preferably, the power control circuit employs a sensor responsive to a natural stimulus associated with a person preparing to use the wireless headset. The wireless headset may sense motion, physical orientation, or user proximity. Sensing techniques include but are not limited to micro-electro-mechanical-systems (MEMS), mercury switches, attitude switches, and IR or acoustic proximity sensors. In some embodiments, the wireless headset transitions from the inactive state to an active state in response to a user picking it up or mounting the wireless headset upon their head.

Claims	Prior Art
	Irvin '332 at 6:3–33 FIG. 4C illustrates the power control circuit 210 coupled with a contact switch functioning as the sensor 220. The contact switch includes a first and second contact connected to the power control circuit 210, and connecting member 222 actuated when the user places the wireless headset 100 on their body. When actuated, the connecting member 222 places the first and second contacts of sensor 220 in electrical connection. Ideally, the sensor 220, when configured as a contact sensor, is placed in the earpiece 130, in the retaining member 140, or in the retaining pad 150 shown in FIG. 1B. Preferably, when sensor 220 is configured as a contact-based proximity sensor, the contacting element of sensor 220 is sealed in a manner that minimizes contaminant ingress. In some embodiments, the contact sensor may be actuated by the user resiliently expanding the retaining member 140 or other element of the wireless headset 100 for mounting upon their body. FIG. 4D illustrates the power control circuit 210 coupled with a proximity sensor 220 not based on mechanical actuation. The proximity sensor 220 may be an active or passive IR sensor, may be a resistive or other type of thermal sensor, or may be an acoustic sensor. As a proximity sensor, sensor 220 provides indication that a user has placed the wireless headset 100 upon their body. As such, any of the foregoing or other presence sensing techniques may be used to implement sensor 220. Preferably, when configured as a proximity sensor, sensor 220 requires minimal power and provides a sensor output signal based on proximity to the user's body. Depending upon the sensing technology chosen, the control circuit 210 may be required to periodically stimulate sensor 220 to generate a detection response. Irvin '332 at 8:11–22 FIGS. 6 and 7 illustrate operation of the wireless headset 100. FIG. 6 is a state diagram for one exemplary embodiment of the present invention. When the wireless headset 100 is not in use, it automatically enters an inactive state (610). As explained, this inactive state may constitute disconnecting the communications circuit 230 from the power source 240, or may simply represent placing the communications circuit 230 in a non-functional, low-power condition. Absent user stimulus, such as motion of the wireless headset 100 or placement of the wireless headset 100 upon the user's body, the wireless headset 100 remains in the inactive state (610). The POSITA would understand that sending a signal if the eyeglasses were removed or if the temperature sensor is not functioning properly would necessarily include processing the thermal radiation data from the temperature sensor to make that determination. Further, the POSITA would understand that the temperature sensor would fail to capture signals in a proper manner if the eyeglasses were not being worn. Accordingly, Abreu's detecting system could determine whether the eyeglasses are being worn based on at least the processed thermal radiation data.

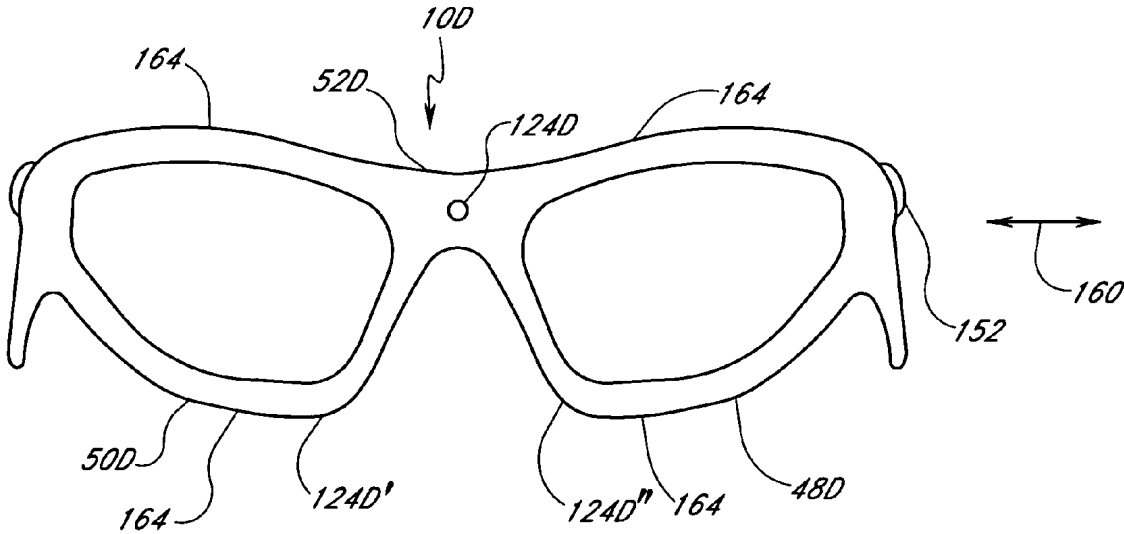
Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [23a]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
24[pre]. A personal audio system operable to at least generate customized audio output, comprising:	Radar '349 expressly or inherently discloses “[a] personal audio system operable to at least generate customized audio output,” for example, for the same reasons discussed above for claim element [1pre]. <i>See above at claim 1[pre].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[24a] a head-worn wearable electronic device including at least a pair of speakers, each of the speakers being configured to be wearable proximate to an ear of a user; and	Radar '349 expressly or inherently discloses “a head-worn wearable electronic device including at least a pair of speakers, each of the speakers being configured to be wearable proximate to an ear of a user,” for example, for the same reasons discussed above for claim element [1a]. For example, Radar discloses that binaural headphones can be connected to a mobile phone that produces customized audio, and a POSITA would understand binaural headphones to include one speaker for each ear. A POSITA would understand the headset disclosed by Radar to be a “head-worn wearable electronic device” (i.e., “eyewear or headwear”) at least because the illustrated headset, as well as commercially available models at the time, include a headband that rests on the top of the user’s head for support. In addition, a POSITA would have understood from these disclosures that Radar’s headset can include a pair of speakers, one for each ear, as shown above; with each speaker wearable near (and thus proximate to) its respective ear, <i>i.e.</i>, when the headset is worn. <i>See above at claim [1a].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[24b] a mobile communication device at least for supporting audio	Radar '349 expressly or inherently discloses “a mobile communication device at least for supporting audio output, the mobile communication device configured to store at least a hearing profile associated with the

Claims	Prior Art
output, the mobile communication device configured to store at least a hearing profile associated with the user, the stored hearing profile associated with the user at least characterizes hearing impairment regarding the user's ability to hear,	user, the stored hearing profile associated with the user at least characterizes hearing impairment regarding the user's ability to hear,” for example, for the same reasons discussed above for claim element [1b]. <i>See above at claim [1b].</i> To the extent that Radar ’349 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[24c] the mobile communication device configured to produce audio output signals customized for the user based on at least the stored hearing profile associated with the user such that the customized audio output signals at least compensate for the hearing impairment regarding the user's ability to hear,	Radar ’349 expressly or inherently discloses “the mobile communication device configured to produce audio output signals customized for the user based on at least the stored hearing profile associated with the user such that the customized audio output signals at least compensate for the hearing impairment regarding the user's ability to hear,” for example, for the same reasons discussed above for claim element [1c]. <i>See above at claim [1c].</i> To the extent that Radar ’349 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[24d] the mobile communication device configured to produce the customized audio output signals using at least signal amplification,	Radar ’349 expressly or inherently discloses “the mobile communication device configured to produce the customized audio output signals using at least signal amplification,” for example, for the same reasons discussed above for claim element [1d]. <i>See above at claim [1d].</i> To the extent that Radar ’349 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[24e] and the mobile communication device configured to transmit the customized audio output signals to the pair of speakers,	Radar ’349 expressly or inherently discloses “the mobile communication device configured to transmit the customized audio output signals to the pair of speakers,” for example, for the same reasons discussed above for claim element [1e]. <i>See above at claim [1e].</i> To the extent that Radar ’349 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[24f] wherein each of the speakers is configured to receive at least a portion of the customized audio output signals transmitted by the mobile communication device, and	Radar '349 expressly or inherently discloses “each of the speakers is configured to receive at least a portion of the customized audio output signals transmitted by the mobile communication device,” for example, for the same reasons discussed above for claim element [1f]. <i>See above at claims [1f], [24e].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[24g] wherein each of the speakers is configured to generate at least a portion of the customized audio output for the user in accordance with at least the portion of the customized audio output signals being received.	Radar '349 expressly or inherently discloses “each of the speakers is configured to generate at least a portion of the customized audio output for the user in accordance with at least the portion of the customized audio output signals being received,” for example, for the same reasons discussed above for claim element [1g]. <i>See above at claims [1g], [24e].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[25a] A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes at least a rechargeable battery, and	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes at least a rechargeable battery.” The following citations show examples of where Jannard discloses this limitation. Jannard '526 at 20:57–64 The interface device 110 includes a power source 112, a transceiver 114, an interface 116, and an antenna 118. The power source 112 can be in the form of disposable or rechargeable batteries. Optionally, the power source 112 can be in the form of solar panels and a power regulator. The transceiver 114 can be in the form of a digital wireless transceiver for one-way or two-way communication. Jannard '526 at 24:37–55 Optionally, the power source 112 can comprise portions of the ear stems 54D, 56D which have been formed into batteries. For example, the rear portions 160, 162 of the ear stems 54D, 56D, respectively, can be in the form of custom made batteries, either disposable or rechargeable. Preferably, the rear portions 160, 162 are removable from the forward portions of the ear stems 54D, 56D. This provides a particular advantage in terms of balance. As noted above, imbalanced loads on the head can cause muscular pain and/or headaches. In particular, excessive pressure on the nose can cause severe headaches. Additionally,

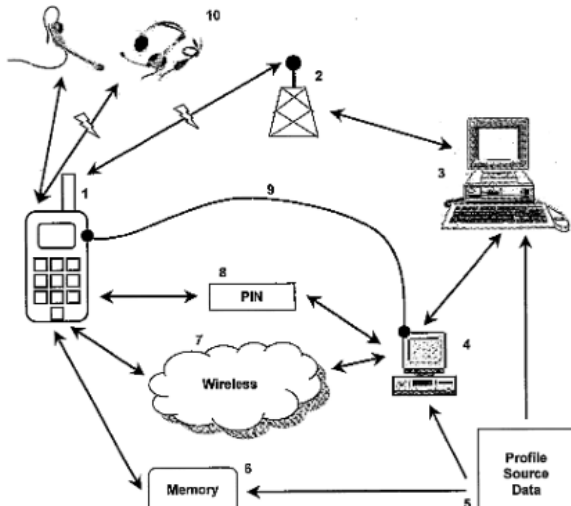
Claims	Prior Art
	batteries can have a significantly higher mass density than plastic and lightweight metals, such as sintered titanium or magnesium. Thus, by constructing the rearward portions 160, 162 of the ear stems 54D, 56D of batteries, the weight of these batteries can improve forward-rearward balance of the audio device 10D in that the weight of the interface device 110 can be offset by the batteries. In another embodiment, the ear stems 54D, 56D can define a housing for removable batteries. Jannard '526 at 24:56–25:3 The audio device 10D can also include power contacts 164 for recharging any rechargeable batteries connected thereto. For example, the power contacts 164 can be disposed on a lower edge of the orbitals 48D, 50D. Thus, with an appropriate recharging cradle (not shown), the audio device 10D can be laid on the cradle, thereby making contact between the power contacts 164 and corresponding contacts in the cradle (not shown). Alternatively, power contacts can be provided in numerous other locations as desired. For example, the power contacts 164 can be disposed at the ends of the ear stems 54D, 56D. A corresponding cradle can include two vertically oriented holes into which the ear stems are inserted for recharging. In this configuration, the lens within the orbitals 48D, 50D would face directly upwardly. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success. Radar discloses a headset that can be used with a communication device. However, Radar does not provide all the implementation details of the headset. The POSITA would look to Jannard to supply these missing details, since both Radar and Jannard disclose systems including head-worn devices that can be used with communication devices. The POSITA would have recognized that using the rechargeable battery described in Jannard in Radar's headset would realize various benefits, such as reducing the cost, waste, and inconvenience associated with disposable batteries. The POSITA would have a reasonable chance of success combining the teachings of Radar and Jannard because the inventions share several structural and functional similarities. For example, as noted above, both Radar and Jannard disclose systems that include head-worn devices configured to provide audio output to a user. Both devices include similar, well-understood components, such as microphones and speakers. Therefore, combining the teachings of Radar and Jannard would involve combining known components with predictable results. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

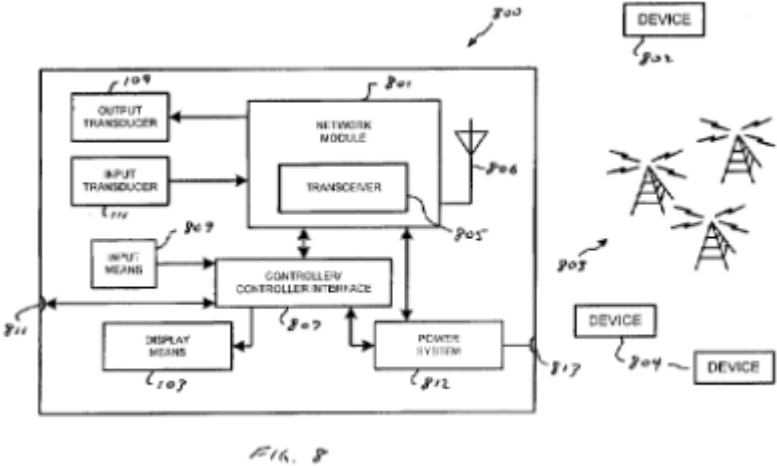
Claims	Prior Art
[25b] wherein the rechargeable battery is able to be charged when the head-worn wearable electronic device is coupled to a docking station.	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the rechargeable battery is able to be charged when the head-worn wearable electronic device is coupled to a docking station.” For example, For example, Jannard discloses that the power contacts of the audio device make electrical contact with corresponding contacts in a recharging “cradle” to charge the audio device. <i>Id.</i> at 25:7-8. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [25a]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[26a] A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes at least a rechargeable battery and at least one conductive element,	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes at least a rechargeable battery and at least one conductive element.” The following citations show examples of where Jannard '526 discloses conductive elements for recharging. <i>See, e.g. id.</i> at 24:56–58; 25:7–8; FIG. 11.

Claims	Prior Art
	Jannard '526 at FIG. 11  FIG. 11 Jannard '526 at 4:27–28 FIG. 11 is a front elevational view of the audio device illustrated in FIG. 10. Jannard '526 at 24:56–25:3 The audio device 10D can also include power contacts 164 for recharging any rechargeable batteries connected thereto. For example, the power contacts 164 can be disposed on a lower edge of the orbitals 48D, 50D. Thus, with an appropriate recharging cradle (not shown), the audio device 10D can be laid on the cradle, thereby making contact between the power contacts 164 and corresponding contacts in the cradle (not shown). Alternatively, power contacts can be provided in numerous other locations as desired. For example, the power contacts 164 can be disposed at the ends of the ear stems 54D, 56D. A corresponding cradle can include two vertically oriented holes into which the ear stems are inserted for recharging. In this configuration, the lens within the orbitals 48D, 50D would face directly upwardly. Since the power contacts 164 make electrical contact with corresponding contacts in a recharging cradle to enable charging, the POSITA would have understood the power contacts 164 to be conductive elements.

Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[26b] wherein the rechargeable battery is able to be electrically coupled via the at least one conductive element to a charging apparatus and charged when the head-worn wearable electronic device is placed within the charging apparatus, and	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the rechargeable battery is able to be electrically coupled via the at least one conductive element to a charging apparatus and charged when the head-worn wearable electronic device is placed within the charging apparatus.” <i>See above at claim [26a].</i> The following citations show examples of where Jannard discloses this limitation. Jannard '526 at 24:56–25:3 The audio device 10D can also include power contacts 164 for recharging any rechargeable batteries connected thereto. For example, the power contacts 164 can be disposed on a lower edge of the orbitals 48D, 50D. Thus, with an appropriate recharging cradle (not shown), the audio device 10D can be laid on the cradle, thereby making contact between the power contacts 164 and corresponding contacts in the cradle (not shown). Alternatively, power contacts can be provided in numerous other locations as desired. For example, the power contacts 164 can be disposed at the ends of the ear stems 54D, 56D. A corresponding cradle can include two vertically oriented holes into which the ear stems are inserted for recharging. In this configuration, the lens within the orbitals 48D, 50D would face directly upwardly. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[26c] wherein the electrical coupling of the at least one conductive element with the	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the electrical coupling of the at least one conductive element with the charging apparatus is supported by at least a magnetic element.”

Claims	Prior Art
charging apparatus is supported by at least a magnetic element.	For example, Jannard discloses that the power contacts 164 engage corresponding contacts in an “appropriate recharging cradle.” <i>Id.</i> at 24:59-63. To the extent not expressly disclosed in Jannard, it would have been obvious to the POSITA that the recharging cradle includes a magnetic element. This is because magnetic charging was well-known in the art by the effective filing date of the ’693 patent. It would have been obvious to use at least a magnetic element in Jannard’s charger to support electrical coupling of the power contacts to the corresponding contacts in the cradle in order to eliminate the need for charging cables. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
27. A personal audio system as recited in claim 24, wherein the mobile communication device is configured to wirelessly communicate with the head-worn wearable electronic device over a wireless network.	Radar ’349 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the mobile communication device is configured to wirelessly communicate with the head-worn wearable electronic device over a wireless network.” <i>See</i> above at claim [1e]. The following citations show examples of where Radar discloses this limitation. Radar ’349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar ’349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3.

Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
28. A personal audio system as recited in claim 27, wherein the wireless network is a short-range wireless network.	Radar '349 in view of Bodley '433 expressly or inherently discloses “[a] personal audio system as recited in claim 27, wherein the wireless network is a short-range wireless network.” The following citations show examples of where Bodley discloses this limitation.

Claims	Prior Art
	Bodley '433 at FIG. 8  Bodley '433 at 2:20–21 FIG. 8 is a block diagram of the electronics of a preferred embodiment of a headset according to the invention; Bodley '433 at 3:44–50 FIG. 8 is a high-level block diagram of the electronics of a preferred embodiment of a headset according to the invention. As shown, system 800 includes a wireless networking module 801 that provides short distance (e.g., on the order of 30 feet) wireless communications between the headset (e.g., a headset such as those shown in FIGS. 1-7) and a correspondingly enabled peripheral electronic device 802. A POSITA would have been motivated to combine the teachings of Radar and Bodley to meet the claim limitations with a reasonable expectation of success. Radar discloses that accessories such as headsets can communicate with a mobile phone via a wireless link. However, Radar does not characterize the wireless network over which communications take place. Since Bodley also discloses a system including a headset that can wirelessly communicate with a mobile phone, the POSITA would have looked to Bodley for details of the wireless network. Radar and Bodley would have been readily combinable. As discussed above, both Radar and Bodley disclose systems including a headset and a communication device. The systems and devices share several similar components. For example, both Radar and Bodley's headsets are equipped with microphones and speakers

Claims	Prior Art
	are capable of wireless communication. Accordingly, combining the teachings of Rader and Bodley would involve combining known components to yield predictable results. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
29. A personal audio system as recited in claim 27, wherein the short-range wireless network is a Bluetooth network.	Radar '349 in view of Bodley '433 expressly or inherently discloses “[a] personal audio system as recited in claim 27, wherein the short-range wireless network is a Bluetooth network.” For example, Bodley discloses that the short distance wireless networking module 801 can utilize any of a variety of networking technologies and protocols, a suitable example being Bluetooth. <i>See id.</i> at 3:55-61. A POSITA would have been motivated to combine the teachings of Radar and Bodley to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 28. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
30. A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes an accelerometer.	Radar '349 in view of Abreu '960 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes an accelerometer.” <i>See above at claim [23].</i> The following citations show examples of where Abreu and Irvin discloses this limitation. Abreu discloses that “[m]otion and deceleration can be detected by mounting an accelerometer in the eyeglasses.” Abreu '960 at 16:56–57. Abreu '960 at 13:46–60 The eyeglasses or other support structures can also have elements which produce and radiate recognizable signals and this procedure could be used to locate and track individuals, particularly in military operations. A permanent magnet can also be mounted in the eyeglasses and used for tracking as described above. A fixed frequency transmitter can be mounted in the eyeglasses and used as a tracking device which utilizes a satellite tracking system by noting the frequency received from the fixed frequency transmitter to a passing satellite, or via Global Positioning Systems. Motion and deceleration can be detected by mounting an accelerometer in the eyeglasses. The use of eyeglasses as tracking means can be useful for locating a kidnapped individual or for rescue operations in the military, since eyeglasses are

Claims	Prior Art
	normally unsuspecting articles. Irvin '332 at 5:1–23 Because the wireless headset 100 of the present invention automatically enables and disables its communication functions based on use, the sensor 220 may be based on a variety of technologies. In general, its purpose is to provide a signal responsive to a natural stimulus associated with use of the headset by a user. Movement or vibration of the wireless headset 100, or placement of the wireless headset 100 upon the user's body indicates usage. Movement may be detected based on vibration or by sensing acceleration, such as with an accelerometer. Mechanical or liquid-based switches represent alternate mechanisms for sensing movement. In such switches, movement causes an electrical connection to be established between contact pairs. Further, the particular sensor 220 employed may be tuned or configured such that only stimulus consistent with actual use actuates the sensor, thus avoiding inadvertent or unintended enabling of the wireless headset 100. In such configurations, the sensor 220 preferably employs output conditioning that prevents assertion of the sensor output signal for stimulus below a defined threshold. Alternatively, the power control circuit 210 may include such conditioning as part of its interface to the sensor 220. FIGS. 4A–4D illustrate possible sensor embodiments. A POSITA would have been motivated to combine the teachings of Radar and Abreu or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
31. A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes a plurality of circuit boards, each circuit board including at least one integrated circuit mounted thereto.	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes a plurality of circuit boards, each circuit board including at least one integrated circuit mounted thereto.” The following citations show examples of where Jannard '526 discloses examples of this limitation. <i>See, e.g. id.</i> at 12:63–66; 13:51–55; 15:49 (describing multiple circuit boards 264, 284).

Claims

Prior Art

Jannard '526 at FIG. 3J

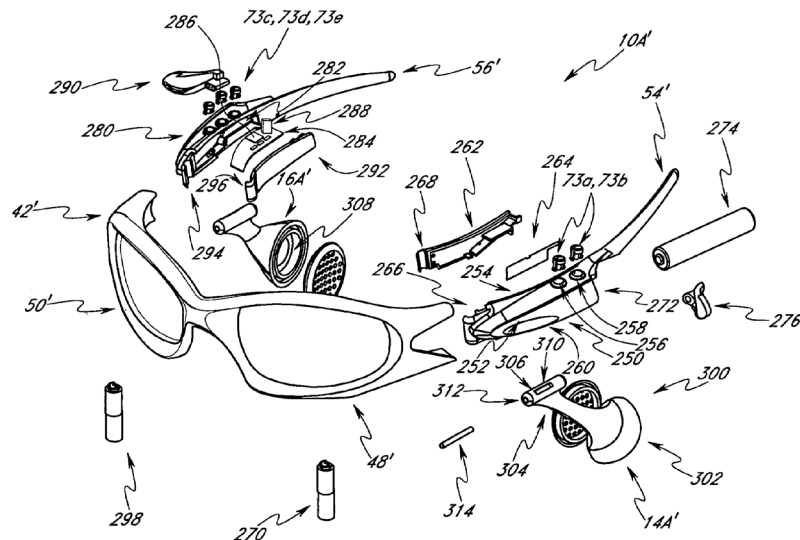


FIG. 3J

Jannard '526 at 3:56–58

FIG. 3J is a front, top, and left side perspective and exploded view of the wearable audio device illustrated in FIG. 3D.

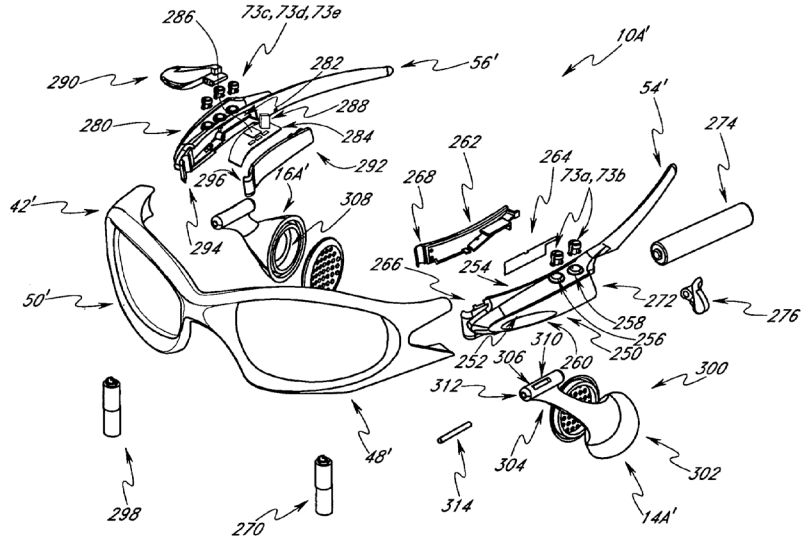
Jannard '526 at 12:62–13:6

A cover member 262 cooperates with the housing 250 to define the closed internal cavity 252. In the illustrated embodiment, the internal cavity 252 includes at least one compartment configured to receive an electronic circuit board 264 which includes at least one switch for each of the buttons 73a, 73b. In an exemplary but non-limiting embodiment, the board 264 can include two switches, one for each of the buttons 73a, 73b, which are configured to control a volume output from the speakers 14A', 16A'. The cover 262 can be attached to the ear stems 54A' with any type of fastener, such as, for example, but without limitation, screws, rivets, bolts, adhesive, and the like.

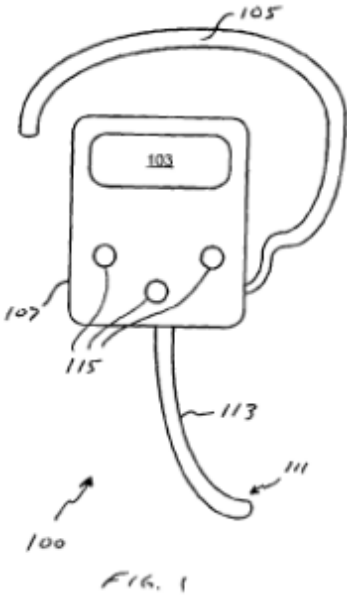
Jannard '526 at 13:50–55

The internal cavity 282, in the illustrated embodiment, is configured to receive a printed circuit board 284. In the illustrated embodiment, the printed circuit board 284 includes one switch for each of the buttons

Claims	Prior Art
	73c, 73d, and 73e. Additionally, the printed circuit board 284 includes an audio file storage and playback device 286. Jannard '526 at 14:6–14 Advantageously, the printed circuit board 284 also includes or is in electrical communication with a data transfer port 388. In the illustrated embodiment, the housing 280 includes an aperture (not shown) disposed in a position similar to the position of the aperture 272 on the housing 250. In the housing 280, however, the aperture is aligned with the data transfer port 288. Thus, when the printed circuit board 284 is received in the internal cavity 282, the data transfer port 288 is aligned with the aperture. Jannard '526 at 15:60–16:2 Thus, with reference to FIGS. 3J and 3M, the ribbon connector 318 can extend from the housing 280, into the recesses 294, 296, through an aperture (not shown) in the hinge pin 298 to the upper opening within the hinge pin 298, then through the channel 316 (FIG. 3E), to an upper opening of the hinge pin 270, out through an aperture (not shown) through a side of a hinge pin 270, through the recesses 266, 268 of the housing 250, and then to the speaker 14A', printed circuit board 264, and the power storage device 274. Jannard '526 at 25:12–21 With reference to FIGS. 8, 9A, and 9B, in another embodiment, the audio device 10C is advantageously adapted to support any of a variety of portable electronic circuitry or devices which have previously been difficult to incorporate into conventional headsets due to bulk, weight or other considerations. For example, but without limitation, the electronics are digital or other storage devices and retrieval circuitry such as for retrieving music or other information from MP3 format memory or other memory devices. As noted above, Jannard's circuit boards 284 and 264 include "an audio file storage and playback device 286." <i>Id.</i> at 13:51-55. A POSITA would have understood Jannard's audio file storage and playback device to comprise one or more circuits. To the extent not expressly disclosed in Jannard, it would have been obvious to the POSITA that these circuits would be implemented as integrated circuits at least because, by the priority date of the '693 patent, integrated circuits were well-known and ubiquitous structures for packaging circuit elements. Consistent with this, the '693 patent provides only generic disclosure of an integrated circuit—disclosing, e.g., that "a number of electrical components" can be "integrated into one or more integrated circuits"—relying instead on the POSITA's knowledge of integrated circuits for support. '693 patent at 84:6-9. By at least 1989, integrated circuits had largely replaced circuits constructed from discrete transistors, and

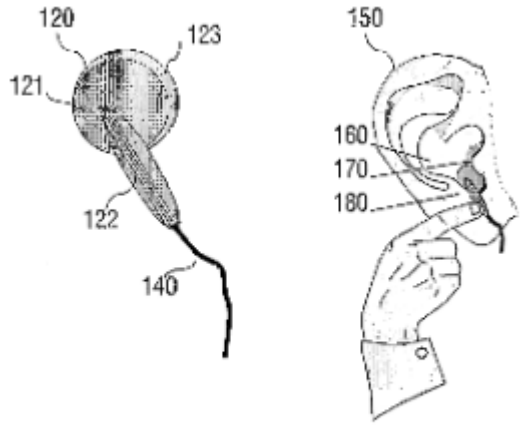
Claims	Prior Art
	had become smaller, more durable, and more economical than discrete circuits. A POSITA would have implemented at least Jannard's audio file storage and/or playback device as an integrated circuit at least to realize these advantages. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
32. A personal audio system as recited in claim 31, wherein at least one of the circuit boards is a flexible printed circuit board.	Radar '349 in view of Jannard '526 expressly or inherently discloses "[a] personal audio system as recited in claim 31, wherein at least one of the circuit boards is a flexible printed circuit board." <i>See above at claim [31].</i> The following citations show examples of where Jannard discloses this limitation. Jannard '526 at FIG. 3J  <i>FIG. 3J</i>

Claims	Prior Art
	Jannard '526 at 3:56–58 FIG. 3J is a front, top, and left side perspective and exploded view of the wearable audio device illustrated in FIG. 3D. Jannard '526 at 12:62–13:6 A cover member 262 cooperates with the housing 250 to define the closed internal cavity 252. In the illustrated embodiment, the internal cavity 252 includes at least one compartment configured to receive an electronic circuit board 264 which includes at least one switch for each of the buttons 73a, 73b. In an exemplary but non-limiting embodiment, the board 264 can include two switches, one for each of the buttons 73a, 73b, which are configured to control a volume output from the speakers 14A', 16A'. The cover 262 can be attached to the ear stems 54A' with any type of fastener, such as, for example, but without limitation, screws, rivets, bolts, adhesive, and the like. Jannard '526 at 14:6–14 Advantageously, the printed circuit board 284 also includes or is in electrical communication with a data transfer port 388. In the illustrated embodiment, the housing 280 includes an aperture (not shown) disposed in a position similar to the position of the aperture 272 on the housing 250. In the housing 280, however, the aperture is aligned with the data transfer port 288. Thus, when the printed circuit board 284 is received in the internal cavity 282, the data transfer port 288 is aligned with the aperture. Jannard '526 at 26:21–27 With reference to FIGS. 8, 9A, and 9B, in another embodiment, the transceiver 114 is adapted to employ a wide variety of technologies, including wireless communication such as RF, IR, ultrasonic, laser or optical, as well as wired and other communications technologies. In one embodiment, a body-LAN radio is employed. Other embodiments can employ a flexible-circuit design. Jannard discloses that a transceiver of an audio device “can employ a flexible-circuit design,” which the POSITA would understand to refer to a circuit disposed on a flexible printed circuit board. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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,

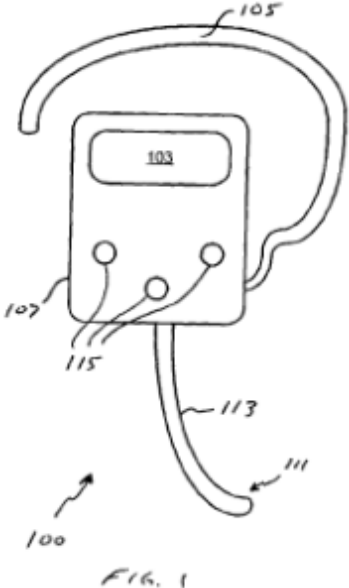
Claims	Prior Art
	with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
33. A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes a touch sensitive surface.	Radar '349 in view of Bodley '433 or Hollemans '490 or Seshadri '839 expressly or inherently discloses "[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes a touch sensitive surface." The following citations show examples of where Bodley and Hollemans and Seshadri disclose this limitation. Bodley '433 at FIG. 1  Bodley '433 at 2:7–8 FIG. 1 is a frontal view of a generic headset that includes a display in accordance with the invention; Bodley '433 at 2:38–50 Although headset 100 may use any of a variety of means of attaching to a user (e.g., headband, earpiece, etc.) and thus allowing hands-free operation of the headset, preferably headset 100 includes an earpiece 105 (e.g., an ear hook) that is coupled to the user's ear, or a portion thereof. More preferably, earpiece 105 fits around a portion of the user's ear. Earpiece 105 is coupled to body 107 of the headset, body 107 housing the various electronic components necessary to provide functionality to headset 100. Attached to

Claims	Prior Art
	the back surface of body 107 is an output transducer 109 (e.g., a speaker). Also coupled to body 107 is an input transducer 111 (e.g., a microphone), which, in this embodiment, is located at the end of a boom member 113. Bodley '433 at 2:65–3:22 Display 103 can be used to provide the user with various types of information depending upon the design goals for the specific headset. The design goals are primarily based on the expected headset use, desired headset functionality, display size, display resolution, allowable headset power drain, and the processing capabilities of the headset on-board processor (also referred to as a controller or an interface controller). Examples of information that can be displayed on display 103 are headset battery level, headset signal level, call status (e.g., dialing, in use, etc.), caller identification, current time/date, and timer information such as elapsed time associated with a particular call. Display 103 can also be configured to flash or otherwise visually indicate an incoming call. Assuming that the information is provided to the headset processor, display 103 can also display the battery level of the base unit (e.g., cell phone, dongle, etc.) and the signal strength of the base unit (e.g., cell phone). Additionally, display 103 can be used during headset configuration (e.g., to adjust or set the ring mode, ring loudness, headset volume, display mode, voice dialing, time, date, etc.) or to provide additional headset functionality (e.g., phone lists, text messages, dialing using virtual numeric keypad or phone list dialing). Additionally, display 103 can be touch sensitive, thus providing a touch screen for data input (e.g., phone numbers into a phone list, dialing using a virtual numeric keypad). Hollemans '490 at 2:6–9 This object is realized in that the controller has an outer surface with a touch-sensitive area, the controller being arranged to be substantially worn in or by a human ear, the controller being further arranged to detect the touch-sensitive area being touched, and to send the control signal in response to detecting the touch-sensitive area being touched. Hollemans '490 at 2:10–18 The remote controller thus gets a fixed position with respect to the user in or by the human ear. It is easy to find one's ear. This prevents looking for the remote controller. In addition, the user is not tempted to look at the remote controller, because there is nothing relevant to be seen for controlling the device. To avoid having to find tiny buttons, merely touching the remote controller somewhere on its touch-sensitive area operates said remote controller, which detects being touched and subsequently sends the control signal to the device. Also the problem of finding the proper orientation of the remote controller is solved

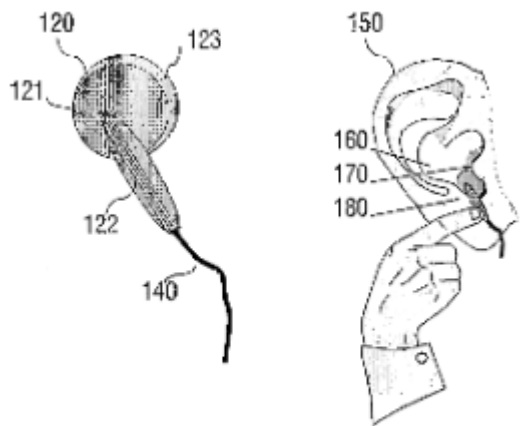
Claims	Prior Art
	by wearing the remote controller in or by the ear, because its orientation becomes fixed with respect to the user. Hollemans '490 at 2:25–33 Advantageously, the controller is arranged to detect a temporal pattern in the touch-sensitive area being touched, and to send the control signal in response to detecting the temporal pattern. In general, the device offers a plurality of functions and capabilities. Rather than having more buttons on the remote control that may be hard to distinguish, the single touch-sensitive area is used for controlling the plurality of functions. The temporal pattern is a particularly appropriate user interface, because it is easy to create temporal patterns in touching the area rhythmically and because the temporal patterns can constitute a natural and consistent interface. An example is a single short tap for pause/play, double short tap for next track, triple short tap for next artist/album and a long tap for adjusting the volume. Hollemans '490 at 3:1–6 Advantageously, the outer surface has a further touch-sensitive area, such that the further touch-sensitive area is touched substantially by the ear when the controller is substantially worn in or by a human ear, the controller being arranged to send the control signal only if the further touch-sensitive area is touched. This will prevent the accidental remote control of the device when the remote controller is not worn, thus preventing unwanted activation of the device and unnecessary battery exhaustion.

Claims	Prior Art
	Holleman '490 at FIG. 2  FIG.2 Seshadri '839 at [0041] Wearable earpiece 12, as shown in FIG. 5, includes antenna 46, transmit/receive switch 122, receiver module 40, data recovery module 42, speaker module 44, transmitter module 120, input module 128 and display module 132. Receiver module 40, data recovery module 42 and speaker module 44 operate as discussed with reference to FIG. 4, with the exception of the data recovery module 42, to produce display information that is provided to display module 132. For instance, the received RF signal may include display information such as caller ID, command information, etc. which is separated by data recovery module 42 and provided to display module 132, which may be an LCD display, plasma display, etc. Seshadri '839 at [0042] Input module 128, which may be a keypad, touch screen, voice recognition circuit, or other like user interfaces, receives user commands and produces digital command messages 124 there from. Such digital command messages 124 includes, but are not limited to, packet size, synchronization information, frequency hopping initiation information, timeslot allocation information, link establishment information, piconet address information, fast-forward, play, pause, volume adjust, record, stop and rewind. A POSITA would have been motivated to combine the teachings of Radar and Bodley to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 28.

Claims	Prior Art
	Further, the POSITA would have been motivated to combine Bodley’s touch sensitive display with Radar’s headset because Radar discloses that “the personal choice of an individual may be important in setting customization parameters for delivery of enhanced audio.” The POSITA would have understood Bodley to provide an individual with means for setting those customization parameters by providing the earpiece with a touch sensitive surface that can be used for controlling functions and settings of the earpiece. Alternatively, POSITA would have also been motivated to combine Hollemans’ or Seshadri’s touch sensitive display with Radar’s headset because Radar discloses that “the personal choice of an individual may be important in setting customization parameters for delivery of enhanced audio” and POSITA would have understood Hollemans or Seshadri to provide an individual with means for setting those customization parameters by providing the earpiece with a touch sensitive surface that can be used for controlling functions and settings of the earpiece. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
34. A personal audio system as recited in claim 33, wherein the touch sensitive surface is configured to detect a user input, the detected user input operating to at least alter operation of the head-worn wearable electronic device.	Radar ’349 in view of Bodley ’433 or Hollemans ’490 or Seshadri ’839 expressly or inherently discloses “[a] personal audio system as recited in claim 33, wherein the touch sensitive surface is configured to detect a user input, the detected user input operating to at least alter operation of the head-worn wearable electronic device.” The following citations show examples of where Bodley, Hollemans, and Seshadri discloses this limitation.

Claims	Prior Art
	Bodley '433 at FIG. 1  Bodley '433 at 2:7–8 FIG. 1 is a frontal view of a generic headset that includes a display in accordance with the invention; Bodley '433 at 2:38–50 Although headset 100 may use any of a variety of means of attaching to a user (e.g., headband, earpiece, etc.) and thus allowing hands-free operation of the headset, preferably headset 100 includes an earpiece 105 (e.g., an ear hook) that is coupled to the user's ear, or a portion thereof. More preferably, earpiece 105 fits around a portion of the user's ear. Earpiece 105 is coupled to body 107 of the headset, body 107 housing the various electronic components necessary to provide functionality to headset 100. Attached to the back surface of body 107 is an output transducer 109 (e.g., a speaker). Also coupled to body 107 is an input transducer 111 (e.g., a microphone), which, in this embodiment, is located at the end of a boom member 113. Bodley '433 at 2:65–3:22 Display 103 can be used to provide the user with various types of information depending upon the design goals for the specific headset. The design goals are primarily based on the expected headset use, desired

Claims	Prior Art
	headset functionality, display size, display resolution, allowable headset power drain, and the processing capabilities of the headset on-board processor (also referred to as a controller or an interface controller). Examples of information that can be displayed on display 103 are headset battery level, headset signal level, call status (e.g., dialing, in use, etc.), caller identification, current time/date, and timer information such as elapsed time associated with a particular call. Display 103 can also be configured to flash or otherwise visually indicate an incoming call. Assuming that the information is provided to the headset processor, display 103 can also display the battery level of the base unit (e.g., cell phone, dongle, etc.) and the signal strength of the base unit (e.g., cell phone). Additionally, display 103 can be used during headset configuration (e.g., to adjust or set the ring mode, ring loudness, headset volume, display mode, voice dialing, time, date, etc.) or to provide additional headset functionality (e.g., phone lists, text messages, dialing using virtual numeric keypad or phone list dialing). Additionally, display 103 can be touch sensitive, thus providing a touch screen for data input (e.g., phone numbers into a phone list, dialing using a virtual numeric keypad). Hollemans '490 at 2:6–9 This object is realized in that the controller has an outer surface with a touch-sensitive area, the controller being arranged to be substantially worn in or by a human ear, the controller being further arranged to detect the touch-sensitive area being touched, and to send the control signal in response to detecting the touch-sensitive area being touched. Hollemans '490 at 2:10–18 The remote controller thus gets a fixed position with respect to the user in or by the human ear. It is easy to find one's ear. This prevents looking for the remote controller. In addition, the user is not tempted to look at the remote controller, because there is nothing relevant to be seen for controlling the device. To avoid having to find tiny buttons, merely touching the remote controller somewhere on its touch-sensitive area operates said remote controller, which detects being touched and subsequently sends the control signal to the device. Also the problem of finding the proper orientation of the remote controller is solved by wearing the remote controller in or by the ear, because its orientation becomes fixed with respect to the user. Hollemans '490 at 2:25–33 Advantageously, the controller is arranged to detect a temporal pattern in the touch-sensitive area being touched, and to send the control signal in response to detecting the temporal pattern. In general, the device offers a plurality of functions and capabilities. Rather than having more buttons on the remote control that

Claims	Prior Art
	may be hard to distinguish, the single touch-sensitive area is used for controlling the plurality of functions. The temporal pattern is a particularly appropriate user interface, because it is easy to create temporal patterns in touching the area rhythmically and because the temporal patterns can constitute a natural and consistent interface. An example is a single short tap for pause/play, double short tap for next track, triple short tap for next artist/album and a long tap for adjusting the volume. Hollemans '490 at 3:1–6 Advantageously, the outer surface has a further touch-sensitive area, such that the further touch-sensitive area is touched substantially by the ear when the controller is substantially worn in or by a human ear, the controller being arranged to send the control signal only if the further touch-sensitive area is touched. This will prevent the accidental remote control of the device when the remote controller is not worn, thus preventing unwanted activation of the device and unnecessary battery exhaustion. Hollemans '490 at FIG. 2  FIG.2 Seshadri '839 at [0041] Wearable earpiece 12, as shown in FIG. 5, includes antenna 46, transmit/receive switch 122, receiver module 40, data recovery module 42, speaker module 44, transmitter module 120, input module 128 and display module 132. Receiver module 40, data recovery module 42 and speaker module 44 operate as discussed with reference to FIG. 4, with the exception of the data recovery module 42, to produce display

Claims	Prior Art
	information that is provided to display module 132. For instance, the received RF signal may include display information such as caller ID, command information, etc. which is separated by data recovery module 42 and provided to display module 132, which may be an LCD display, plasma display, etc. Seshadri '839 at [0042] Input module 128, which may be a keypad, touch screen, voice recognition circuit, or other like user interfaces, receives user commands and produces digital command messages 124 there from. Such digital command messages 124 includes, but are not limited to, packet size, synchronization information, frequency hopping initiation information, timeslot allocation information, link establishment information, piconet address information, fast-forward, play, pause, volume adjust, record, stop and rewind. The POSITA would have understood configuring a headset via the display to be a user input that operates to alter operation of the head-worn wearable electronic device. A POSITA would have been motivated to combine the teachings of Radar and Bodley to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claims 28 and 33. A POSITA would have been motivated to combine the teachings of Radar with Hollemans or Seshadri to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 33. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[35a] A personal audio system as recited in claim 34, wherein the head-worn wearable electronic device is configured to support audio output to the user, and	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 34, wherein the head-worn wearable electronic device is configured to support audio output to the user,” for example, for the same reasons discussed above for claim element [1g] and [38a]. <i>See</i> above at claims [1g]; [24a]; [24e]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[35b] wherein the at least one operation of the head-worn electronic device being altered concerns control of the audio output being provided to the user.	Radar '349 in view of Bodley '433 or Hollemans '490 expressly or inherently discloses “wherein the at least one operation of the head-worn electronic device being altered concerns control of the audio output being provided to the user.” <i>See</i> above at claim [34a]. The following citations show examples of where Bodley discloses this limitation. Bodley '433 discloses a touch sensitive display that “can be used during headset configuration (e.g., to adjust or set the ring mode, ring loudness, headset volume, display mode, voice dialing, time, date, etc.) or to provide additional headset functionality.” <i>See id.</i> at 3:14-18. A POSITA would have understood configuring a headset via the display to be a user input that operates to alter operation of the head-worn wearable electronic device. A POSITA would have been motivated to combine the teachings of Radar and Bodley '433 to meet the claim limitations for the reasons discussed above for element [3a]. Bodley '433 at 2:65–3:22 Display 103 can be used to provide the user with various types of information depending upon the design goals for the specific headset. The design goals are primarily based on the expected headset use, desired headset functionality, display size, display resolution, allowable headset power drain, and the processing capabilities of the headset on-board processor (also referred to as a controller or an interface controller). Examples of information that can be displayed on display 103 are headset battery level, headset signal level, call status (e.g., dialing, in use, etc.), caller identification, current time/date, and timer information such as elapsed time associated with a particular call. Display 103 can also be configured to flash or otherwise visually indicate an incoming call. Assuming that the information is provided to the headset processor, display 103 can also display the battery level of the base unit (e.g., cell phone, dongle, etc.) and the signal strength of the base unit (e.g., cell phone). Additionally, display 103 can be used during headset configuration (e.g., to adjust or set the ring mode, ring loudness, headset volume, display mode, voice dialing, time, date, etc.) or to provide additional headset functionality (e.g., phone lists, text messages, dialing using virtual numeric keypad or phone list dialing). Additionally, display 103 can be touch sensitive, thus providing a touch screen for data input (e.g., phone numbers into a phone list, dialing using a virtual numeric keypad). The following citations show examples of where Hollemans discloses this limitation. Hollemans '490 at 2:10–18 The remote controller thus gets a fixed position with respect to the user in or by the human ear. It is easy to find one's ear. This prevents looking for the remote controller. In addition, the user is not tempted to look at the remote controller, because there is nothing relevant to be seen for controlling the device. To

Claims	Prior Art
	avoid having to find tiny buttons, merely touching the remote controller somewhere on its touch-sensitive area operates said remote controller, which detects being touched and subsequently sends the control signal to the device. Also the problem of finding the proper orientation of the remote controller is solved by wearing the remote controller in or by the ear, because its orientation becomes fixed with respect to the user. Hollemans '490 at 2:25–33 Advantageously, the controller is arranged to detect a temporal pattern in the touch-sensitive area being touched, and to send the control signal in response to detecting the temporal pattern. In general, the device offers a plurality of functions and capabilities. Rather than having more buttons on the remote control that may be hard to distinguish, the single touch-sensitive area is used for controlling the plurality of functions. The temporal pattern is a particularly appropriate user interface, because it is easy to create temporal patterns in touching the area rhythmically and because the temporal patterns can constitute a natural and consistent interface. An example is a single short tap for pause/play, double short tap for next track, triple short tap for next artist/album and a long tap for adjusting the volume. Hollemans '490 at 3:1–6 Advantageously, the outer surface has a further touch-sensitive area, such that the further touch-sensitive area is touched substantially by the ear when the controller is substantially worn in or by a human ear, the controller being arranged to send the control signal only if the further touch-sensitive area is touched. This will prevent the accidental remote control of the device when the remote controller is not worn, thus preventing unwanted activation of the device and unnecessary battery exhaustion. Hollemans '490 at 3:7–10 Advantageously, the controller is arranged to send a further control signal to the device if the further touch-sensitive area is touched. This makes it, for example, possible for the device to pause playing music as soon as the earpiece is taken out and to resume playing music upon re-insertion. Hollemans '490 at 3:11–21 In an embodiment of the personal audio system according to the invention, the system comprises a second controller for remotely controlling the device by sending a further control signal to the device, the second controller having an outer surface with a further touch-sensitive area, the second controller being arranged to be substantially worn in or by a human ear, and the second controller being further arranged to detect a

Claims	Prior Art
	further temporal pattern in the further touch-sensitive area being touched, and to send the further control signal in response to detecting the further temporal pattern. A second controller fits in with the natural symmetry of the human head. It also considerably enhances the user interface for controlling the device. For example, the symmetry can be exploited in such a way that a long tap at the left remote controller decreases the volume, but a long tap at the right controller increases the volume. Hollemans '490 at FIG. 3  FIG.3 Hollemans '490 at FIG. 4  FIG.4 A POSITA would have understood configuring the “ring mode, ring loudness, [and] headset volume” of the headset to “concern control of the audio output” being provided to the user. <i>See</i> Bodley at 3:16-17. A POSITA would have been motivated to combine the teachings of Radar and Bodley or Hollemans to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 28.

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
36. A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes a force sensor configured to receive a user input based at least on sensing force applied to the force sensor.	Radar '349 in view of Abreu '960 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device includes a force sensor configured to receive a user input based at least on sensing force applied to the force sensor.” Abreu discloses that eyeglasses can include “pressure sensing means” incorporated into the temples of the eyeglasses and that the pressure sensing means can “detect if the sunglasses are being worn.” Abreu '960 at 15:60–65. Thus, the pressure sensing means can receive a user input, where the user input indicates that the user is wearing the glasses, based at least on sensing pressure applied to the pressure sensing means. The POSITA would understand the “pressure sensing means” to be a “force sensor,” since measuring pressure necessarily requires measuring force. Abreu '960 at 15:60–65 By way of illustration, but not of limitation, pressure sensing means can be incorporated in the end of the temples to detect if the sunglasses are being worn, and an abrupt drop in the pressure signal indicates glasses were removed or misplacement of the sensor can also generate an identifiable signal. The following citations show examples of where Irvin '332 discloses this limitation. Irvin '332 at 6:34–48 FIG. 4E illustrates the power control circuit 210 coupled to an alternate type of attitude sensor 220. In this embodiment, the attitude sensor 220 is a mechanical sensor that includes a contacting member 224 responsive to a physical orientation of the sensor 220. In one or more physical orientations, the contacting member 224 does not electrically connect the first and second contacts of attitude sensor 220. In one or more other physical orientations, the contacting member places the first and second contacts of attitude sensor 220 in electrical connection. The power control circuit 210 is configured to be responsive to this electrical connection. Contacting member 224 may be resiliently biased away from one or both contacts to ensure an open electrical connection between contacts when the headset is not oriented in a position indicative of use. <i>See also</i> Irvin at FIGS. 1, 4C, 6, 7; 4:3-10, 4:39-49, 6:3-33, 8:11-9:39.

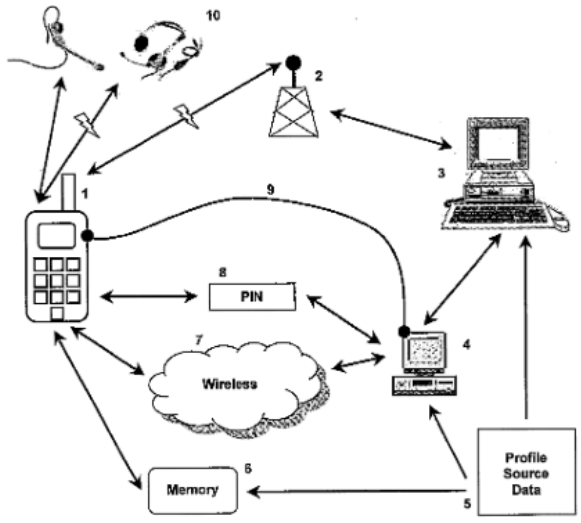
Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar and Abreu or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
37. A personal audio system as recited in claim 36, wherein the force sensor is configured to detect the user input, the detected user input operating to alter at least an operation of the head-worn wearable electronic device.	Radar '349 in view of Abreu '960 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 36, wherein the force sensor is configured to detect the user input, the detected user input operating to alter at least an operation of the head-worn wearable electronic device.” Abreu discloses that eyeglasses can include “pressure sensing means” incorporated into the temples of the eyeglasses and that the pressure sensing means can “detect if the sunglasses are being worn.” Abreu '960 at 15:60–65. Abreu '960 further discloses that “an abrupt drop in the pressure signal indicates glasses were removed” and can cause the eyeglasses to “generate an identifiable signal.” Abreu '960 at 15:63-65. Thus, a user input (a reduction in pressure applied to the pressure sensing means) can alter operation of the eyeglasses by causing the eyeglasses to generate an identifiable signal. Abreu '960 at 15:60–65 By way of illustration, but not of limitation, pressure sensing means can be incorporated in the end of the temples to detect if the sunglasses are being worn, and an abrupt drop in the pressure signal indicates glasses were removed or misplacement of the sensor can also generate an identifiable signal. The following citations show examples of where Irvin '332 discloses this limitation. Irvin '332 at 2:20–34 The wireless headset serves as a communication accessory to a base unit, such as a cellular telephone. When not in use, the wireless headset reverts to an inactive state and draws essentially no power. A power control circuit imparts automatic enabling capability to the wireless headset. Preferably, the power control circuit employs a sensor responsive to a natural stimulus associated with a person preparing to use the wireless headset. The wireless headset may sense motion, physical orientation, or user proximity. Sensing techniques include but are not limited to micro-electro-mechanical-systems (MEMS), mercury switches, attitude switches, and IR or acoustic proximity sensors. In some embodiments, the wireless headset transitions from the inactive state to an active state in response to a user picking it up or mounting the

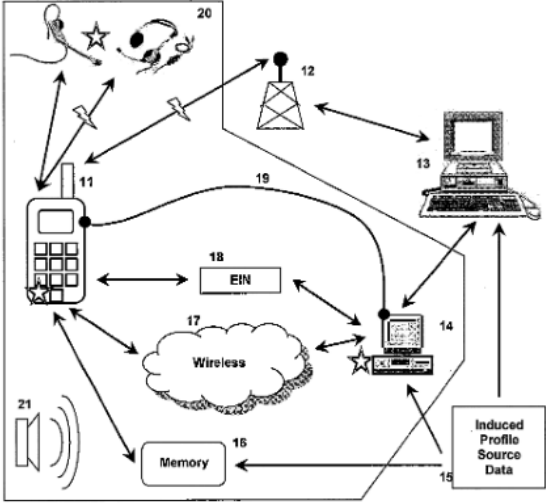
Claims	Prior Art
	wireless headset upon their head. Irvin '332 at 6:34–48 FIG. 4E illustrates the power control circuit 210 coupled to an alternate type of attitude sensor 220. In this embodiment, the attitude sensor 220 is a mechanical sensor that includes a contacting member 224 responsive to a physical orientation of the sensor 220. In one or more physical orientations, the contacting member 224 does not electrically connect the first and second contacts of attitude sensor 220. In one or more other physical orientations, the contacting member places the first and second contacts of attitude sensor 220 in electrical connection. The power control circuit 210 is configured to be responsive to this electrical connection. Contacting member 224 may be resiliently biased away from one or both contacts to ensure an open electrical connection between contacts when the headset is not oriented in a position indicative of use. Irvin '332 at 8:11–22 FIGS. 6 and 7 illustrate operation of the wireless headset 100. FIG. 6 is a state diagram for one exemplary embodiment of the present invention. When the wireless headset 100 is not in use, it automatically enters an inactive state (610). As explained, this inactive state may constitute disconnecting the communications circuit 230 from the power source 240, or may simply represent placing the communications circuit 230 in a non-functional, low-power condition. Absent user stimulus, such as motion of the wireless headset 100 or placement of the wireless headset 100 upon the user's body, the wireless headset 100 remains in the inactive state (610). <i>See also</i> Irvin at FIG. 1; 6:3-13. These elements correspond to headset components of Radar (<i>e.g.</i>, the illustrated headset), such that in combination with Radar, the contact switch will be activated when the user places the headset on his or her head. A POSITA would have understood the contact switch to be a force sensor configured to detect user input (<i>i.e.</i>, application of force against the switch by the user's head), consistent with the '693 patent's characterization of such mechanical switches as force sensors. <i>See</i> '693 patent at 103:22-47, FIGS. 78, 79. The user input alters an operation of the combined head-worn apparatus, at least by causing transitions between states as described for claim 36[A]. A POSITA would have been motivated to combine the teachings of Radar and Abreu or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23.

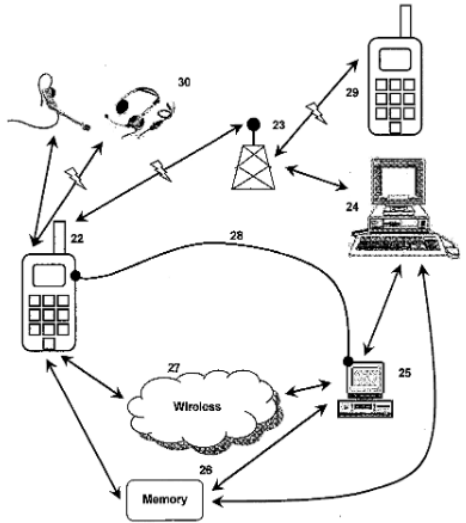
Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
38[a] A personal audio system as recited in claim 37, wherein the head-worn wearable electronic device is configured to support audio output to the user, and	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 37, wherein the head-worn wearable electronic device is configured to support audio output to the user.” For example, Radar discloses that a headset can include a speaker, and that the headset can output acoustic stimuli to a user (e.g., during hearing profile configuration). <i>See, e.g. id.</i> at [0047]. <i>See above at claims [1g]; [24a]; [24e].</i> A POSITA would have been motivated to combine the teachings of Radar and Abreu to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[38b] wherein the at least one operation of the head-worn electronic device being altered concerns control of the audio output being provided to the user.	Radar '349 in view of Abreu '960 or Irvin '332 expressly or inherently discloses “wherein the at least one operation of the head-worn electronic device being altered concerns control of the audio output being provided to the user.” For example, Abreu discloses that the eyeglasses can “send a signal if the eyeglasses were removed,” which can be detected based on “an abrupt drop in the pressure signal.” <i>Id.</i> at 15:57-63. Abreu further discloses that signals produced by the apparatus can be reported “by audio, visual or tactile means.” <i>Id.</i> at 19:25-26. Thus, the operation of Abreu’s eyeglasses that is altered based on a detected user input to a force sensor can be the generation or cessation of an audio signal. The POSITA would understand this to “concern” control of the audio output being provided to the user in that it dictates whether or not audio is being output. <i>See above at claim [35b], [23].</i> A POSITA would have been motivated to combine the teachings of Radar and Abreu or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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,

Claims	Prior Art
	with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
42[pre]. A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises:	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises,” for example, for the same reasons discussed above for claim element [24pre]. <i>See above at claim 1[pre].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[42a] a first head-worn structure including at least a first speaker of the pair of speakers, the first speaker being wearable proximate to a first ear of the user; and	Radar '349 expressly or inherently discloses “a first head-worn structure including at least a first speaker of the pair of speakers, the first speaker being wearable proximate to a first ear of the user,” for example, by disclosing a pair of binaural headphones described as including a speaker, where the headphones are shown including a first structure corresponding to and designed to sit over one of the user’s ears and a second structure corresponding to and designed to sit over the other ear, e.g., in FIG. 3. A POSITA would have understood that each structure of the headset could contain a speaker in order to provide the user with a binaural listening experience. Each of the speakers, by virtue of its placement in the portions of the headset sitting over the user’s ears is thus wearable proximate to (i.e., near) the user’s respective ear. <i>See above at claim [24a].</i> The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor.

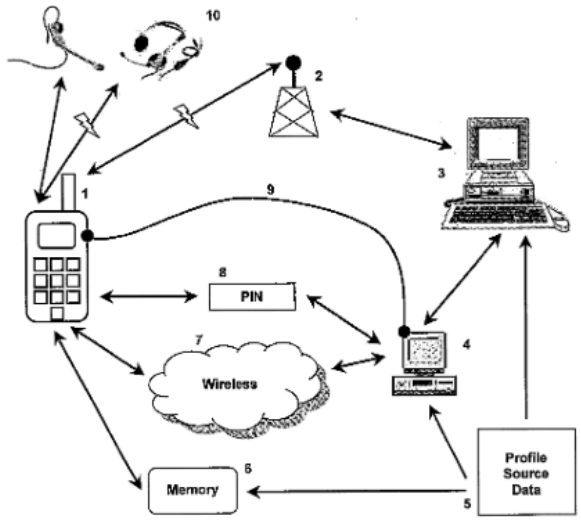
Claims	Prior Art
	Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various embodiments of the present invention. Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets.

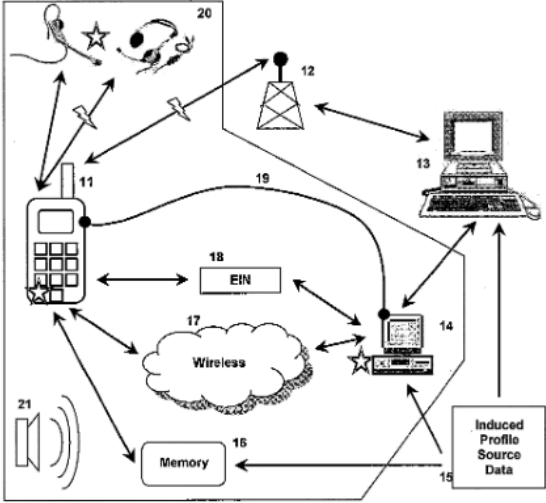
Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3

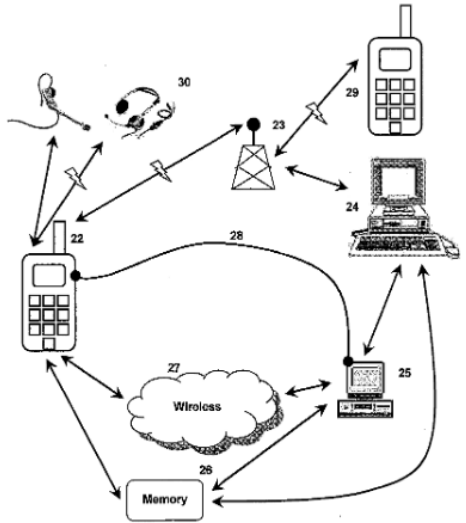
Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[42b] a second head-worn structure including at least a second speaker of the pair of speakers, the second speaker being wearable proximate to a second ear of the user.	Radar '349 expressly or inherently discloses “a second head-worn structure including at least a second speaker of the pair of speakers, the second speaker being wearable proximate to a second ear of the user,” for example, for the same reasons discussed for claim element [42a]. <i>See above at claim [24a].</i> The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic

Claims	Prior Art
	applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various embodiments of the present invention. Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets.

Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
43[pre]. A personal audio system as recited in claim 42, wherein the first head-worn structure comprises:	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises,” for example, for the same reasons discussed above for claim 42. <i>See above at claim 1[pre].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

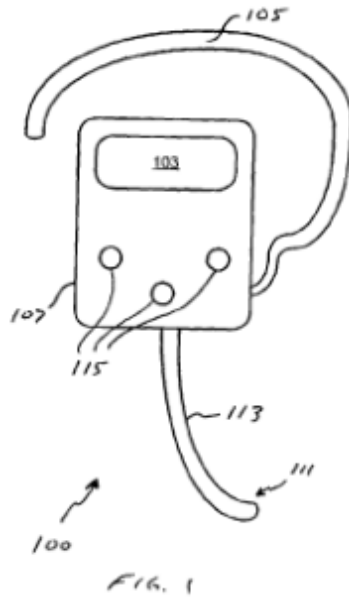
Claims	Prior Art
43[a] a first circuit board internal to the first head-worn structure,	Radar '349 in view of Jannard '526 expressly or inherently discloses “a first circuit board internal to the first head-worn structure.” For example, Jannard discloses an audio device including “a printed circuit board 284 [that] includes one switch for each of the buttons 73c, 73d, and 73e” and “an audio file storage and playback device 286.” <i>Id.</i> at 13:51-55. The printed circuit board is configured to be received by an “internal cavity” of the eyeglasses. <i>Id.</i> at 13:50-51. <i>See above at claim 31.</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
43[b] the first circuit board supporting at least a first integrated circuit and a second integrated circuit, the first integrated circuit and the second integrated circuit being physically attached to the first circuit board,	Radar '349 in view of Jannard '526 expressly or inherently discloses “the first circuit board supporting at least a first integrated circuit and a second integrated circuit, the first integrated circuit and the second integrated circuit being physically attached to the first circuit board.” For example, Jannard discloses that a printed circuit board can support multiple elements, such as “one switch for each of the buttons 73c, 73d, and 73e” and “an audio file storage and playback device 286.” <i>Id.</i> at 13:51-55. The printed circuit board “includes” these elements, such that they are physically attached to the printed circuit board. <i>See id.</i> at 13:53-54. <i>See above at claim 31.</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
43[c] and the first integrated circuit being electrically connected to the second integrated circuit or another electronic component.	Radar '349 in view of Jannard '526 expressly or inherently discloses “and the first integrated circuit being electrically connected to the second integrated circuit or another electronic component.” For example, Jannard’s audio file storage and playback device 286 includes a memory, an amplifier, and a processor that “operate together to function as an audio storage and playback system.” Jannard at 13:56-61. The POSITA would have understood that these elements could be implemented as integrated circuits, since, as discussed

Claims	Prior Art
	above for claim 31, integrated circuits were well-known and ubiquitous structures for packaging circuit elements by the priority date of the '693 patent. The POSITA would have also understood that these integrated circuits would be electrically connected to one another, since they “operate together to function” as the audio storage and playback device. <i>See id.</i> at 13:56-61. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
44. A personal audio system as recited in claim 43, wherein the first circuit board is a flexible circuit board.	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 43, wherein the first circuit board is a flexible circuit board,” for example, for the same reasons discussed above for claim element [32a]. <i>See</i> above at claims 32, 43. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
45[pre]. A personal audio system as recited in claim 42, wherein the first head-worn structure comprises:	Radar '349, alone or in view of Bodley '433 and Zadesky '230 or Hollemans '40 or Seshadri '839 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises,” for example, for the same reasons discussed above for claim 42. <i>See</i> above at claim 1[pre]; 24[pre]. A POSITA would have been motivated to combine the teachings of Radar, Bodley, and Zadesky to meet the claim limitations with a reasonable expectation of success. A POSITA would have been motivated to combine the teachings of Radar and Bodley as described above for claim 33. A POSITA would be motivated to further modify the Radar-Bodley system with Zadesky's capacitive sensing touch pad. Bodley discloses that a display for controlling settings and functions of an earpiece can include a touch sensitive surface. However, the specific details of the functionality of the touch sensitive surface are not disclosed in Bodley. A POSITA thus would have been motivated to look to other references to supply these missing details. A

Claims	Prior Art
	POSITA would have been motivated to look to Zadesky at least because it is in the same general field of endeavor as Radar and Bodley. Both Radar and Bodley disclose systems for providing audio output from a communication device to a user via a headset. Similarly, Zadesky discloses a media player that is “dedicated to processing media such as audio” and “allow[s] a user to listen to music.” Zadesky is therefore from the same general field of endeavor as Radar and Bodley—providing audio output to a user. Thus, a POSITA would have been motivated to combine the teachings of these references with a reasonable expectation of success. A POSITA would have found it obvious to combine the teachings of Radar with Hollemans or Seshadri for similar reasons. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[45a] a user input device, the user input device being configured to receive a user input, the user input device is based on at least capacitive effect, wherein the user input being received induces at least a capacitive change to produce at least an electrical response.	Radar ’349, in view of Bodley ’433 or Zadesky ’230 or Hollemans ’490 or Seshadri ’839, expressly or inherently discloses “a user input device, the user input device being configured to receive a user input, the user input device is based on at least capacitive effect, wherein the user input being received induces at least a capacitive change to produce at least an electrical response.” Zadesky discloses a capacitive sensing touch pad for a media player that includes a protective shield layer that is touched by a user to implement cursor movements on a display screen and an electrode layer for interpreting the position of the user’s finger when the finger is resting or moving on the protective shield. Zadesky ’230, 2:40–42, 2:49–55. Zadesky further discloses that the touch pad includes sensing electronics that “measure the amount of capacitance in each of the electrodes,” “compute the position of finger movement based on the capacitance in each of the electrodes,” and “report this information to [a] computing device.” Zadesky ’230, 3:1–5. Zadesky ’230 at 2:16–59 With regards to touch pads, mice and track balls, a Cartesian coordinate system is used to monitor the position of the finger, mouse and ball, respectively, as they are moved. The Cartesian coordinate system is generally defined as a two dimensional coordinate system (x, y) in which the coordinates of a point (e.g., position of finger, mouse or ball) are its distances from two intersecting, often perpendicular straight lines, the distance from each being measured along a straight line parallel to each other. For example, the x, y positions of the mouse, ball and finger may be monitored. The x, y positions are then used to correspondingly locate and move the input pointer on the display screen. To elaborate further, touch pads generally include one or more sensors for detecting the proximity of the finger thereto. By way of example, the sensors may be based on resistive sensing, surface acoustic wave

Claims	Prior Art
	sensing, pressure sensing (e.g., strain gauge), optical sensing, capacitive sensing and the like. The sensors are generally dispersed about the touch pad with each sensor representing an x, y position. In most cases, the sensors are arranged in a grid of columns and rows. Distinct x and y position signals, which control the x, y movement of a pointer device on the display screen, are thus generated when a finger is moved across the grid of sensors within the touch pad. For brevity sake, the remaining discussion will be held to the discussion of capacitive sensing technologies. It should be noted, however, that the other technologies have similar features. Capacitive sensing touch pads generally contain several layers of material. For example, the touch pad may include a protective shield, one or more electrode layers and a circuit board. The protective shield typically covers the electrode layer(s), and the electrode layer(s) is generally disposed on a front side of the circuit board. As is generally well known, the protective shield is the part of the touch pad that is touched by the user to implement cursor movements on a display screen. The electrode layer(s), on the other hand, is used to interpret the x, y position of the user's finger when the user's finger is resting or moving on the protective shield. The electrode layer (s) typically consists of a plurality of electrodes that are positioned in columns and rows so as to form a grid array. The columns and rows are generally based on the Cartesian coordinate system and thus the rows and columns correspond to the x and y directions. Zadesky '230 at 2:60–3:5 The touch pad may also include sensing electronics for detecting signals associated with the electrodes. For example, the sensing electronics may be adapted to detect the change in capacitance at each of the electrodes as the finger passes over the grid. The sensing electronics are generally located on the backside of the circuit board. By way of example, the sensing electronics may include an application specific integrated circuit (ASIC) that is configured to measure the amount of capacitance in each of the electrodes and to compute the position of finger movement based on the capacitance in each of the electrodes. The ASIC may also be configured to report this information to the computing device. Zadesky '230 at 3:6–22 Referring to FIG. 1, a touch pad 10 will be described in greater detail. The touch pad is generally a small rectangular area that includes a protective shield 12 and a plurality of electrodes 14 disposed underneath the protective shield layer 12. For case of discussion, a portion of the protective shield layer 12 has been removed to show the electrodes 14. Each of the electrodes 14 represents a different x, y position. In one configuration, as a finger 16 approaches the electrode grid 14, a tiny capacitance forms between the finger 16 and the electrodes 14 proximate the finger 16. The circuit board/sensing electronics measures capacitance and produces an x, y input signal 18 corresponding to the active electrodes 14 is sent to a host device 20 having a display screen 22. The x, y input signal 18 is used to control the movement of a cursor

Claims	Prior Art
	24 on a display screen 22. As shown, the input pointer moves in a similar x, y direction as the detected x, y finger motion. Zadesky '230 at 12:31–41 The capacitance in each of the electrodes 258 is measured by control circuitry 260 located on the backside of the circuit board 256. By detecting changes in capacitance at each of the electrodes 258, the control circuitry 260 can determine the angular location, direction, speed and acceleration of the finger as it is moved across the touch pad 250. The control circuitry 260 can also report this information in a form that can be used by a computing device. By way of example, the control circuitry may include an ASIC (application specific integrated circuit). <i>See also</i> Zadesky at 5:61-6:8; 10:40-51. A POSITA would have understood Zadesky’s “finger moving across the surface” to disclose a sliding action. Bodley further discloses that the display 103 can be “touch sensitive, thus providing a touch screen for data input.” Bodley '433 at 3:20–21, 2:40–41, 2:65–67.

Claims	Prior Art
	Bodley '433 at FIG. 1  Bodley '433 at 2:7–8 FIG. 1 is a frontal view of a generic headset that includes a display in accordance with the invention; Bodley '433 at 2:38–50 Although headset 100 may use any of a variety of means of attaching to a user (e.g., headband, earpiece, etc.) and thus allowing hands-free operation of the headset, preferably headset 100 includes an earpiece 105 (e.g., an ear hook) that is coupled to the user's ear, or a portion thereof. More preferably, earpiece 105 fits around a portion of the user's ear. Earpiece 105 is coupled to body 107 of the headset, body 107 housing the various electronic components necessary to provide functionality to headset 100. Attached to the back surface of body 107 is an output transducer 109 (e.g., a speaker). Also coupled to body 107 is an input transducer 111 (e.g., a microphone), which, in this embodiment, is located at the end of a boom member 113. Bodley '433 at 2:65–3:22 Display 103 can be used to provide the user with various types of information depending upon the design goals for the specific headset. The design goals are primarily based on the expected headset use, desired

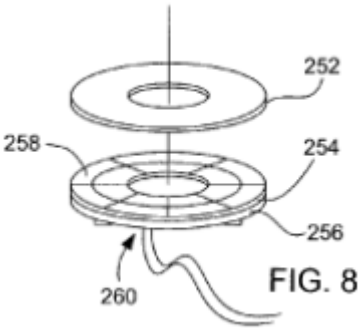
Claims	Prior Art
	headset functionality, display size, display resolution, allowable headset power drain, and the processing capabilities of the headset on-board processor (also referred to as a controller or an interface controller). Examples of information that can be displayed on display 103 are headset battery level, headset signal level, call status (e.g., dialing, in use, etc.), caller identification, current time/date, and timer information such as elapsed time associated with a particular call. Display 103 can also be configured to flash or otherwise visually indicate an incoming call. Assuming that the information is provided to the headset processor, display 103 can also display the battery level of the base unit (e.g., cell phone, dongle, etc.) and the signal strength of the base unit (e.g., cell phone). Additionally, display 103 can be used during headset configuration (e.g., to adjust or set the ring mode, ring loudness, headset volume, display mode, voice dialing, time, date, etc.) or to provide additional headset functionality (e.g., phone lists, text messages, dialing using virtual numeric keypad or phone list dialing). Additionally, display 103 can be touch sensitive, thus providing a touch screen for data input (e.g., phone numbers into a phone list, dialing using a virtual numeric keypad). Hollemans also discloses this feature. Hollemans '490 at Abstract In a personal audio system (100), a remote controller (120) has a touch-sensitive area (122) and is worn in or by a human ear. A temporal pattern in the area (122), which is being touched, is detected and used for remotely controlling a device (110) for personal audio by means of a control signal (130). This prevents the hassle involved in finding, manipulating and operating a conventional remote control that is typically dangling somewhere along a wire. Hollemans '490 at 2:6–9 This object is realized in that the controller has an outer surface with a touch-sensitive area, the controller being arranged to be substantially worn in or by a human ear, the controller being further arranged to detect the touch-sensitive area being touched, and to send the control signal in response to detecting the touch-sensitive area being touched. Hollemans '490 at 2:10–18 The remote controller thus gets a fixed position with respect to the user in or by the human ear. It is easy to find one's ear. This prevents looking for the remote controller. In addition, the user is not tempted to look at the remote controller, because there is nothing relevant to be seen for controlling the device. To avoid having to find tiny buttons, merely touching the remote controller somewhere on its touch-sensitive

Claims	Prior Art
	area operates said remote controller, which detects being touched and subsequently sends the control signal to the device. Also the problem of finding the proper orientation of the remote controller is solved by wearing the remote controller in or by the ear, because its orientation becomes fixed with respect to the user. Hollemans '490 at 2:25–33 Advantageously, the controller is arranged to detect a temporal pattern in the touch-sensitive area being touched, and to send the control signal in response to detecting the temporal pattern. In general, the device offers a plurality of functions and capabilities. Rather than having more buttons on the remote control that may be hard to distinguish, the single touch-sensitive area is used for controlling the plurality of functions. The temporal pattern is a particularly appropriate user interface, because it is easy to create temporal patterns in touching the area rhythmically and because the temporal patterns can constitute a natural and consistent interface. An example is a single short tap for pause/play, double short tap for next track, triple short tap for next artist/album and a long tap for adjusting the volume. Hollemans '490 at 3:1–6 Advantageously, the outer surface has a further touch-sensitive area, such that the further touch-sensitive area is touched substantially by the ear when the controller is substantially worn in or by a human ear, the controller being arranged to send the control signal only if the further touch-sensitive area is touched. This will prevent the accidental remote control of the device when the remote controller is not worn, thus preventing unwanted activation of the device and unnecessary battery exhaustion. Hollemans '490 at 4:30–5:7 The outer surface 121 is just the physical outer side of the controller 120. A part of this outer surface 121 is sensitive to being touched and is referred to as the touch-sensitive area 122. Optionally, the controller 120 comprises a second area that is sensitive to being touched, referred to as the further touch-sensitive area 123. The touch-sensitive area 122 can be realized in many ways, including a sensor for changes in capacity or induced voltages or currents, a grid of conducting parts between which changes in resistance are measured and detected, or an ordinary pressure sensor, button or temperature sensor. Another possibility is to measure and detect changes in either a passive or an active electromagnetic field. With the passive variant, the controller 120 relies on, for example, nearby power lines to generate measurable fields when being touched. With the active variant, the controller 120 generates an electromagnetic field of its

Claims	Prior Art
	own. Hollemans '490 at 8:19–22 In a third way, the touch-sensitive area is used for picking up a gesture made on the area with e.g. a stylus or a finger. The remote control may be extended for this purpose with means for detecting a gesture, e.g. a laser beetle, a small camera, an IR movement sensor, or a cross-capacitance sensor. Hollemans '490 at 8:30–33 The gesture detected may be a user defined gesture for activating a user defined function. The gesture detected may be used for user identification by matching with initials or an autograph. The gesture may extend into two dimensions, e.g. a planar gesture, or it may extend into three dimensions. Hollemans '490 at FIG. 2 FIG.2 Seshadri also discloses this feature. Seshadri '839 at [0041] Wearable earpiece 12, as shown in FIG. 5, includes antenna 46, transmit/receive switch 122, receiver module 40, data recovery module 42, speaker module 44, transmitter module 120, input module 128 and display module 132. Receiver module 40, data recovery module 42 and speaker module 44 operate as

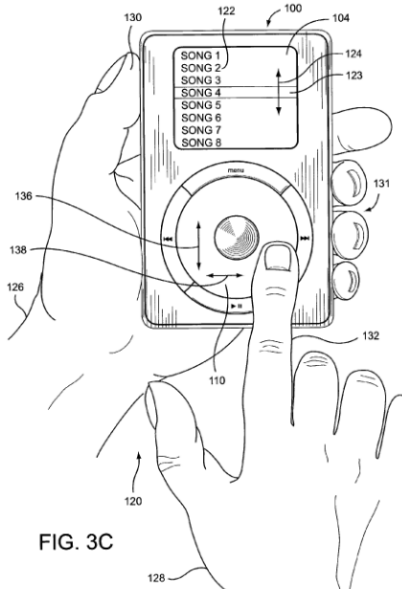
Claims	Prior Art
	discussed with reference to FIG. 4, with the exception of the data recovery module 42, to produce display information that is provided to display module 132. For instance, the received RF signal may include display information such as caller ID, command information, etc. which is separated by data recovery module 42 and provided to display module 132, which may be an LCD display, plasma display, etc. Seshadri '839 at [0042] Input module 128, which may be a keypad, touch screen, voice recognition circuit, or other like user interfaces, receives user commands and produces digital command messages 124 there from. Such digital command messages 124 includes, but are not limited to, packet size, synchronization information, frequency hopping initiation information, timeslot allocation information, link establishment information, piconet address information, fast-forward, play, pause, volume adjust, record, stop and rewind. A POSITA would have been motivated to combine the teachings of Radar, Bodley, and Zadesky to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [45pre]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
46. A personal audio system as recited in claim 45, wherein the user input device is configured to distinguish at least a direction of the user input with respect to the user input device.	Radar '349, in view of Zadesky '230 or Hollemans '490 or Seshadri '839, expressly or inherently discloses “[a] personal audio system as recited in claim 45, wherein the user input device is configured to distinguish at least a direction of the user input with respect to the user input device.” Zadesky discloses a capacitive sensing touch pad including a protective shield layer and an electrode layer for interpreting the position of the user’s finger on the protective shield. Zadesky, 2:49-55. Zadesky further discloses that “by detecting changes in capacitance at each of the electrodes” of the electrode layer, control circuitry can “determine the angular location, direction, speed and acceleration of the finger as it is moved across the touch pad.” Zadesky, 12:34-37. Zadesky '230 at 2:16–59 With regards to touch pads, mice and track balls, a Cartesian coordinate system is used to monitor the position of the finger, mouse and ball, respectively, as they are moved. The Cartesian coordinate system is generally defined as a two dimensional coordinate system (x, y) in which the coordinates of a point (e.g., position of finger, mouse or ball) are its distances from two intersecting, often perpendicular straight lines,

Claims	Prior Art
	the distance from each being measured along a straight line parallel to each other. For example, the x, y positions of the mouse, ball and finger may be monitored. The x, y positions are then used to correspondingly locate and move the input pointer on the display screen. To elaborate further, touch pads generally include one or more sensors for detecting the proximity of the finger thereto. By way of example, the sensors may be based on resistive sensing, surface acoustic wave sensing, pressure sensing (e.g., strain gauge), optical sensing, capacitive sensing and the like. The sensors are generally dispersed about the touch pad with each sensor representing an x, y position. In most cases, the sensors are arranged in a grid of columns and rows. Distinct x and y position signals, which control the x, y movement of a pointer device on the display screen, are thus generated when a finger is moved across the grid of sensors within the touch pad. For brevity sake, the remaining discussion will be held to the discussion of capacitive sensing technologies. It should be noted, however, that the other technologies have similar features. Capacitive sensing touch pads generally contain several layers of material. For example, the touch pad may include a protective shield, one or more electrode layers and a circuit board. The protective shield typically covers the electrode layer(s), and the electrode layer(s) is generally disposed on a front side of the circuit board. As is generally well known, the protective shield is the part of the touch pad that is touched by the user to implement cursor movements on a display screen. The electrode layer(s), on the other hand, is used to interpret the x, y position of the user's finger when the user's finger is resting or moving on the protective shield. The electrode layer (s) typically consists of a plurality of electrodes that are positioned in columns and rows so as to form a grid array. The columns and rows are generally based on the Cartesian coordinate system and thus the rows and columns correspond to the x and y directions. Zadesky '230 at 12:31–41 The capacitance in each of the electrodes 258 is measured by control circuitry 260 located on the backside of the circuit board 256. By detecting changes in capacitance at each of the electrodes 258, the control circuitry 260 can determine the angular location, direction, speed and acceleration of the finger as it is moved across the touch pad 250. The control circuitry 260 can also report this information in a form that can be used by a computing device. By way of example, the control circuitry may include an ASIC (application specific integrated circuit). <i>See also Zadesky at 6:38-59.</i> The following citations show examples of where Hollemans '490 discloses this limitation.

Claims	Prior Art
	Hollemans '490 at 8:19–22 In a third way, the touch-sensitive area is used for picking up a gesture made on the area with e.g. a stylus or a finger. The remote control may be extended for this purpose with means for detecting a gesture, e.g. a laser beetle, a small camera, an IR movement sensor, or a cross-capacitance sensor. Hollemans '490 at 8:30–33 The gesture detected may be a user defined gesture for activating a user defined function. The gesture detected may be used for user identification by matching with initials or an autograph. The gesture may extend into two dimensions, e.g. a planar gesture, or it may extend into three dimensions. A POSITA would have been motivated to combine the teachings of Radar and Zadesky or Hollemans or Seshadri to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 45. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
47. A personal audio system as recited in claim 46, wherein the user input device is configured to detect at least a sliding of a finger action with respect to the user input device.	Radar '349, in view of Zadesky '230 or Hollemans '490, expressly or inherently discloses “[a] personal audio system as recited in claim 46, wherein the user input device is configured to detect at least a sliding of a finger action with respect to the user input device.” See above at claim [45a]. Zadesky '230 at FIG. 8 

Claims	Prior Art
	Zadesky '230 at 11:50–12:20 FIG. 8 is a partially broken away perspective view of an annular capacitive touch pad 250, in accordance with one embodiment of the present invention. By way of example, the annular capacitive touch pad 250 may correspond to the touch pad of FIG. 2. The annular capacitive touch pad 250 is arranged to detect changes in capacitance as the user swirls an object such as a finger around the touch pad 250. The annular capacitive touch pad 250 is also arranged to detect changes in capacitance as the user moves their finger radially across the touch pad 250. The annular capacitive touch pad 250 is formed from various layers including at least a label layer 252, an electrode layer 254 and a circuit board 256. The label layer 252 is disposed over the electrode layer 254 and the electrode layer 254 is disposed over the circuit board 256. At least the label 252 and electrode layer 254 are annular such that they are defined by concentric circles, i.e., they have an inner perimeter and an outer perimeter. The circuit board 256 is generally a circular piece having an outer perimeter that coincides with the outer perimeter of the label 252 and electrode layer 254. It should be noted, however, that in some cases the circuit board 256 may be annular or the label 252 and electrode layer 254 may be circular. The label layer 252 serves to protect the underlayers and to provide a surface for allowing a finger to slide thereon. The surface is generally smooth so that the finger does not stick to it when moved. The label layer 252 also provides an insulating layer between the finger and the electrode layer 254. The electrode layer 254 includes a plurality of spatially distinct electrodes 258 that have positions based on the polar coordinate system. For instance, the electrodes 258 are positioned both angularly and radially on the circuit board 256 such that each of the electrodes 258 defines a distinct angular and radial position thereon. Any suitable number of electrodes 258 may be used. In most cases, it would be desirable to increase the number of electrodes 258 so as to provide higher resolution, i.e., more information can be used for things such as acceleration. Hollemans '490 at 8:19–22 In a third way, the touch-sensitive area is used for picking up a gesture made on the area with e.g. a stylus or a finger. The remote control may be extended for this purpose with means for detecting a gesture, e.g. a laser beetle, a small camera, an IR movement sensor, or a cross-capacitance sensor. Hollemans '490 at 8:30–33 The gesture detected may be a user defined gesture for activating a user defined function. The gesture detected may be used for user identification by matching with initials or an autograph. The gesture may extend into two dimensions, e.g. a planar gesture, or it may extend into three dimensions.

Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar and Zadesky or Hollemans to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 45. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
48. A personal audio system as recited in claim 45, wherein the user input device is configured to distinguish at least whether the user input pertains to a forward sliding action or a backward sliding action with respect to the user input device.	Radar '349, in view of Zadesky '230 or Hollemans '490, expressly or inherently discloses “[a] personal audio system as recited in claim 45, wherein the user input device is configured to distinguish at least whether the user input pertains to a forward sliding action or a backward sliding action with respect to the user input device.” <i>See above at claim [47].</i> Zadesky discloses that a touch pad 110 can be integrated into a media player 100 and a user 120 can “slide his or her finger 132 substantially tangentially from all sides of the touch pad 110. For example, the touch pad 110 may be actuated forwards and backwards as shown by arrows 136 and side to side by arrows 138.” Zadesky 8:52–61, FIG. 3C, 9:17–21. Zadesky further discloses that signals produced by a finger passing a sensor of the touch pad are “monitored by an electronic interface that converts the number, combination and frequency of the signals into location, direction, speed and acceleration information.” Zadesky, 7:33-41. Accordingly, the POSITA would have understood Zadesky’s touch pad to distinguish whether a user input pertains to a forward sliding action or a backward sliding action.

Claims	Prior Art
	Zadesky '230 at FIG. 3C  FIG. 3C Zadesky '230 at 7:28–44 The touch pad generally consists of a touchable outer surface 111 for receiving a finger for manipulation on the touch pad 110. Although not shown in FIG. 2, beneath the touchable outer surface 111 is a sensor arrangement. The sensor arrangement includes a plurality of sensors that are configured to activate as the finger passes over them. In the simplest case, an electrical signal is produced each time the finger passes a sensor. The number of signals in a given time frame may indicate location, direction, speed and acceleration of the finger on the touch pad, i.e., the more signals, the more the user moved his or her finger. In most cases, the signals are monitored by an electronic interface that converts the number, combination and frequency of the signals into location, direction, speed and acceleration information. This information may then be used by the media player 100 to perform the desired control function on the display screen 104. Zadesky '230 at 8:52–67 FIGS. 3A-3C show the media player 100 of FIG. 2 being used by a user 120, in accordance with different embodiments of the invention. In all of these embodiments, the user 120 is linearly scrolling 104 (as shown by arrow 124) through a list of songs 122 displayed on the display screen via a slider bar 123. As

Claims	Prior Art
	shown, the media device 100 is comfortably held by one hand 126 while being comfortably addressed by the other hand 128. This configuration generally allows the user 120 to easily actuate the touch pad 110 with one or more fingers. For example, the thumb 130 and rightmost fingers 131 (or leftmost fingers if left handed) of the first hand 126 are used to grip the sides of the media player 100 while a finger 132 of the opposite hand 128 is used to actuate the touch pad 110. As shown, the entire top surface of the touch pad 110 is accessible to the user's finger 130. Zadesky '230 at 9:16–21 Referring to FIG. 3C, and in accordance with one embodiment of the invention, the user 120 can slide his or her finger 132 substantially tangentially from all sides of the touch pad 110. For example, the touch pad 110 may be actuated forwards and backwards as shown by arrows 136 and side to side by arrows 138. Zadesky '230 at 11:50–12:20 FIG. 8 is a partially broken away perspective view of an annular capacitive touch pad 250, in accordance with one embodiment of the present invention. By way of example, the annular capacitive touch pad 250 may correspond to the touch pad of FIG. 2. The annular capacitive touch pad 250 is arranged to detect changes in capacitance as the user swirls an object such as a finger around the touch pad 250. The annular capacitive touch pad 250 is also arranged to detect changes in capacitance as the user moves their finger radially across the touch pad 250. The annular capacitive touch pad 250 is formed from various layers including at least a label layer 252, an electrode layer 254 and a circuit board 256. The label layer 252 is disposed over the electrode layer 254 and the electrode layer 254 is disposed over the circuit board 256. At least the label 252 and electrode layer 254 are annular such that they are defined by concentric circles, i.e., they have an inner perimeter and an outer perimeter. The circuit board 256 is generally a circular piece having an outer perimeter that coincides with the outer perimeter of the label 252 and electrode layer 254. It should be noted, however, that in some cases the circuit board 256 may be annular or the label 252 and electrode layer 254 may be circular. The label layer 252 serves to protect the underlayers and to provide a surface for allowing a finger to slide thereon. The surface is generally smooth so that the finger does not stick to it when moved. The label layer 252 also provides an insulating layer between the finger and the electrode layer 254. The electrode layer 254 includes a plurality of spatially distinct electrodes 258 that have positions based on the polar coordinate system. For instance, the electrodes 258 are positioned both angularly and radially on the circuit board 256 such that each of the electrodes 258 defines a distinct angular and radial position thereon. Any suitable number of electrodes 258 may be used. In most cases, it would be desirable to

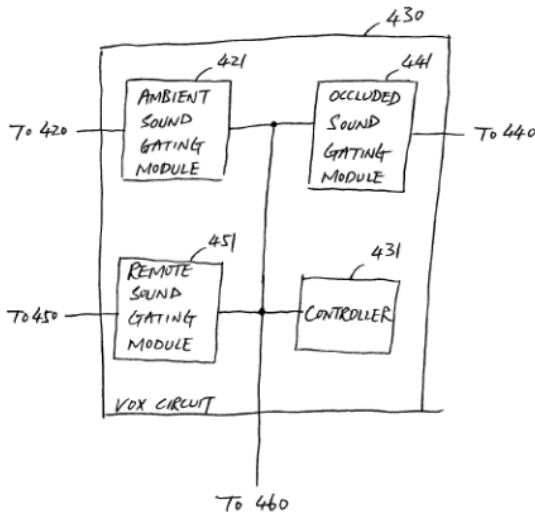
Claims	Prior Art
	increase the number of electrodes 258 so as to provide higher resolution, i.e., more information can be used for things such as acceleration. Hollemans '490 at 8:19–22 In a third way, the touch-sensitive area is used for picking up a gesture made on the area with e.g. a stylus or a finger. The remote control may be extended for this purpose with means for detecting a gesture, e.g. a laser beetle, a small camera, an IR movement sensor, or a cross-capacitance sensor. Hollemans '490 at 8:30–33 The gesture detected may be a user defined gesture for activating a user defined function. The gesture detected may be used for user identification by matching with initials or an autograph. The gesture may extend into two dimensions, e.g. a planar gesture, or it may extend into three dimensions. A POSITA would have been motivated to combine the teachings of Radar and Zadesky or Hollemans to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 45. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[49a] A personal audio system as recited in claim 48, wherein the head-worn wearable electronic device comprises: a second circuit board internal to the second head-worn structure,	Radar '349, in view of Bodley '433, Zadesky '230, and Jannard '526, expressly or inherently discloses “[a] personal audio system as recited in claim 48, wherein the head-worn wearable electronic device comprises: a second circuit board internal to the second head-worn structure,” for example, for the reasons discussed above for claim element [43a]. <i>See</i> above at claim [31]. A POSITA would have been motivated to combine the teachings of Radar, Bodley, Zadesky, and Jannard to meet the claim limitations with a reasonable expectation of success. For example, a POSITA would have been motivated to combine Radar, Bodley, and Zadesky for the reasons discussed above for claim 45. A POSITA would have been further motivated to incorporate the teachings of Jannard because Jannard discloses well-known components (printed circuit boards) for supporting circuitry, such as the circuitry disclosed in Radar, Bodley, and Zadesky. It would have been obvious to the POSITA to look to Jannard to supply the details of the circuitry configuration, since, like Radar and Bodley, Jannard also discloses a system including a head-worn device that supports audio output received from a communication device.

Claims	Prior Art
	Furthermore, Radar, Bodley, Zadesky, and Jannard are not incompatible because each reference relates to providing audio output to a user. For example, Radar, Bodley, Zadesky, and Jannard each disclose systems for providing audio output to a user. Thus, a POSITA would have been motivated to combine the teachings of these references with a reasonable expectation of success. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[49b] the second circuit board supporting at least a third integrated circuit and a fourth integrated circuit, the third integrated circuit and the fourth integrated circuit being physically attached to the second circuit board, and	Radar '349, in view of Bodley '433, Zadesky '230, and Jannard '526, expressly or inherently discloses “the second circuit board supporting at least a third integrated circuit and a fourth integrated circuit, the third integrated circuit and the fourth integrated circuit being physically attached to the second circuit board,” for example, for the reasons discussed above for claim element [43b]. <i>See above at claim 43.</i> A POSITA would have been motivated to combine the teachings of Radar, Bodley, Zadesky, and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [49a]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[49c] the third integrated circuit being electrically connected to the fourth integrated circuit or another electronic component.	Radar '349, in view of Bodley '433, Zadesky '230, and Jannard '526, expressly or inherently discloses “the third integrated circuit being electrically connected to the fourth integrated circuit or another electronic component,” for example, for the reasons discussed above for claim element [43c]. A POSITA would have been motivated to combine the teachings of Radar, Bodley, Zadesky, and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [49a]. <i>See above at claims 43[c]; 49[a]; 49[b].</i> To the extent that Radar '349, alone or in view of the above cited reference(s), 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,

Claims	Prior Art
	with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
50[pre]. A personal audio system as recited in claim 42, wherein the first head-worn structure of the head-worn wearable electronic device comprises:	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure of the head-worn wearable electronic device comprises,” for example, for the same reasons discussed above for claim 42. <i>See above at claims 1[pre]; 24[pre].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[50a] a first microphone configured to pick up at least audio input from at least the user, the first microphone being at least partially in the first head-worn structure and is positioned to be directed towards the user when the first head-worn structure is being worn by the user; and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “a first microphone configured to pick up at least audio input from at least the user, the first microphone being at least partially in the first head-worn structure and is positioned to be directed towards the user when the first head-worn structure is being worn by the user,” for example, for the same reasons discussed above for claim element [10a]. A POSITA would have incorporated Nemirovski's microphone teachings into Radar's headset, such that the headset would include analogous microphones to improve speech detection and noise cancellation. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[50b] a second microphone configured to pick up at least ambient sound input associated with an environment in the vicinity of the first head-worn structure, the second microphone being positioned to be directed away	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “a second microphone configured to pick up at least ambient sound input associated with an environment in the vicinity of the first head-worn structure, the second microphone being positioned to be directed away from the user when the head-worn wearable electronic device is being worn by the user,” for example, for the same reasons discussed above for claim element [10b].

Claims	Prior Art
from the user when the head-worn wearable electronic device is being worn by the user.	A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[51a] A personal audio system as recited in claim 42, wherein the first head-worn structure comprises: a first circuit board internal to the first head-worn structure, the first circuit board supporting at least a first integrated circuit, the first integrated circuit being physically attached to the first circuit board,	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises: a first circuit board internal to the first head-worn structure, the first circuit board supporting at least a first integrated circuit, the first integrated circuit being physically attached to the first circuit board,” for example, for the same reasons discussed above for claim elements [43a] and [43b]. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[51b] wherein the first integrated circuit includes at least a processing unit, and	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the first integrated circuit includes at least a processing unit.” For example, as discussed above for claim element [43c], Jannard’s audio file storage and playback device 286 includes a memory, an amplifier, and a processor. Jannard at 13:56-61. The POSITA would have understood that the processor could be implemented as an integrated circuit, since, as discussed above for claim element [31a], integrated circuits were well-known and ubiquitous structures for packaging circuit elements by the priority date of the '693 patent. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

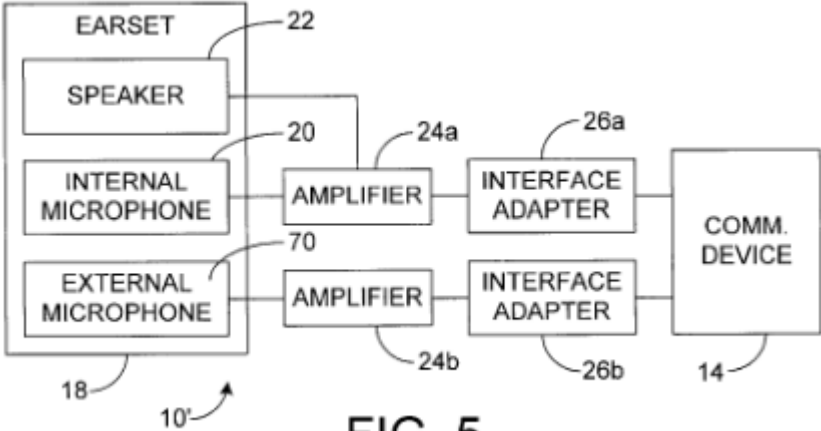
Claims	Prior Art
[51c] wherein the processing unit is configured to: determine an ambient sound level; and	Radar '349 in view of Jannard '526 and/or Victorian '313 expressly or inherently discloses “wherein the processing unit is configured to: determine an ambient sound level.” For example, Jannard '526 discloses that the second microphone is used conjunction with an algorithms to “discern” ambient noise for purposes of noise cancellation. Jannard '526 at 25:53–26:20 In another embodiment, a further modification of the audio devices 10, 10A, 10B, 10C, and 10D is provided wherein the audio devices include at least two banks of microphones, with one bank acting as a speaker of received and one bank providing an ambient noise-cancellation function. The microphone banks can be positioned at any suitable location or combination of locations (e.g., on the audio device, within the audio device, opposing sides of the audio device, or the like). In one embodiment, automatic switching of the speaking-microphone and noise-canceling-microphone banks' functions advantageously enhances ease of use. In a further embodiment, the microphone banks can be arranged in an array to be used in conjunction with algorithms to discern, reduce, and/or eliminate noise for the purpose of voice recognition. For example, in one embodiment, such microphone banks can include ASIC-based noise-canceling technology, such as is available in chips from Andrea Electronics Corporation (AEC), to enable voice recognition in ambient noise up to about 130 Db or more. In another embodiment, microphone banks can be arranged in any suitable combination of linear or non-linear arrays to be used in conjunction with algorithms to discern, reduce, and/or eliminate noise in any suitable manner. In another embodiment, audio/proximity sensors can advantageously trigger the appropriate functionality in a specific bank. In another embodiment, a noise-canceling microphone can be provided in connection with a cord or other microphones described above. For example, without limitation, a series of miniature microphones can be supported down a cord from the audio device, separated by desired distances, and aimed in different directions. In another implementation, one or more of the microphones can be for verbal input from the user, and one or more others of the microphones, or the same microphone, can also be for noise-cancellation purposes. Victorian '313 also renders this feature obvious. Victorian discloses an ear-level device including a VOX circuit 430 that includes “a voice-driven switch or attenuator driven by the output of a comparator that compares the amplitude of a detected ambient sound with a predetermined threshold for the ambient sound.” Victorian '313 at [0047]. The ambient sound gating module 421 is turned on when the detected ambient sound exceeds the threshold and turned off when the detected ambient sound drops below the threshold. Victorian '313 at [0047]. A POSITA would have understood that in order to compare an ambient sound to a threshold, an ambient sound level must necessarily be determined.

Claims	Prior Art
	Victorian '313 at FIG. 4B  FIG. 4B Victorian '313 at [0021] FIG. 4B is a block diagram showing one embodiment of portions of a voice operated exchange (VOX) circuit included in the single ear-level device of FIG. 1. Victorian '313 at [0044] Ear-level device 110 includes an external microphone 420, an ear canal microphone 440, an ear canal speaker 470, a processor 460, a wireless transceiver 450, an antenna 455, a voice operated exchange (VOX) circuit 430, and a battery 480. External microphone 420 picks up ambient sound such that a hearing impaired person wearing ear-level device 110 is not “isolated” when communicating to remote device 190. Thus, ear-level device enables the hearing impaired person to talk to another person either directly (if the other person is nearby) or through a device such as a cell phone. Ear canal microphone 440 detects sound from the ear canal. The sound includes primarily speech of the person wearing ear-level device 110. Ear canal speaker 470 transmits sound received from remote device 190 and/or external microphone 420 to the same ear canal. In one embodiment, ear canal microphone 440 and ear canal speaker 470 are implemented as one physical device. Processor 460 converts the sound picked up from

Claims	Prior Art
	the ear canal to an electrical signal to be transmitted to remote device 190, and converts the signals received from remote device 190 and/or external microphone 420 to a sound audible to the person wearing ear-level device 110. In one embodiment, processor 460 includes one or more of amplification circuitry, filtering circuitry, acoustic feedback reduction circuitry, noise reduction circuitry, and tone control circuitry, among other circuits performing signal processing functions as known in the art. In one embodiment, processor 460 includes a speech recognition module to enhance the audio signal received by and/or transmitted from ear-level device 110. Wireless transceiver 450 and antenna 455 form a telemetry interface supporting telemetry link 195 between ear-level device 110 and remote device 190. Wireless transceiver 450 includes a wireless transmitter and a wireless receiver. The wireless transmitter receives the electrical signal representing the sound picked up from the ear canal from processor 460 and transmits an outgoing wireless signal representing the same sound to remote device 190. The wireless receiver receives an incoming wireless signal representing a remote sound from remote device 190 and transmits an electrical signal representing the remote sound to processor 460. Telemetry link 195 provides for bi-directional communication allowing simultaneous signal transmission, in both directions, between ear-level device 110 and remote device 190. VOX circuit 430 activates a major portion of ear-level device 110 only when sound is detected by at least one of external microphone 420, ear canal microphone 440, and wireless transceiver 450. In one embodiment, VOX circuit 430 includes a voice-controlled switch connecting between battery 480 and the portions of ear-level device 110 that are voice activated. The switch is driven by the sound detected by at least one of external microphone 420, ear canal microphone 440, and wireless transceiver 450. It is turned on when sound detected by external microphone 420 exceeds a predetermined threshold, when sound detected by ear canal microphone 440 exceeds another predetermined threshold, and/or when wireless transceiver 450 receives the incoming wireless signal representing the remote sound. In one embodiment, as discussed with respect to FIG. 4B below, VOX circuit 430 gates or attenuates one or more sounds detected by external microphone 420, ear canal microphone 440, and wireless transceiver 450, to eliminate or reduce echo and ringing caused by the loop formed by ear canal speaker 470 and ear canal microphone 440. Battery 480 supplies the power needed for the operation of ear-level device 110. In one embodiment, battery 480 is a rechargeable battery that can be recharged without being taken out from ear-level device 110. Victorian '313 at [0045] FIG. 4B is a block diagram showing one embodiment of portions of VOX circuit 430. In this embodiment, VOX circuit 430 includes an ambient sound gating module 421 that blanks or attenuates the sound detected by external microphone 420, an occluded sound gating module 441 that blanks or attenuates the sound detected by ear canal microphone 440, a remote sound gating module 451 that blanks or attenuates the sound detected by wireless transceiver 450, and controller 431 to coordinate the states of

Claims	Prior Art
	the gating modules. Because ear canal microphone 440 is capable of detecting the sound delivered to the ear canal from ear canal speaker 470, there is a need to avoid echo and/or ringing. For example, a remote sound from remote device 190 delivered to the ear canal may be detected as an occluded sound and transmitted back to remote device 190, causing echo. The gating modules function in a coordinated manner to eliminate or reduce such echo and/or ringing caused by breaking, or applying resistance into, the audio loop formed by ear canal speaker 470 and ear canal microphone 440. Victorian '313 at [0047] Ambient sound gating module 421 includes a voice-driven switch or attenuator driven by the output of a comparator that compares the amplitude of a detected ambient sound with a predetermined threshold for the ambient sound. When the amplitude of the detected ambient sound exceeds the threshold for the ambient sound, and when controller 431 permits, ambient sound gating module 421 is turned on. When the amplitude of the detected ambient sound drops below the threshold for the ambient sound, ambient sound gating module 421 is turned off. In one embodiment, after the amplitude of the detected ambient sound drops below the threshold for the ambient sound, ambient sound gating module 421 is turned off after a predetermined delay. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. A POSITA would have been motivated to combine the teachings of Radar-Jannard and Victorian to meet the claim limitations with a reasonable expectation of success as well. A POSITA would recognize that Jannard's ear bud would distinguish between sounds from the ambient environment and sounds from the user and would have been motivated to combine the teachings of Radar-Jannard with Victorian in order to determine how much the ambient noise signal should be reduced to produce the mixed signal. Both Jannard and Victorian disclose head-worn devices for providing audio output to a user. Jannard at FIG. 3A; Victorian '313 at [0002]. Jannard and Victorian also share various structural and functional similarities that render the inventions readily combinable. For example, both Jannard and Victorian disclose head-worn devices having microphones, speakers, wireless transceivers, and associated circuitry. Jannard at FIG. 3A, 25:12-22; Victorian '313 at FIG. 4A. Accordingly, combining the teachings of Jannard and Victorian would involve combining known components to yield predictable results.

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[51d] amplify audio output from the first speaker dependent at least in part on the ambient sound level.	Radar '349 in view of Jannard '526 expressly or inherently discloses “amplify audio output from the first speaker dependent at least in part on the ambient sound level.” <i>See above at claim [51c].</i> Jannard '526 discloses that the second microphone is used conjunction with algorithms to “reduce” or “eliminate” ambient noise for purposes of noise cancellation and voice recognition technology in ambient noise “up to about 130 Db.” A POSITA would have recognized that the output signal would thus depend on the ambient noise level. Jannard '526 at 25:53–26:20 In another embodiment, a further modification of the audio devices 10, 10A, 10B, 10C, and 10D is provided wherein the audio devices include at least two banks of microphones, with one bank acting as a speaker of received and one bank providing an ambient noise-cancellation function. The microphone banks can be positioned at any suitable location or combination of locations (e.g., on the audio device, within the audio device, opposing sides of the audio device, or the like). In one embodiment, automatic switching of the speaking-microphone and noise-canceling-microphone banks' functions advantageously enhances ease of use. In a further embodiment, the microphone banks can be arranged in an array to be used in conjunction with algorithms to discern, reduce, and/or eliminate noise for the purpose of voice recognition. For example, in one embodiment, such microphone banks can include ASIC-based noise-canceling technology, such as is available in chips from Andrea Electronics Corporation (AEC), to enable voice recognition in ambient noise up to about 130 Db or more. In another embodiment, microphone banks can be arranged in any suitable combination of linear or non-linear arrays to be used in conjunction with algorithms to discern, reduce, and/or eliminate noise in any suitable manner. In another embodiment, audio/proximity sensors can advantageously trigger the appropriate functionality in a specific bank. In another embodiment, a noise-canceling microphone can be provided in connection with a cord or other microphones described above. For example, without limitation, a series of miniature microphones can be supported down a cord from the audio device, separated by desired distances, and aimed in different directions. In another implementation, one or more of the microphones can be for verbal input from the user, and one or more others of the microphones, or the same microphone, can also be for noise-

Claims	Prior Art
	cancellation purposes. Nemirovski '379 discloses that the earset 18 can include amplifiers 24a and 24b for amplifying or cancel the signals generated by the internal microphone 20 and external microphone 70, respectively. Nemirovski, 9:46–48, 9:66–67, FIG. 5. Nemirovski '379 at FIG. 5  FIG. 5 Nemirovski '379 at 2:59–60 FIG. 5 is a block diagram of an ear microphone assembly according to another aspect of the invention; and Nemirovski '379 at 3:6–23 The present invention is directed to a communication system, including a communications device and an ear microphone, or earset, assembly. The communications system allows a user to speak with a remotely located person. The ear microphone assembly, also referred to herein as an earset, includes a microphone and a speaker supported by a housing. The housing is retained by the ear of the user and allows for hands free use of the communication system while carrying on a conversation with the remotely located person. The microphone is directed towards the ear canal of the user and detects sounds emanating or coming out of the ear (or air pressure changes occurring within the ear) to accurately and reliably detect the speech of the user. The position of the microphone may also help to reduce detection of externally generated

Claims	Prior Art
	sounds. The ear microphone assembly allows for separation of a speech input device for a cellular, or wireless, telephone from an RF transceiver of the telephone. Nemirovski '379 at 4:27–41 The communications system 10 includes an ear microphone assembly, or earset 18, having a microphone 20 and a speaker 22 supported by a housing 30 (FIG. 3). The physical arrangement of the earset 18 will be described in more detail below. The microphone 20 is used to detect sounds emanating or coming from the ear (sometimes referred to as air pressure changes within the ear) of the user that result from speech of the user. The microphone 20 converts those detections into an electrical signal. The electrical signal is optionally amplified by an amplifier 24. Next, the amplified electrical signal is received by the communication device 14 via an appropriate interface adapter 26. The interface adapter 26 can be, for example, a jack or other electrical connector received by a corresponding receptacle of the communication device 14. Nemirovski '379 at 9:33–39 The external microphone 70 is disposed on a exterior portion 72 of the housing 30 and is pointed away from the wearer of the earset 18 assembly. The external microphone 70 can be secured to the housing 30 with adhesive and can be disposed in a recess defined by the exterior portion 72. Similar to the internal microphone 20, the external microphone 70 is small (e.g., less than two mm in size). Nemirovski '379 at 9:45–60 FIG. 5 is a block diagram that illustrates a system 10' for detecting speech of the user. The system 10' includes the earset 18 having the internal microphone 20, the speaker 22 and amplifier 24a as described in greater detail above. In addition, the earset 18 of the system 10' has the external microphone 70. As one skilled in the art will appreciate, the use of the external microphone 70 is optional. The external microphone 70 is disposed on the housing 30 (FIG. 3) and generally points away from the person wearing the earset 18. As a result, the external microphone 70 detects air pressure changes located outside the ear. These air pressure changes are mainly the result of externally generated noise (other people's speech, environmental noise, etc.) and, in part, to the speech of the person wearing the earset 18, when the speech travels from the mouth of the user and through the air to the external microphone 70. Nemirovski '379 at 10:8–13 The unique signals generated by the internal and external microphone 20, 70 can be used to distinguish

Claims	Prior Art
	between user produced speech and externally produced sounds. In alternative configurations of the system 10', the system 10' can be adapted to cancel externally generated noise from the detections of the internal microphone 20. Nemirovski '379 at 10:14–26 When the user speaks both the internal microphone 20 and the external microphone 70 detects the speech. Sounds generated by a source other than the user (e.g., another person speaking, a passing vehicle, machinery, the hum of an air conditioner or computer, etc.) will be referred to herein as noise. Both the external microphone 70 and the internal microphone 20 detect the noise. Accordingly, the communication device 14 (or other processing circuit) can be programmed to isolate the user's speech by identifying (i.e., separating) the speech component and the noise component. As a result, a relatively noise-free speech signal can be produced which can be transmitted to the communication network 12 by the communication device 14. Nemirovski '379 at 10:27–47 In one embodiment, signal separation can be made by solving equations 1 and 2, identified below, for a sound component signal (“S”) and a noise component signal (“N”). An impulse response of the internal microphone (F_{MI}) and an impulse response of the external microphone (F_{ME}) reflect the sensitivity of the microphones, the frequency response of the microphones, resonating characteristics of the ear and housing, etc. Y_I represents the overall signal produced by the internal microphone and Y_E represents the overall signal produced by the external microphone. Assuming that the entire system is linear (the system features are additive and homogeneous), the system can be represented by equations 1 and 2 as follows (the asterisk, or “*”, represents a convolution operator): [Equation] $F_{ME} * S + F_{ME} * N = Y_E \quad \text{Eq. 2}$ By using the output signals Y_I and Y_E and the known impulse responses F_{MI} and F_{ME}, the two equations can be solved in real time for the two unknown signals S and N. Victorian discloses that an ambient sound level can be used to modify audio signals provided to a processor 460 based on an ambient sound level by turning on the ambient sound gating module 421 (i.e., ambient sounds are allowed to pass to a processor 460) when the ambient sound level exceeds a threshold, and turning off the ambient sound gating module 421 (i.e., ambient sounds are blanked or attenuated) when the ambient sound level is below the threshold. Victorian '313 at [0045], [0047].

Claims

Prior Art

Victorian '313 at FIG. 9

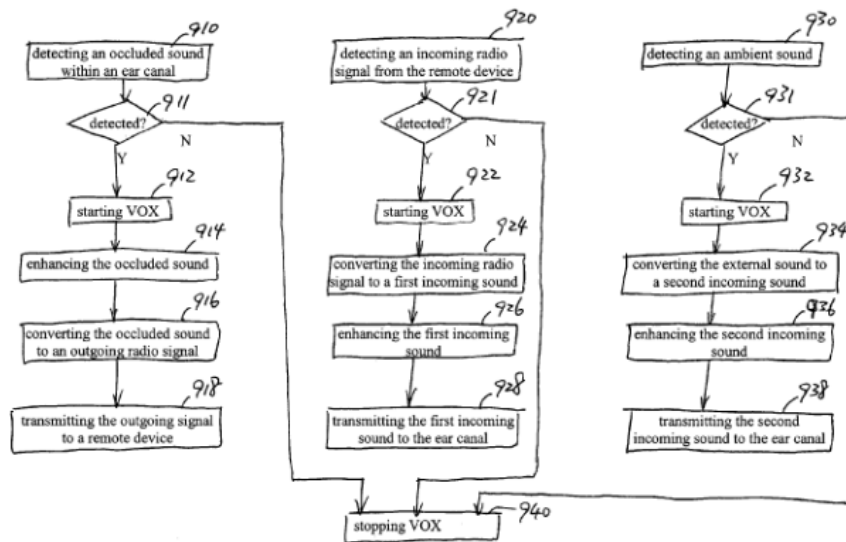


FIG. 9

Victorian '313 at [0026]

FIG. 9 is a flow chart illustrating an embodiment of a method for audio communication between the single ear-level device or the pair of ear-level devices and a remote device.

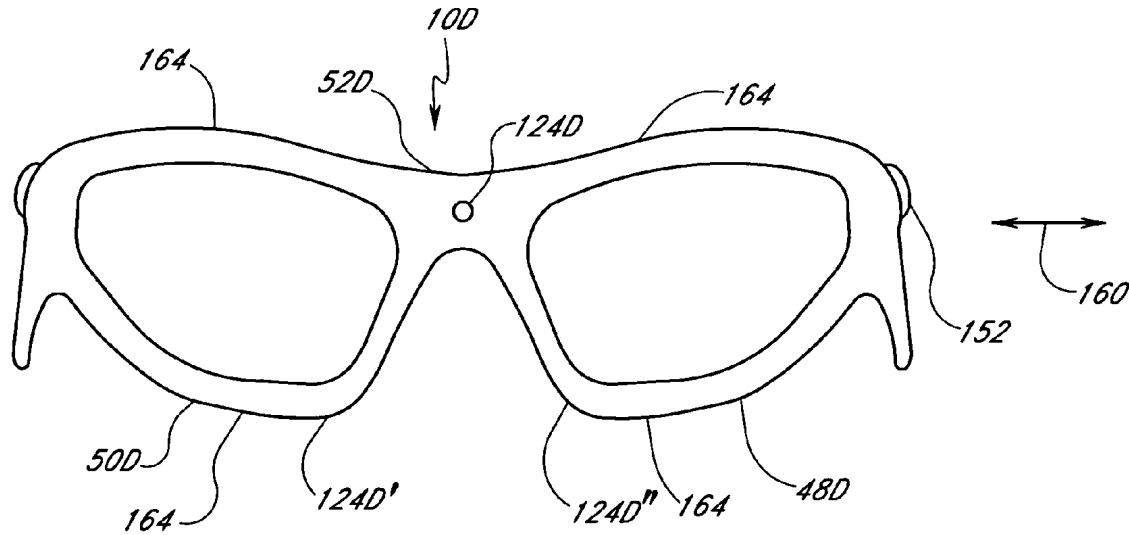
Victorian '313 at [0044]

Ear-level device 110 includes an external microphone 420, an ear canal microphone 440, an ear canal speaker 470, a processor 460, a wireless transceiver 450, an antenna 455, a voice operated exchange (VOX) circuit 430, and a battery 480. External microphone 420 picks up ambient sound such that a hearing impaired person wearing ear-level device 110 is not “isolated” when communicating to remote device 190. Thus, ear-level device enables the hearing impaired person to talk to another person either directly (if the other person is nearby) or through a device such as a cell phone. Ear canal microphone 440 detects sound from the ear canal. The sound includes primarily speech of the person wearing ear-level device 110. Ear canal speaker 470 transmits sound received from remote device 190 and/or external microphone 420 to the same ear canal. In one embodiment, ear canal microphone 440 and ear canal speaker 470 are implemented as one physical device. Processor 460 converts the sound picked up from the ear canal to an electrical signal to be transmitted to remote device 190, and converts the signals

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	received from remote device 190 and/or external microphone 420 to a sound audible to the person wearing ear-level device 110. In one embodiment, processor 460 includes one or more of amplification circuitry, filtering circuitry, acoustic feedback reduction circuitry, noise reduction circuitry, and tone control circuitry, among other circuits performing signal processing functions as known in the art. In one embodiment, processor 460 includes a speech recognition module to enhance the audio signal received by and/or transmitted from ear-level device 110. Wireless transceiver 450 and antenna 455 form a telemetry interface supporting telemetry link 195 between ear-level device 110 and remote device 190. Wireless transceiver 450 includes a wireless transmitter and a wireless receiver. The wireless transmitter receives the electrical signal representing the sound picked up from the ear canal from processor 460 and transmits an outgoing wireless signal representing the same sound to remote device 190. The wireless receiver receives an incoming wireless signal representing a remote sound from remote device 190 and transmits an electrical signal representing the remote sound to processor 460. Telemetry link 195 provides for bi-directional communication allowing simultaneous signal transmission, in both directions, between ear-level device 110 and remote device 190. VOX circuit 430 activates a major portion of ear-level device 110 only when sound is detected by at least one of external microphone 420, ear canal microphone 440, and wireless transceiver 450. In one embodiment, VOX circuit 430 includes a voice-controlled switch connecting between battery 480 and the portions of ear-level device 110 that are voice activated. The switch is driven by the sound detected by at least one of external microphone 420, ear canal microphone 440, and wireless transceiver 450. It is turned on when sound detected by external microphone 420 exceeds a predetermined threshold, when sound detected by ear canal microphone 440 exceeds another predetermined threshold, and/or when wireless transceiver 450 receives the incoming wireless signal representing the remote sound. In one embodiment, as discussed with respect to FIG. 4B below, VOX circuit 430 gates or attenuates one or more sounds detected by external microphone 420, ear canal microphone 440, and wireless transceiver 450, to eliminate or reduce echo and ringing caused by the loop formed by ear canal speaker 470 and ear canal microphone 440. Battery 480 supplies the power needed for the operation of ear-level device 110. In one embodiment, battery 480 is a rechargeable battery that can be recharged without being taken out from ear-level device 110. Victorian '313 at [0045] FIG. 4B is a block diagram showing one embodiment of portions of VOX circuit 430. In this embodiment, VOX circuit 430 includes an ambient sound gating module 421 that blanks or attenuates the sound detected by external microphone 420, an occluded sound gating module 441 that blanks or attenuates the sound detected by ear canal microphone 440, a remote sound gating module 451 that blanks or attenuates the sound detected by wireless transceiver 450, and controller 431 to coordinate the states of the gating modules. Because ear canal microphone 440 is capable of detecting the sound delivered to the

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	ear canal from ear canal speaker 470, there is a need to avoid echo and/or ringing. For example, a remote sound from remote device 190 delivered to the ear canal may be detected as an occluded sound and transmitted back to remote device 190, causing echo. The gating modules function in a coordinated manner to eliminate or reduce such echo and/or ringing caused by breaking, or applying resistance into, the audio loop formed by ear canal speaker 470 and ear canal microphone 440. Victorian '313 at [0047] Ambient sound gating module 421 includes a voice-driven switch or attenuator driven by the output of a comparator that compares the amplitude of a detected ambient sound with a predetermined threshold for the ambient sound. When the amplitude of the detected ambient sound exceeds the threshold for the ambient sound, and when controller 431 permits, ambient sound gating module 421 is turned on. When the amplitude of the detected ambient sound drops below the threshold for the ambient sound, ambient sound gating module 421 is turned off. In one embodiment, after the amplitude of the detected ambient sound drops below the threshold for the ambient sound, ambient sound gating module 421 is turned off after a predetermined delay. Victorian '313 at [0066] Steps 930-938 illustrate the process of detecting a sound from the environment and transmit it to the ear canal. A microphone outside the ear canal detects an ambient sound at 930. If the ambient sound is detected at 931, the VOX of the system is started at 932 if it is not already on. The ambient sound is converted to a second incoming audio signal at 934. The second incoming audio signal is enhanced at 936 with a voice recognition system that improves the signal-to-noise ratio, where the signal is any voice included in the ambient sound, and the noise is any sound other than the voice. A speaker disposed in the ear canal transmits the second incoming audio signal representing to the ear canal at 928. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. A POSITA would have been motivated to combine the teachings of Radar-Jannard and Nemirovski and Victorian, with a reasonable expectation of success. For example, a POSITA would have been motivated to combine the teachings of Jannard and Nemirovski in order to produce a modified signal representative of the ambient noise that is typically reduced in volume before being output to a speaker and also to provide noise cancellation functionality to provide audio output to a user that is not distorted by ambient sound. A POSITA

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	would recognize that all disclosed headsets and earbuds would distinguish between sounds from the ambient environment and sounds from the user and, as each disclose ear-worn devices for hearing impaired individuals. A POSITA would recognize that it would be useful to employ the techniques disclosed in Victorian (e.g., to determine an ambient sound level) in order to determine how much the ambient noise signal should be reduced to produce the mixed signal it would have been obvious for the POSITA to look to Victorian to fill in the missing details for such modification in order to provide improved audio output to a user that most closely mimics audio as it would be perceived by individuals without a hearing impairment. Moreover, the devices disclosed in Jannard, Nemirovski, and Victorian share various structural and functional similarities that render the inventions readily combinable. For example, each disclose ear-worn devices for providing audio output to a hearing-impaired user and include similar components, such as microphones, speakers, wireless transceivers, and control circuitry. Accordingly, combining the teachings of Jannard, Nemirovski, and Victorian would involve combining known components to yield predictable results. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[52a] A personal audio system as recited in claim 42, wherein the first head-worn structure of the wearable electronic device comprises: a battery internal to the first head-worn structure; and	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure of the wearable electronic device comprises: a battery internal to the first head-worn structure,” for example, for the same reasons discussed above for claim element [25a]. <i>See</i> above at claims [25a]; [26a]. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[52b] at least one conductive element that facilitates electrical coupling with the battery, the at least one conductive element is at	Radar '349 in view of Jannard '526 expressly or inherently discloses “at least one conductive element that facilitates electrical coupling with the battery, the at least one conductive element is at least partially internal to the first head-worn structure but remains at least partially exposed external to the first head-worn structure, and the at least one conductive element comprises at least one conductive pad.” For example, as discussed for

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least partially internal to the first head-worn structure but remains at least partially exposed external to the first head-worn structure, and the at least one conductive element comprises at least one conductive pad,	claim element [26a], Jannard discloses an audio device including “power contacts 164 for recharging any rechargeable batteries connected thereto.” <i>Id.</i> at 24:56-58. The POSITA would understand the power contacts 164 to be conductive pads because the power contacts “make electrical contact with corresponding contacts in the [recharging] cradle.” <i>Id.</i> at 25:7-8. Because the power contacts 164 make electrical contact with the corresponding cradle contacts, the POSITA would understand the power contacts 164 to be at least partially exposed external to the audio device. Further, because the power contacts 164 are not entirely visible external to the audio device, as shown in FIG. 11, the POSITA would understand the power contacts to be at least partially internal to the audio device. Jannard '526 at FIG. 11  FIG. 11 Jannard '526 at 4:27–28 FIG. 11 is a front elevational view of the audio device illustrated in FIG. 10. Jannard '526 at 24:56–25:3 The audio device 10D can also include power contacts 164 for recharging any rechargeable batteries connected thereto. For example, the power contacts 164 can be disposed on a lower edge of the orbitals 48D, 50D. Thus, with an appropriate recharging cradle (not shown), the audio device 10D can be laid on the cradle, thereby making contact between the power contacts 164 and corresponding contacts in the

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	cradle (not shown). Alternatively, power contacts can be provided in numerous other locations as desired. For example, the power contacts 164 can be disposed at the ends of the ear stems 54D, 56D. A corresponding cradle can include two vertically oriented holes into which the ear stems are inserted for recharging. In this configuration, the lens within the orbitals 48D, 50D would face directly upwardly. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[52c] wherein the battery is able to be electrically coupled via the at least one conductive element to a charging apparatus and charged when at least the first head-worn structure of the head-worn wearable electronic device is placed within the charging apparatus, and	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the battery is able to be electrically coupled via the at least one conductive element to a charging apparatus and charged when at least the first head-worn structure of the head-worn wearable electronic device is placed within the charging apparatus,” for example, for the same reasons discussed above for claim element [26b]. <i>See above at claim [26b].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[52d] wherein the electrical coupling of the at least one conductive element with the charging apparatus is supported by at least a magnetic element.	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the electrical coupling of the at least one conductive element with the charging apparatus is supported by at least a magnetic element,” for example, for the same reasons discussed above for claim element [26c]. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

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[53a] A personal audio system as recited in claim 52, wherein the head-worn wearable electronic device comprises: a microphone at least partially internal to the first head-worn structure,	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 52, wherein the head-worn wearable electronic device comprises: a microphone at least partially internal to the first head-worn structure.” For example, Radar discloses that a headset can include a microphone. <i>Id.</i> at [0009]. <i>See</i> above at claim 6. A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[53b] wherein the head-worn wearable electronic device is configured to receive a voice input via the microphone, determine a requested operation from the voice input using voice recognition, and control an operation by the head-worn wearable electronic device based on the requested operation.	Radar '349 in view of Jannard '526 or Seshadri '839 expressly or inherently discloses “wherein the head-worn wearable electronic device is configured to receive a voice input via the microphone, determine a requested operation from the voice input using voice recognition, and control an operation by the head-worn wearable electronic device based on the requested operation.” Jannard discloses that the audio device includes a microphone configured to convert a wearer’s voice into a transmitted telecommunication signal. Jannard, 2:1–3. The microphone can be disposed “in the frame” of the eyeglasses, such as in in the bridge portion or along a lower edge of the right or left orbitals. Jannard, 22:1-9. Jannard further discloses that the audio device can include interface electronics having a “speech recognition engine” for “recogniz[ing] speech from the user, convert[ing] the speech to AT commands, and control[ing] [the] source device using standard AT command protocol.” Jannard '526 at 32:14-19. Jannard '526 at 25:53–26:20 In another embodiment, a further modification of the audio devices 10, 10A, 10B, 10C, and 10D is provided wherein the audio devices include at least two banks of microphones, with one bank acting as a speaker of received and one bank providing an ambient noise-cancellation function. The microphone banks can be positioned at any suitable location or combination of locations (e.g., on the audio device, within the audio device, opposing sides of the audio device, or the like). In one embodiment, automatic switching of the speaking-microphone and noise-canceling-microphone banks' functions advantageously enhances ease of use. In a further embodiment, the microphone banks can be arranged in an array to be used in conjunction with algorithms to discern, reduce, and/or eliminate noise for the purpose of voice recognition. For example, in one embodiment, such microphone banks can include ASIC-based noise-canceling technology, such as is available in chips from Andrea Electronics Corporation (AEC), to enable voice recognition in ambient noise up to about 130 Db or more. In another embodiment, microphone

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	banks can be arranged in any suitable combination of linear or non-linear arrays to be used in conjunction with algorithms to discern, reduce, and/or eliminate noise in any suitable manner. In another embodiment, audio/proximity sensors can advantageously trigger the appropriate functionality in a specific bank. In another embodiment, a noise-canceling microphone can be provided in connection with a cord or other microphones described above. For example, without limitation, a series of miniature microphones can be supported down a cord from the audio device, separated by desired distances, and aimed in different directions. In another implementation, one or more of the microphones can be for verbal input from the user, and one or more others of the microphones, or the same microphone, can also be for noise-cancellation purposes. Jannard '526 at 30:53–31:2 With reference to FIG. 9A, the interface electronics 116 can include audio or “aural” menus that can be selected by user. For example, a user can initiate an audio menu by depressing the button 150 (FIGS. 10–12). Upon initiation of the audio menus, the interface electronics 116 can send an audio signal to the speakers 14, 14A, 14B, 14C, 14D, 14E, 16, 16A, 16B, 16C, 16D, 16E including a humanoid voice. The voice signal can indicate that a first menu option is available. For example, but without limitation, the first menu choice can be to initiate a call. Thus, when the user pushes the button 150 the first time, the user will hear the words “initiate a call,” emanating from the speakers 14, 14A, 14B, 14C, 14D, 14E, 16, 16A, 16B, 16C, 16D, 16E. If the user wishes to initiate a call, the user can depress the button 150 again which will send the appropriate AT command to the transceiver 114 so as to transmit the proper AT code to the cellular phone source device S, B (FIG. 8). Jannard '526 at 32:4–13 For example, if a user chooses a voice command option, the user could issue commands such as, for example, but without limitation, “phonebook” or “call alpha.” With a source device such as a cellular phone, that has a speech recognition engine and that is properly trained to recognize the voice of the user, the user can automatically enter the phonebook mode or directly call the phonebook listing “alpha,” of course, as is apparent to one of ordinary skill in the art, such a voice command protocol could be used to issue other commands as well. Jannard '526 at 32:14–19 In another alternative, the interface electronics 116 can include a speech recognition engine and audio menus. In this alternative, the interface electronics 116 can recognize speech from the user, convert the

Claims	Prior Art
	speech to AT commands, and control this source device using a standard AT command protocol. Seshadri similarly discloses using a “voice recognition circuit” and input via a microphone to request an operation for controlling its device, such as initiating calls. Seshadri ’839 at [0042] Input module 128, which may be a keypad, touch screen, voice recognition circuit, or other like user interfaces, receives user commands and produces digital command messages 124 there from. Such digital command messages 124 includes, but are not limited to, packet size, synchronization information, frequency hopping initiation information, timeslot allocation information, link establishment information, piconet address information, fast-forward, play, pause, volume adjust, record, stop and rewind. Seshadri ’839 at [0047] Detachable ear-piece 156 and microphone 154 may have on-chip operations to support call conferencing, call waiting, flash, and other features associated with telephones. These functions may be accessed and reviewed by a user interface 158 and display 160 within host device 152 or a user interface and display located on either detachable ear-piece 156 or microphone 154. The user interface and display, located on either the host device or detachable ear-piece 156 and microphone 154 may have a display and button(s) that may be used to program device, perform directory functions including selecting number to call, view caller ID, initiate call waiting, or initiate call conferencing. Additionally, circuitry within the ear-piece 156 and microphone 154 may enable voice activated dialing. The actual voice recognition could be performed within ear-piece 156, microphone 154, or host device 152. Thus, ear-piece 156 and microphone 154 may act to initiate calls and receive calls. A POSITA would have been motivated to combine the teachings of Radar and Jannard or Seshadri to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claims 25 and 33. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[54a] A personal audio system as recited in claim 42, wherein the	Radar ’349 in view of Abreu ’960 or Luo ’446 or Irvin ’332 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises: an infrared emitter

Claims	Prior Art
first head-worn structure comprises: an infrared emitter configured to at least direct infrared signals towards the user when at least the first head-worn structure of the head-worn wearable electronic device is being worn; and	configured to at least direct infrared signals towards the user when at least the first head-worn structure of the head-worn wearable electronic device is being worn.” Abreu discloses that a support structure (e.g., “eyeglasses, head mounted gear and the like”) “includes at least one radiation source from infrared to visible light” that interacts with a biological substance associated with a user that is being measured. Abreu ’960, 3:2–3, 44:48–50. The radiation source “direct[s] preferably near-infrared energy into the surface of the skin” of the user. Abreu ’960, 44:61–62. A POSITA would therefore understand Abreu’s radiation source to direct infrared radiation toward the user when the user is wearing the support structure. The following citations show examples of where Abreu ’960 discloses this limitation. Abreu ’960 at Abstract The support structure includes patches, clips, eyeglasses, head mounted gear and the like, containing passive or active sensors positioned at the end of the tunnel with sensing systems positioned on and accessing a physiologic tunnel. Abreu ’960 at 2:62–3:12 Included in the present invention are support structures for positioning a sensor on the skin at the end of the tunnel. The present invention discloses devices directed at measuring brain temperature, brain function, metabolic function, hydrodynamic function, hydration status, hemodynamic function, body chemistry and the like. The components include devices and methods for evaluating biological parameters using patches, clips, eyeglasses, head mounted gear and the like with sensing systems adapted to access physiologic tunnels to provide precise and clinically useful information about the physiologic status of the wearer and for enhancing the safety and performance of said wearer, and helping to enhance and preserve the life of said wearer by providing adequate reporting means and alert means relating to the biological parameter being monitored. Other components provide for producing direct or indirect actions, acting on another device, or adjusting another device or article of manufacture based on the biological parameter measured. Abreu ’960 at 44:48–51 The support structure includes at least one radiation source from infrared to visible light which interacts with the substance being measured at the BTE tunnel and a detector for collecting the resulting radiation. Abreu ’960 at 44:61–67 The present invention includes means for directing preferably near-infrared energy into the surface of the

Claims	Prior Art
	skin at the end of the BTE tunnel, means for analyzing and converting the reflectance or back scattered spectrun into the concentration of the substance measured and support means for positioning the light source and detector means adjacent to the surface of the skin at the BTE tunnel site. The following citations show examples of where Luo '446 discloses this limitation. Luo '446 at [0036] The invention generally relies on shining light having a particular wavelength on human skin as well as the reflectance properties of human skin. The surface reflection of the human skin occurs at the surface of the epidermis and is approximately independent of the lighting wavelength and independent of human race. In the infrared (IR) range the wavelengths that can be used are greater than 800 nano-meters and the surface reflectance of human skin is more or less constant and close to 50%. The same hold true for orange and red light in the visible light range, namely wavelengths between approximately 600 and 800 nano-meters can be used, although the surface reflectance for darker skin is reduced for shorter wavelengths. Surface reflectance for dark skin is approximately 25% at 700 nano-meters. In the embodiments shown herein, the energy of choice in the sensor unit 18 is preferably infrared (IR) energy. However, long wavelength visible light energy can also be used as discussed below. Luo '446 at [0038] The optical window 56 is placed at a certain location on the shell 58 of the hearing aid 10. The location of the optical window 56 depends on whether the hearing aid is a BTE, ITE, ITC or CIC hearing aid. In addition, the location is chosen to minimize the distance between the optical window 56 and the skin 64. For optimal reflection of IR signals back through the optical window, the hearing aid user's skin (i.e. the reflecting surface) is required to be immediately over the optical window 56; otherwise the reflected IR energy will not be reflected back towards the reception unit 62. The optical window 56 is typically a small window having a diameter of approximately 1 mm for example. The optical window 56 can be made from IR grade glass or other suitable material that allows for the passage of infrared energy (a different material would be used if visible light is used rather than infrared light). The optical window 56 should be kept clean at all times in order to prevent the emitted infrared energy from being reflected back due to dirt and the like that may accumulate on the optical window 56 over time. The location of the optical window 56 will be discussed in further detail below. The following citations show examples of where Irvin '332 discloses this limitation.

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	Irvin '332 at 6:3–33 FIG. 4C illustrates the power control circuit 210 coupled with a contact switch functioning as the sensor 220. The contact switch includes a first and second contact connected to the power control circuit 210, and connecting member 222 actuated when the user places the wireless headset 100 on their body. When actuated, the connecting member 222 places the first and second contacts of sensor 220 in electrical connection. Ideally, the sensor 220, when configured as a contact sensor, is placed in the earpiece 130, in the retaining member 140, or in the retaining pad 150 shown in FIG. 1B. Preferably, when sensor 220 is configured as a contact-based proximity sensor, the contacting element of sensor 220 is sealed in a manner that minimizes contaminant ingress. In some embodiments, the contact sensor may be actuated by the user resiliently expanding the retaining member 140 or other element of the wireless headset 100 for mounting upon their body. FIG. 4D illustrates the power control circuit 210 coupled with a proximity sensor 220 not based on mechanical actuation. The proximity sensor 220 may be an active or passive IR sensor, may be a resistive or other type of thermal sensor, or may be an acoustic sensor. As a proximity sensor, sensor 220 provides indication that a user has placed the wireless headset 100 upon their body. As such, any of the foregoing or other presence sensing techniques may be used to implement sensor 220. Preferably, when configured as a proximity sensor, sensor 220 requires minimal power and provides a sensor output signal based on proximity to the user's body. Depending upon the sensing technology chosen, the control circuit 210 may be required to periodically stimulate sensor 220 to generate a detection response. A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[54b] an infrared detector configured to detect infrared radiation reflected back from the user when at least the first head-worn structure of the head-worn	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “an infrared detector configured to detect infrared radiation reflected back from the user when at least the first head-worn structure of the head-worn wearable electronic device is being worn.”

Claims	Prior Art
wearable electronic device is being worn.	Abreu discloses that the support structure includes “a detector for collecting the resulting radiation” emitted by the radiation source. Abreu ’960 at 44:50–51. A POSITA would understand a support structure that includes the radiation detector to at least partially contain the radiation detector. The following citations show examples of where Abreu ’960 discloses this limitation. Abreu ’960 at 44:48–51 The support structure includes at least one radiation source from infrared to visible light which interacts with the substance being measured at the BTE tunnel and a detector for collecting the resulting radiation. Abreu ’960 at 44:61–67 The present invention includes means for directing preferably near-infrared energy into the surface of the skin at the end of the BTE tunnel, means for analyzing and converting the reflectance or back scattered spectrum into the concentration of the substance measured and support means for positioning the light source and detector means adjacent to the surface of the skin at the BTE tunnel site. The following citations show examples of where Luo ’446 discloses this limitation. Luo ’446 at [0036] The invention generally relies on shining light having a particular wavelength on human skin as well as the reflectance properties of human skin. The surface reflection of the human skin occurs at the surface of the epidermis and is approximately independent of the lighting wavelength and independent of human race. In the infrared (IR) range the wavelengths that can be used are greater than 800 nano-meters and the surface reflectance of human skin is more or less constant and close to 50%. The same hold true for orange and red light in the visible light range, namely wavelengths between approximately 600 and 800 nano-meters can be used, although the surface reflectance for darker skin is reduced for shorter wavelengths. Surface reflectance for dark skin is approximately 25% at 700 nano-meters. In the embodiments shown herein, the energy of choice in the sensor unit 18 is preferably infrared (IR) energy. However, long wavelength visible light energy can also be used as discussed below. Luo ’446 at [0038] The optical window 56 is placed at a certain location on the shell 58 of the hearing aid 10. The location of the optical window 56 depends on whether the hearing aid is a BTE, ITE, ITC or CIC hearing aid. In addition, the location is chosen to minimize the distance between the optical window 56 and the skin 64.

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	For optimal reflection of IR signals back through the optical window, the hearing aid user's skin (i.e. the reflecting surface) is required to be immediately over the optical window 56; otherwise the reflected IR energy will not be reflected back towards the reception unit 62. The optical window 56 is typically a small window having a diameter of approximately 1 mm for example. The optical window 56 can be made from IR grade glass or other suitable material that allows for the passage of infrared energy (a different material would be used if visible light is used rather than infrared light). The optical window 56 should be kept clean at all times in order to prevent the emitted infrared energy from being reflected back due to dirt and the like that may accumulate on the optical window 56 over time. The location of the optical window 56 will be discussed in further detail below. The following citations show examples of where Irvin '332 discloses this limitation. Irvin '332 at 6:3–33 FIG. 4C illustrates the power control circuit 210 coupled with a contact switch functioning as the sensor 220. The contact switch includes a first and second contact connected to the power control circuit 210, and connecting member 222 actuated when the user places the wireless headset 100 on their body. When actuated, the connecting member 222 places the first and second contacts of sensor 220 in electrical connection. Ideally, the sensor 220, when configured as a contact sensor, is placed in the earpiece 130, in the retaining member 140, or in the retaining pad 150 shown in FIG. 1B. Preferably, when sensor 220 is configured as a contact-based proximity sensor, the contacting element of sensor 220 is sealed in a manner that minimizes contaminant ingress. In some embodiments, the contact sensor may be actuated by the user resiliently expanding the retaining member 140 or other element of the wireless headset 100 for mounting upon their body. FIG. 4D illustrates the power control circuit 210 coupled with a proximity sensor 220 not based on mechanical actuation. The proximity sensor 220 may be an active or passive IR sensor, may be a resistive or other type of thermal sensor, or may be an acoustic sensor. As a proximity sensor, sensor 220 provides indication that a user has placed the wireless headset 100 upon their body. As such, any of the foregoing or other presence sensing techniques may be used to implement sensor 220. Preferably, when configured as a proximity sensor, sensor 220 requires minimal power and provides a sensor output signal based on proximity to the user's body. Depending upon the sensing technology chosen, the control circuit 210 may be required to periodically stimulate sensor 220 to generate a detection response. A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23.

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349 and Abreu '960, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
55. A personal audio system as recited in claim 54, wherein electronic circuitry within the first head-worn structure is configured to facilitate determining whether the first head-worn structure is being worn by the user based on at least the detected infrared radiation.	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 54, wherein electronic circuitry within the first head-worn structure is configured to facilitate determining whether the first head-worn structure is being worn by the user based on at least the detected infrared radiation.” <i>See</i> above at claims [23b] and [54a]. The following citations show examples of where Abreu '960 discloses this limitation. Abreu '960 at 15:57–60 The eyeglasses can be incorporated with a detecting system to send a signal if the eyeglasses were removed or if the temperature sensor is not capturing signals in a proper manner. Abreu '960 at 15:60–65 By way of illustration, but not of limitation, pressuse sensing means can be incorporated in the end of the temples to detect if the sunglasses are being worn, and an abrupt drop in the pressure signal indicates glasses were removed or misplacement of the sensor can also generate an identifiable signal. Abreu '960 at 18:56–59 The present invention preferably includes all functions in a miniature semiconductor chip, which as an integrated circuit, incorporates sensor, processing and transmitting units and control circuits. Abreu '960 at 44:61–67 The present invention includes means for directing preferably near-infrared energy into the surface of the skin at the end of the BTE tunnel, means for analyzing and converting the reflectance or back scattered spectrun into the concentration of the substance measured and support means for positioning the light source and detector means adjacent to the surface of the skin at the BTE tunnel site. Luo '446 at [0034] In general, the location sensor module 18 and the hearing aid module 24 communicate via a bi-directional

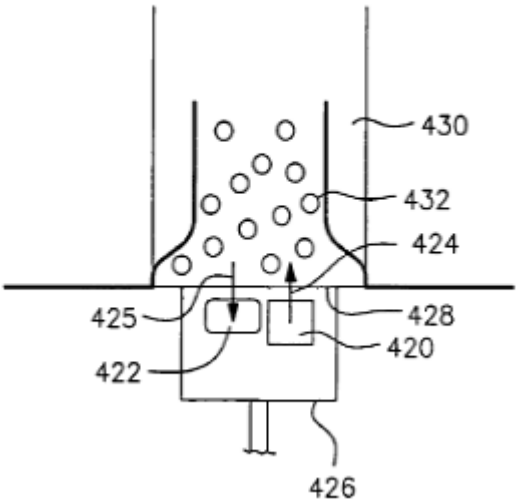
Claims	Prior Art
	information signal 42. The hearing aid module 24 polls the location sensor module 18 via the bi-directional signal 42, on preferably a periodic basis, to determine whether the hearing aid 10 is in the ear of the hearing aid user. In this case, the bi-directional signal 42 acts as a polling signal. In response to polling done via the bi-directional information signal 42, the location sensor module 18 probes the outer environment of the hearing aid 10 and returns location information via the bi-directional location signal 42. In this case, the bi-directional signal 42 acts as a location information signal. If the location information indicates that the hearing aid 10 is in the ear of the hearing aid user (i.e. the in-the-ear case), the hearing aid 10 operates in full-function mode. If the location information indicates that the hearing aid 10 is not in the ear of the hearing aid user (i.e. the out-of-the-ear case), the hearing aid 10 operates in sleep mode. In sleep mode, the hearing aid 10 can essentially be considered to be off. Luo '446 at [0035] There are several general scenarios for the location of the hearing aid. In the first scenario, the hearing aid 10 is not in the ear of the user and the hearing aid 10 and is in sleep mode. In this case, the location sensor module 18 is polled and the location information indicates that the hearing aid 10 is not in the ear of the hearing aid user and the hearing aid 10 continues to operate in sleep mode. In the second scenario, the hearing aid 10 has just been inserted into the ear of the hearing aid user and the hearing aid 10 was previously in sleep mode. In this case, the location sensor module 18 is polled and the location information indicates that the hearing aid 10 is in the ear of the hearing aid user. The hearing aid 10 then moves into full-function mode. In the third scenario, the hearing aid 10 is in full-function mode and is being taken out of the ear of the hearing aid user. The location sensor module 18 is polled and the location information indicates that the hearing aid 10 is no longer in the ear of the hearing aid user. The hearing aid 10 then moves into sleep mode. Luo '446 at [0036] The invention generally relies on shining light having a particular wavelength on human skin as well as the reflectance properties of human skin. The surface reflection of the human skin occurs at the surface of the epidermis and is approximately independent of the lighting wavelength and independent of human race. In the infrared (IR) range the wavelengths that can be used are greater than 800 nano-meters and the surface reflectance of human skin is more or less constant and close to 50%. The same hold true for orange and red light in the visible light range, namely wavelengths between approximately 600 and 800 nano-meters can be used, although the surface reflectance for darker skin is reduced for shorter wavelengths. Surface reflectance for dark skin is approximately 25% at 700 nano-meters. In the embodiments shown herein, the energy of choice in the sensor unit 18 is preferably infrared (IR) energy.

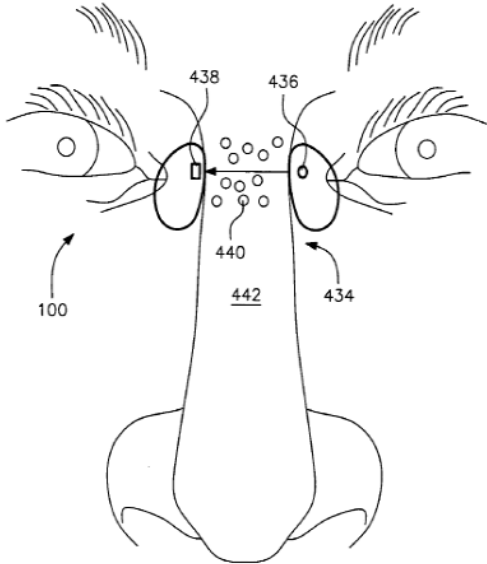
Claims	Prior Art
	However, long wavelength visible light energy can also be used as discussed below. Luo '446 at [0038] The optical window 56 is placed at a certain location on the shell 58 of the hearing aid 10. The location of the optical window 56 depends on whether the hearing aid is a BTE, ITE, ITC or CIC hearing aid. In addition, the location is chosen to minimize the distance between the optical window 56 and the skin 64. For optimal reflection of IR signals back through the optical window, the hearing aid user's skin (i.e. the reflecting surface) is required to be immediately over the optical window 56; otherwise the reflected IR energy will not be reflected back towards the reception unit 62. The optical window 56 is typically a small window having a diameter of approximately 1 mm for example. The optical window 56 can be made from IR grade glass or other suitable material that allows for the passage of infrared energy (a different material would be used if visible light is used rather than infrared light). The optical window 56 should be kept clean at all times in order to prevent the emitted infrared energy from being reflected back due to dirt and the like that may accumulate on the optical window 56 over time. The location of the optical window 56 will be discussed in further detail below. Irvin '332 at 2:20–34 The wireless headset serves as a communication accessory to a base unit, such as a cellular telephone. When not in use, the wireless headset reverts to an inactive state and draws essentially no power. A power control circuit imparts automatic enabling capability to the wireless headset. Preferably, the power control circuit employs a sensor responsive to a natural stimulus associated with a person preparing to use the wireless headset. The wireless headset may sense motion, physical orientation, or user proximity. Sensing techniques include but are not limited to micro-electro-mechanical-systems (MEMS), mercury switches, attitude switches, and IR or acoustic proximity sensors. In some embodiments, the wireless headset transitions from the inactive state to an active state in response to a user picking it up or mounting the wireless headset upon their head. Irvin '332 at 6:3–33 FIG. 4C illustrates the power control circuit 210 coupled with a contact switch functioning as the sensor 220. The contact switch includes a first and second contact connected to the power control circuit 210, and connecting member 222 actuated when the user places the wireless headset 100 on their body. When actuated, the connecting member 222 places the first and second contacts of sensor 220 in electrical connection. Ideally, the sensor 220, when configured as a contact sensor, is placed in the earpiece 130, in the retaining member 140, or in the retaining pad 150 shown in FIG. 1B. Preferably, when sensor 220 is

Claims	Prior Art
	configured as a contact-based proximity sensor, the contacting element of sensor 220 is sealed in a manner that minimizes contaminant ingress. In some embodiments, the contact sensor may be actuated by the user resiliently expanding the retaining member 140 or other element of the wireless headset 100 for mounting upon their body. FIG. 4D illustrates the power control circuit 210 coupled with a proximity sensor 220 not based on mechanical actuation. The proximity sensor 220 may be an active or passive IR sensor, may be a resistive or other type of thermal sensor, or may be an acoustic sensor. As a proximity sensor, sensor 220 provides indication that a user has placed the wireless headset 100 upon their body. As such, any of the foregoing or other presence sensing techniques may be used to implement sensor 220. Preferably, when configured as a proximity sensor, sensor 220 requires minimal power and provides a sensor output signal based on proximity to the user's body. Depending upon the sensing technology chosen, the control circuit 210 may be required to periodically stimulate sensor 220 to generate a detection response. Irvin '332 at 8:11–22 FIGS. 6 and 7 illustrate operation of the wireless headset 100. FIG. 6 is a state diagram for one exemplary embodiment of the present invention. When the wireless headset 100 is not in use, it automatically enters an inactive state (610). As explained, this inactive state may constitute disconnecting the communications circuit 230 from the power source 240, or may simply represent placing the communications circuit 230 in a non-functional, low-power condition. Absent user stimulus, such as motion of the wireless headset 100 or placement of the wireless headset 100 upon the user's body, the wireless headset 100 remains in the inactive state (610). The POSITA would understand from these disclosures that electronic circuitry in the support structure can process the detected infrared radiation to facilitate making determinations. Since Abreu discloses that a head-worn support structure can make determinations based on sensed radiation data and determine whether the head-worn support structure is being worn based on sensor data, it would have been obvious to the POSITA to use sensed radiation data to determine whether a head-worn support structure is being worn. A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[56a] A personal audio system as recited in claim 42, wherein the first head-worn structure comprises: a radiation detector configured to capture radiation data; and	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises: a radiation detector configured to capture radiation data.” For example, Abreu discloses a support structure that includes “a detector for collecting the resulting radiation” emitted by a radiation source. <i>Id.</i> at 44:50-51. <i>See above at claims [23a]; [24]; [54a].</i> A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[56b] first electronic circuitry provided within the first head-worn structure and electrically connected to the radiation detector, the first electronic circuitry configured to process at least the radiation data captured by the radiation detector.	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “first electronic circuitry provided within the first head-worn structure and electrically connected to the radiation detector, the first electronic circuitry configured to process at least the radiation data captured by the radiation detector.” For example, Abreu discloses that the radiation detector of the support structure “analyz[es] and convert[s] the reflectance or back scattered spectrum into the concentration of the substance measured.” <i>Id.</i> at 44:63-65. The POSITA would understand processing radiation data captured by the radiation detector to include analyzing and converting the reflected radiation. Abreu further discloses that “[t]he present invention preferably includes all functions in a miniature semiconductor chip, which as an integrated circuit, incorporates sensor, processing and transmitting units and control circuits.” <i>Id.</i> at 18:56-59. The POSITA would therefore understand the processing circuitry for processing the radiation data to be electrically connected to the radiation detector within the support structure. <i>See above at claim [23b]; [24].</i> A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
57. A personal audio system as recited in claim 56, wherein the first electronic circuitry is configured to determine whether the first head-worn structure is being worn by a user based on at least the processed radiation data.	Radar '349 in view of Abreu '960 or Luo '446 or Irvin '332 expressly or inherently discloses “[a] personal audio system as recited in claim 56, wherein the first electronic circuitry is configured to determine whether the first head-worn structure is being worn by a user based on at least the processed radiation data.” For example, Abreu discloses that a support structure can make determinations (e.g., the concentration of a measured substance) based on infrared radiation detected by a radiation detector. <i>Id.</i> at 44:63-65. Abreu further discloses that “[t]he present invention preferably includes all functions in a miniature semiconductor chip, which as an integrated circuit, incorporates sensor, processing and transmitting units and control circuits.” <i>Id.</i> at 18:56-59. The POSITA would understand this to mean that electronic circuitry in the support structure can process the detected radiation to make the determinations. Abreu further discloses that a support structure can include a “detecting system” for determining whether the support structure is being worn. <i>Id.</i> at 15:58-59. For example, a pair of eyeglasses can include pressure sensing means for “detect[ing] if the sunglasses are being worn.” <i>Id.</i> at 15:62-63. Since Abreu discloses that a head-worn support structure can both make determinations based on sensed radiation data and determine whether the head-worn support structure is being worn based on sensor data, it would have been obvious to the POSITA to use sensed radiation data to determine whether a head-worn support structure is being worn. <i>See above at claims [23c]; [55a].</i> A POSITA would have been motivated to combine the teachings of Radar and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
58. A personal audio system as recited in claim 57, wherein the radiation detector comprises a photodetector.	Radar '349 in view of Abreu '960 and/or Irvin expressly or inherently discloses “[a] personal audio system as recited in claim 57, wherein the radiation detector comprises a photodetector.” Abreu discloses an embodiment in which the radiation emitter is a light source 436 and the radiation detector is a photodetector 438. Abreu '960 at 46:28-31, FIG. 35, FIG. 36.

Claims	Prior Art
	Abreu '960 at FIG. 35 FIG. 35 

Claims	Prior Art
	Abreu '960 at FIG. 36 FIG. 36  Abreu '960 at 45:60–46:13 In accordance with FIG. 35 a schematic view of one preferred reflectance measuring apparatus of the present invention is shown. FIG. 35 shows a light source 420 such as an infrared LED and a photodetector 422 located side-by-side and disposed within support structure 426 such as a medial canthal pad or modified nose pads of eyeglasses directing radiation 424 at the BTE tunnel 430 with said light source 420 laying in apposition to the skin 428 at the BTE tunnel 430. The light source 420 delivers the radiation 424 to the skin 428 at the BTE tunnel which is partially absorbed according to the interaction with the substance 432 being measured resulting in attenuated radiation 425. Part of the radiation 424 is then absorbed by the substance 432 and the resulting radiation 425 emitted from BTE tunnel 430 is collected by the photodetector 422 and converted by a processor into the blood concentration of the substance 432. Thin skin 428 is the only tissue interposed between radiation 424, 425 and the substance 432 being measured. The concentration of the substance 432 is accomplished by detecting the magnitude of light attenuation collected which is caused by the absorption signature of the substance being measured. A POSITA would have been motivated to combine the teachings of Radar and Abreu to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23.

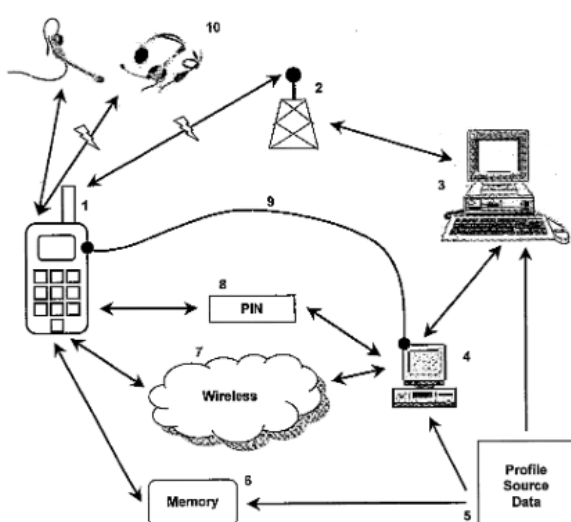
Claims	Prior Art
	A POSITA would have understood Irvin’s infrared sensor to comprise a photodetector, because infrared sensors are devices that detect infrared radiation, and photodetectors are devices that detect radiated energy (such as infrared). <i>See</i> Irvin at 6:22-24. This understanding is consistent with the ’693 patent, which describes an infrared photodiode capturing reflected infrared radiation as an infrared detector; and describes (via an incorporated reference) that the Sharp PD100MCOMP infrared photodiode is a “suitable” photodetector. <i>See</i> ’693 patent at 2:15-19, 93:60-94:3. A POSITA would have been motivated to combine the teachings of Anderson ’783 and Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
59. A personal audio system as recited in claim 42, wherein the first head-worn structure comprises first electronic circuitry configured to provide audio alerts to the user via the first speaker.	Radar ’349 in view of Bodley ’433 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises first electronic circuitry configured to provide audio alerts to the user via the first speaker.” For example, Bodley discloses that various settings of the headset can be configured, such as ring mode and ring volume. <i>Id.</i> at 4:27-33. A POSITA would understand this to mean that the headset is configured to emit ring sounds audible to a user (i.e., audio alerts). Bodley further discloses that the headset includes a controller 807 including electronic circuitry, such as a processor, microcontroller, or ASIC, that is connected to an output transducer 109, such as a speaker, via an output module 801. <i>Id.</i> at 2:46-47, 3:67-4:3, 4:9-18, FIG. 8. In view of these disclosures, a POSITA would understand Bodley’s headset to include electronic circuitry for providing audio alerts to a user via a speaker. It would have been obvious to the POSITA that the audio output from a cellular phone could include audio alerts. For example, the POSITA would have understood that cellular phones ring to indicate incoming calls, and that ringing is a type of audio alert. A POSITA would have been motivated to combine the teachings of Radar and Bodley to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 28. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
60. A personal audio system as recited in claim 59, wherein the audio alerts are dependent on one or more user preference settings.	Radar '349 in view of Bodley '433 expressly or inherently discloses “[a] personal audio system as recited in claim 59, wherein the audio alerts are dependent on one or more user preference settings.” For example, Bodley discloses that a user can adjust or set the ring mode or ring volume during headset configuration. <i>Id.</i> at 3:14-20. A POSITA would understand the resulting audio alerts to be dependent on the user’s preference settings. A POSITA would have been motivated to combine the teachings of Radar and Bodley to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 28. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[61a] A personal audio system as recited in claim 42, wherein the first head-worn structure of the head-worn wearable electronic device comprises: a first microphone configured to pick up at least audio input from at least the user, the first microphone being at least partially in the first head-worn structure; and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure of the head-worn wearable electronic device comprises: a first microphone configured to pick up at least audio input from at least the user, the first microphone being at least partially in the first head-worn structure,” for example, for the same reasons discussed above for claim element [10a], 6 and 11. <i>See above at claims 50a, 6, 10, 11, and 24.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[61b] a second microphone configured to pick up at least ambient sound input associated with an environment in the vicinity of the first head-worn structure,	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “a second microphone configured to pick up at least ambient sound input associated with an environment in the vicinity of the first head-worn structure,” for example, for the same reasons discussed above for claim element [10b]. <i>See above at claims 50b, 6, 10, 11, and 24.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6.

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[61c] wherein the second microphone is positioned to be further away from mouth of the user than the first microphone when at least the first head-worn structure of the head-worn wearable electronic device is being worn.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the second microphone is positioned to be further away from mouth of the user than the first microphone when at least the first head-worn structure of the head-worn wearable electronic device is being worn,” for example, for the same reasons discussed above for claim element [10b]. <i>See</i> above at claims 50b, 6, 10, and 11. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[62] A personal audio system as recited in claim 42, wherein the first head-worn structure comprises: a physical condition sensor configured to acquire data pertaining to a physical condition of the user, the physical condition sensor being provided at least partially internal to the first head-worn structure.	Radar '349 in view of Abreu '960 expressly or inherently discloses “[a] personal audio system as recited in claim 42, wherein the first head-worn structure comprises: a physical condition sensor configured to acquire data pertaining to a physical condition of the user, the physical condition sensor being provided at least partially internal to the first head-worn structure.” For example, Abreu discloses that a pair of eyeglasses can include a microphone integrated into a medial canthal pad that is adapted to identify heart sounds. <i>Id.</i> at 13:24-25. The microphone can measure the “characteristic sound of systole (contraction of the heart) and diastole (relaxation of the heart).” <i>Id.</i> at 13:21-24. The POSITA would have understood systolic and diastolic sounds to pertain to the physical condition of the wearer. A POSITA would have been motivated to combine the teachings of Radar and Abreu to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
63. A personal audio system as recited in claim 62, wherein the acquired data by the physical condition sensor includes data pertaining to or dependent on heart beats of the user.	Radar '349 in view of Abreu '960 expressly or inherently discloses “[a] personal audio system as recited in claim 62, wherein the acquired data by the physical condition sensor includes data pertaining to or dependent on heart beats of the user.” For example, as discussed above for claim element [62a], Abreu discloses eyeglasses having an integrated microphone for measuring systolic and diastolic sounds. <i>Id.</i> at 13:21-24. The POSITA would have understood systolic and diastolic sounds to pertain to heart beats of the user. A POSITA would have been motivated to combine the teachings of Radar and Abreu to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 23. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
64[pre]. A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises:	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises” for example, for the same reasons discussed above for claim 24. <i>See</i> above at claim 1[pre]; 24[pre]. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[64a] a head-worn structure including at least a first microphone, a second microphone, a speaker and a processing unit;	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “a head-worn structure including at least a first microphone, a second microphone, a speaker and a processing unit.” For example, Radar discloses that the headset 10 includes both a microphone and a speaker, and Nemirovski discloses an earset having all the claimed components. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic

Claims	Prior Art
	applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0031] The term “personal communication device,” of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link,

Claims	Prior Art
	as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0068] • Use monaural earpiece • User binaural earpiece Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
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Radar '349 at FIG. 5

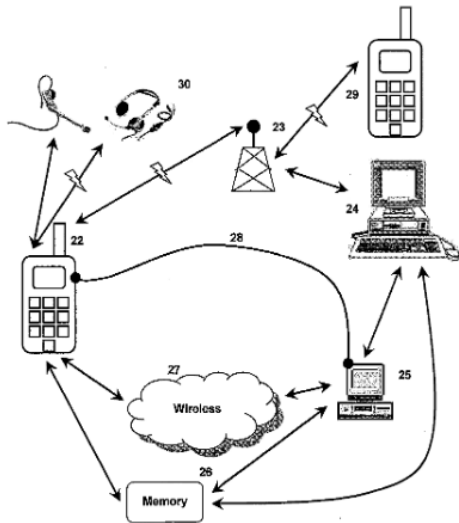


FIG. 5

Nemirovski '379 at FIG. 5

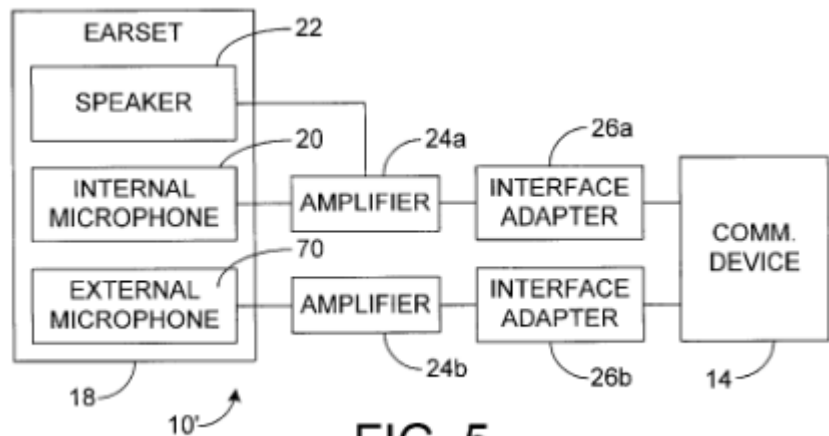


FIG. 5

Nemirovski '379 at 3:6–23

The present invention is directed to a communication system, including a communications device and an

Claims	Prior Art
	ear microphone, or earset, assembly. The communications system allows a user to speak with a remotely located person. The ear microphone assembly, also referred to herein as an earset, includes a microphone and a speaker supported by a housing. The housing is retained by the ear of the user and allows for hands free use of the communication system while carrying on a conversation with the remotely located person. The microphone is directed towards the ear canal of the user and detects sounds emanating or coming out of the ear (or air pressure changes occurring within the ear) to accurately and reliably detect the speech of the user. The position of the microphone may also help to reduce detection of externally generated sounds. The ear microphone assembly allows for separation of a speech input device for a cellular, or wireless, telephone from an RF transceiver of the telephone. Nemirovski '379 at 9:45–60 FIG. 5 is a block diagram that illustrates a system 10' for detecting speech of the user. The system 10' includes the earset 18 having the internal microphone 20, the speaker 22 and amplifier 24a as described in greater detail above. In addition, the earset 18 of the system 10' has the external microphone 70. As one skilled in the art will appreciate, the use of the external microphone 70 is optional. The external microphone 70 is disposed on the housing 30 (FIG. 3) and generally points away from the person wearing the earset 18. As a result, the external microphone 70 detects air pressure changes located outside the ear. These air pressure changes are mainly the result of externally generated noise (other people's speech, environmental noise, etc.) and, in part, to the speech of the person wearing the earset 18, when the speech travels from the mouth of the user and through the air to the external microphone 70. The POSITA would understand Nemirovski's amplifier circuits 24a and 24b to be processing units, since the amplifier circuits are configured to receive electrical signal outputs from the microphones, filter the signal outputs, and amplify them appropriately. <i>See id.</i> at 8:25-35. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[64b] wherein the first microphone is configured to pick up at least audio input from at least the user,	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the first microphone is configured to pick up at least audio input from at least the user,” for example, for the same reasons discussed above for claim element [10a]. <i>See above at claims 6, 11, 24, [50a], [50b].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[64c] wherein the second microphone is configured to pick up at least environmental audio input associated with an environment in the vicinity of the head-worn wearable electronic device, and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the second microphone is configured to pick up at least environmental audio input associated with an environment in the vicinity of the head-worn wearable electronic device,” for example, for the same reasons discussed above for claim element [10b]. <i>See above at claims 6, 11, 24, [50a], [50b].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[64d] wherein the processing unit is configured to process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the processing unit is configured to process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone.” For example, Nemirovski discloses that signals generated by internal microphone 20 and external microphone 70 can be used to “distinguish between user produced speech and externally produced sounds.” <i>Id.</i> at 10:4-10. The system can then “cancel externally generated noise from the detections of the internal microphone 20.” <i>Id.</i> at 10:12-13. To the extent that Nemirovski does not expressly disclose that processing circuitry in the earset performs these functions, it would have been obvious to the POSITA to use the circuitry in Nemirovski's earset to do so in order to consolidate processing operations within the earset.

Claims	Prior Art
	<i>See</i> above at claim 6, 11, and 12. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[65a] A personal audio system as recited in claim 64, wherein the audio input from at least the user picked-up via the first microphone includes at least a voice input, and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 64, wherein the audio input from at least the user picked-up via the first microphone includes at least a voice input.” Nemirovski '379 discloses that its microphone is used to detect sounds resulting from a user’s speech. Nemirovski '379 at 4:27–41 The communications system 10 includes an ear microphone assembly, or earset 18, having a microphone 20 and a speaker 22 supported by a housing 30 (FIG. 3). The physical arrangement of the earset 18 will be described in more detail below. The microphone 20 is used to detect sounds emanating or coming from the ear (sometimes referred to as air pressure changes within the ear) of the user that result from speech of the user. The microphone 20 converts those detections into an electrical signal. The electrical signal is optionally amplified by an amplifier 24. Next, the amplified electrical signal is received by the communication device 14 via an appropriate interface adapter 26. The interface adapter 26 can be, for example, a jack or other electrical connector received by a corresponding receptacle of the communication device 14. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. <i>See also</i> above at claim 11; 12 (referencing the sound component A). To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[65b] wherein the environmental audio input associated with the	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the environmental audio input associated with the environment includes at least ambient noise.” For example, as described above for

Claims	Prior Art
environment includes at least ambient noise.	claim element [10b], Nemirovski's external microphone 70 detects air pressure changes outside of the ear that result from "externally generated noise (other people's speech, environmental noise, etc.)." <i>Id.</i> at 9:53-58. The POSITA would understand environmental noise to include ambient noise. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. <i>See also</i> above at claim 11; 12 (referencing the noise component N). To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
66. A personal audio system as recited in claim 64, wherein the processing unit is configured to process the audio input from at least the user picked-up via the first microphone to remove at least a portion of the environmental audio input picked-up via the second microphone.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses "[a] personal audio system as recited in claim 64, wherein the processing unit is configured to process the audio input from at least the user picked-up via the first microphone to remove at least a portion of the environmental audio input picked-up via the second microphone." For example, as described for claim element [12a], Nemirovski discloses that a communication device or other processing circuit can produce a "relatively noise-free speech signal" in which externally generated noise is "cancel[ed]...from the detections of the internal microphone." <i>id.</i> at 10:12-13, 10:25. The externally generated noise is the primary audio picked up by the external microphone. <i>Id.</i> at 9:55-57. Thus, the POSITA would understand this cancellation process to teach that at least a portion of the audio picked up by the external microphone (the externally generated noise) is removed from the audio picked up by the internal microphone. <i>See</i> above at claims 11 and 12. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[67a] A personal audio system as recited in claim 64, wherein the first microphone is at least	Radar '349 in view of Nemirovski '379 expressly or inherently discloses "[a] personal audio system as recited in claim 64, wherein the first microphone is at least partially in the head-worn structure and is positioned so as to be directed towards the user of the head-worn structure," for example, for the reasons discussed above

Claims	Prior Art
partially in the head-worn structure and is positioned so as to be directed towards the user of the head-worn structure, and	for claim elements [10a] and [50a]. <i>See above at claims [10a]; [50a].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[67b] wherein the second microphone is at least partially in the head-worn structure so as to be directed away from the user of the head-worn structure.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the second microphone is at least partially in the head-worn structure so as to be directed away from the user of the head-worn structure,” for example, for the reasons discussed above for claim elements [10b] and [50b]. <i>See above at claims [10b]; [50b].</i> The external microphone can be disposed in a recess of the housing 30 and thus at least partially in the head-worn structure. <i>See Nemirovski at 9:32-35.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
68. A personal audio system as recited in claim 67, wherein the processing unit is configured to process the audio input picked-up via at least the first microphone to remove at least a portion of the environmental audio input picked-up via the second microphone.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 67, wherein the processing unit is configured to process the audio input picked-up via at least the first microphone to remove at least a portion of the environmental audio input picked-up via the second microphone,” for example, for the same reasons discussed above for claim element [66a]. <i>See above at claim 11.</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6.

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[69a] A personal audio system as recited in claim 68, wherein the audio input from at least the user includes at least a voice input, and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 68, wherein the audio input from at least the user includes at least a voice input,” for example, for the same reasons discussed above for claim element [65a]. <i>See above at claim [65a].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[69b] wherein the environmental audio input includes at least ambient noise.	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the environmental audio input includes at least ambient noise” for example, for the same reasons discussed above for claim element [65b]. <i>See above at claim [65b].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[70a] A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises: a head-worn structure comprising at least two microphones and a processing unit,	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises: a head-worn structure comprising at least two microphones and a processing unit,” for example, for the same reasons discussed above for claim element [64a]. <i>See above at claim [64a].</i>

Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[70b] wherein the at least two microphones are configured to pick up (i) at least audio input from at least the user and (ii) at least environmental audio input associated with environmental sound in the vicinity of the head-worn structure, and	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the at least two microphones are configured to pick up (i) at least audio input from at least the user and (ii) at least environmental audio input associated with environmental sound in the vicinity of the head-worn structure,” for example, for the same reasons discussed above for claim elements [10a], [10b], and [50a]. <i>See above at claims [10a], [10b], and [50a].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[70c] wherein the processing unit is configured to: determine an environmental sound level based on at least the environmental audio input; and	Radar '349 expressly or inherently discloses “wherein the processing unit is configured to: determine an environmental sound level based on at least the environmental audio input.” For example, Radar’s system “compensates for the apparent hearing loss that is known to manifest itself when listening in a noisy environment.” <i>Id.</i> at [0072]. The system “indirectly determin[es] environmental noise, by position of a volume control switch, for use in compensation for environmentally induced hearing loss profile.” <i>Id.</i> at [0074]. The POSITA would understand the position of the volume control switch, and thus the environmental noise level, to be based on at least environmental audio input. A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. <i>See above at claim [64d].</i>

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[70d] amplify at least a portion of the audio input from the first microphone, with the amplification being at least in part dependent on the environmental sound level.	Radar '349 expressly or inherently discloses “amplify at least a portion of the audio input from the first microphone, with the amplification being at least in part dependent on the environmental sound level.” For example, Radar discloses that the position of a volume control switch on a communication device is used “as a proxy for environmental noise level,” and the position of the switch is used to control the amount of compression applied by digital signal processing circuitry of the communication device. <i>Id.</i> at [0077]. The POSITA would understand controlling compression, which relates to amplification and attenuation of audio signals, to include amplifying audio output. <i>See above at claims [12a]; [51c]; [51d].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[71a] A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises at least a first microphone, a second microphone and a processing unit,	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises at least a first microphone, a second microphone and a processing unit,” for example, for the reasons discussed above for claim element [64a]. <i>See above at claim [70a].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[71b] wherein the first microphone is configured to pick up at least	Radar '349 in view of Nemirovski '379 expressly or inherently discloses “wherein the first microphone is configured to pick up at least audio sound from at least the user, wherein the second microphone is configured

Claims	Prior Art
audio sound from at least the user, wherein the second microphone is configured to pick up at least ambient noise associated with an environment in the vicinity of the head-worn wearable electronic device, and	to pick up at least ambient noise associated with an environment in the vicinity of the head-worn wearable electronic device,” for example, for the reasons discussed above for claim elements [10a] and [10b]. <i>See above at claim [70b].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[71c] wherein the processing unit is configured to: determine an ambient noise level based on at least the ambient noise; and	Radar ’349 in view of Nemirovski ’379 expressly or inherently discloses “wherein the processing unit is configured to: determine an ambient noise level based on at least the ambient noise,” for example, for the reasons discussed above for claim element [70c]. <i>See above at claim [51c].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[71d] modify at least a portion of the audio sound picked-up via the first microphone, with the modification being at least in part dependent on the ambient noise level.	Radar ’349 in view of Nemirovski ’379 expressly or inherently discloses “modify at least a portion of the audio sound picked-up via the first microphone, with the modification being at least in part dependent on the ambient noise level,” for example, for the reasons discussed above for claim element [70d]. <i>See above at claim [51d].</i> A POSITA would have been motivated to combine the teachings of Radar and Nemirovski to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 6. To the extent that Radar ’349, alone or in view of the above cited reference(s), 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[72a] A personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises at least a first microphone, a second microphone and a processing unit,	Radar '349 in view of Jannard '526 expressly or inherently discloses “[a] personal audio system as recited in claim 24, wherein the head-worn wearable electronic device comprises at least a first microphone, a second microphone and a processing unit,” for example, for the same reasons discussed above for claim element [64a]. <i>See above at claim [70a].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72b] wherein the first microphone is configured to pick up at least audio sound from at least the user, wherein the second microphone is configured to pick up at least ambient noise associated with an environment in the vicinity of the head-worn wearable electronic device,	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the first microphone is configured to pick up at least audio sound from at least the user, wherein the second microphone is configured to pick up at least ambient noise associated with an environment in the vicinity of the head-worn wearable electronic device,” for example, for the same reasons discussed above for claim elements [10a] and [10b]. <i>See above at claim [70b].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72c] wherein the processing unit is configured to: determine an ambient noise level based on at least the ambient noise; and	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the processing unit is configured to: determine an ambient noise level based on at least the ambient noise,” for example, for the same reasons discussed above for claim element [70c]. <i>See above at claim [51c].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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,

Claims	Prior Art
	with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72d] modify at least a portion of the audio sound picked-up via the first microphone, with the modification being at least in part dependent on the ambient noise level,	Radar '349 in view of Jannard '526 expressly or inherently discloses “modify at least a portion of the audio sound picked-up via the first microphone, with the modification being at least in part dependent on the ambient noise level,” for example, for the same reasons discussed above for claim element [70d]. <i>See above at claim [51d].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72e] wherein the head-worn wearable electronic device comprises at least a rechargeable battery and at least one conductive element,	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the head-worn wearable electronic device comprises at least a rechargeable battery and at least one conductive element,” for example, for the same reasons discussed above for claim element [26a]. <i>See above at claim [26a].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72f] wherein the rechargeable battery is able to be electrically coupled via the at least one conductive element to a charging apparatus and charged when the head-worn wearable electronic device is placed within the charging apparatus,	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the rechargeable battery is able to be electrically coupled via the at least one conductive element to a charging apparatus and charged when the head-worn wearable electronic device is placed within the charging apparatus,” for example, for the same reasons discussed above for claim element [26b]. <i>See above at claim [26b].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25.

Claims	Prior Art
	To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72g] wherein the mobile communication device is configured to wirelessly communicate with the head-worn wearable electronic device over a wireless network, and	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the mobile communication device is configured to wirelessly communicate with the head-worn wearable electronic device over a wireless network,” for example, for the same reasons discussed above for claim element [27a]. <i>See above at claim 27.</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72h] wherein the mobile communication device is or includes a mobile phone,	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the mobile communication device is or includes a mobile phone,” for example, for the same reasons discussed above for claim element [14a]. <i>See above at claim 14.</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[72i] wherein the head-worn wearable electronic device is configured to receive a voice input via the first microphone, determine a requested operation from the voice input using voice	Radar '349 in view of Jannard '526 expressly or inherently discloses “wherein the head-worn wearable electronic device is configured to receive a voice input via the first microphone, determine a requested operation from the voice input using voice recognition, and control an operation by the head-worn wearable electronic device based on the requested operation,” for example, for the same reasons discussed above for claim element [53b].

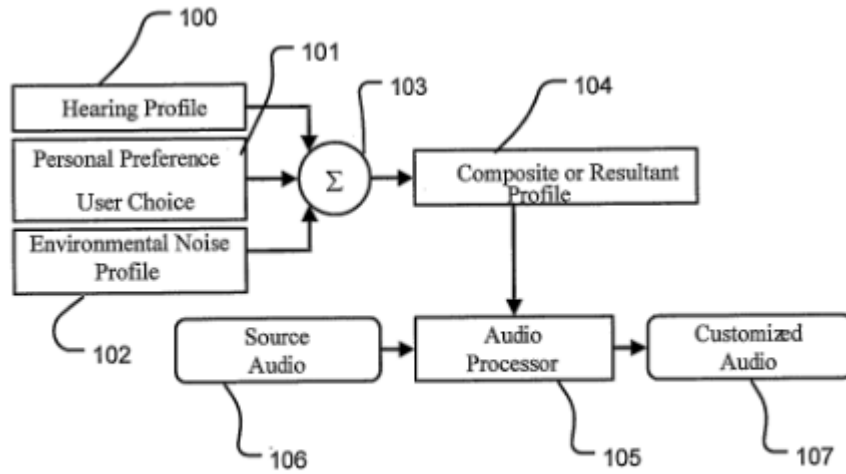
Claims	Prior Art
recognition, and control an operation by the head-worn wearable electronic device based on the requested operation.	<i>See above at claim [53b].</i> A POSITA would have been motivated to combine the teachings of Radar and Jannard to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 25. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[73a] A personal audio system as recited in claim 72, wherein the head-worn wearable electronic device comprises: an infrared emitter configured to at least direct infrared signals towards the user when the head-worn wearable electronic device is being worn;	Radar '349, in view of Jannard '526 and Abreu '960 or Luo '446 or Irvin '332, expressly or inherently discloses “[a] personal audio system as recited in claim 72, wherein the head-worn wearable electronic device comprises: an infrared emitter configured to at least direct infrared signals towards the user when the head-worn wearable electronic device is being worn,” for example, for the same reasons discussed above for claim elements [54a] and [54b]. <i>See above at claims [54a]; [54b].</i> A POSITA would have been motivated to combine the teachings of Radar, Jannard, and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success. The POSITA would have been motivated to combine the teachings of Radar and Jannard for the reasons discussed above with respect to claim 26. A POSITA would have been motivated to combine the teachings of Radar and Abreu for the reasons discussed above with respect to claim 23. Moreover, Jannard and Abreu are not incompatible. For example, Jannard and Abreu each disclose head-worn devices and are therefore analogous art. Accordingly, a POSITA would have a reasonable expectation of success in combining the teachings of these references. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[73b] an infrared detector configured to detect infrared radiation reflected back from the user when the head-worn wearable electronic device is being worn; and	Radar '349, in view of Jannard '526 and Abreu '960 or Luo '446 or Irvin '332, expressly or inherently discloses “an infrared detector configured to detect infrared radiation reflected back from the user when the head-worn wearable electronic device is being worn,” for example, for the same reasons discussed above for claim element [54b]. <i>See above at claim [54b].</i>

Claims	Prior Art
	A POSITA would have been motivated to combine the teachings of Radar, Jannard, and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [73a]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[73c] electronic circuitry configured to facilitate determining whether the head-worn wearable electronic device is being worn by the user based on at least the detected infrared radiation.	Radar '349, in view of Jannard '526 and Abreu '960 or Luo '446 or Irvin '332, expressly or inherently discloses “electronic circuitry configured to facilitate determining whether the head-worn wearable electronic device is being worn by the user based on at least the detected infrared radiation,” for example, for the same reasons discussed above for claim element [55a]. <i>See above at claim 55.</i> A POSITA would have been motivated to combine the teachings of Radar, Jannard, and Abreu or Luo or Irvin to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim element [73a]. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
74. A personal audio system as recited in claim 73, wherein the electrical coupling of the at least one conductive element with the charging apparatus is supported by at least a magnetic element.	Radar '349, in view of Jannard '526 and Abreu '960, expressly or inherently discloses “[a] personal audio system as recited in claim 73, wherein the electrical coupling of the at least one conductive element with the charging apparatus is supported by at least a magnetic element,” for example, for the same reasons discussed above for claim element [26c]. A POSITA would have been motivated to combine the teachings of Radar, Jannard, and Abreu to meet the claim limitations with a reasonable expectation of success for the reasons described above with respect to claim 73. To the extent that Radar '349, alone or in view of the above cited reference(s), 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claims	Prior Art
[75pre] A personal audio system operable to at least generate customized audio output, comprising: a pair of speakers, each of the speakers being configured to be wearable proximate to an ear of a user; and	Radar '349 expressly or inherently discloses “[a] personal audio system operable to at least generate customized audio output, comprising: a pair of speakers, each of the speakers being configured to be wearable proximate to an ear of a user,” for example, for the same reasons discussed above for claim elements [1pre] and [24a]. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0017] Fig. 1 is a conceptual block diagram showing the sound processing in a personal communication device according to the present invention. Radar '349 at [0018] Fig. 2 is a simplified block diagram of a mobile phone, representative of personal communication devices according to the present invention. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various

Claims	Prior Art
	embodiments of the present invention. Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized audio 107, which enhances the user's reception of the audio product. Radar '349 at [0030] Next generation mobile phones are incorporating features that intersect with the functionality of a small computer, music player, and organizer, and include processing resources for customizing the audio as shown in Fig. 1. Radar '349 at [0031] The term "personal communication device," of which the mobile phone is a preferred example, is used throughout this disclosure to indicate a system that has the capability to send and receive a wide variety of audio signals between a remote system and a network infrastructure. The personal communication device could be a very simple system designed to only send and receive voice information, or a complex system that has computational capabilities integrated with or connected to a phone sub-system. The personal communication device could also incorporate phone system attributes combined with audio playback means, where the audio is digitally stored or streamed audio, analog audio playback or other system sound generation. Mobile phones with various combinations of features displays, audio transducers, headsets , and computational tools (e.g. calender programs, contact list programs, audio playback programs, digital image displays, etc.) in addition to phone call processing are examples of personal communication devices. Radar '349 at [0034] Fig. 2 is a simplified diagram of a mobile phone 200, representative of personal communication devices according to the present invention. The mobile phone 200 includes an antenna 201 and a radio frequency

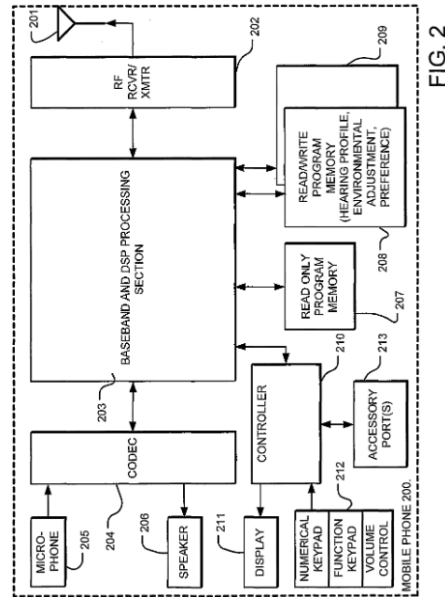
Claims	Prior Art
	RF receiver/transmitter 202, by which the phone 200 is coupled to a wireless communication medium, according to one or more of a variety of protocols. The receiver/transmitter 202 is coupled to baseband and digital signal processor DSP processing section 203, in which the audio signals are processed and call signals are managed. A codec 204, including analog to digital and digital to analog converters, is coupled to the processing section 203. A microphone 205 and a speaker 206 are coupled to the codec 204. Radar '349 at [0035] Read only program memory 207 stores instructions, parameters and other data for execution by the processing section 203. In addition, a read/write memory 208 stores instructions, parameters and other data for use by the processing section 203. There may be multiple types of read/write memory on the device 200, such as non volatile read/write memory 208 (flash memory or EEPROM for example) and volatile read write memory 209 (DRAM or SRAM for example), as shown in Fig. 2. Other embodiments include removable memory modules in which instructions, parameters and other data for use by the processing section 203 are stored. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing

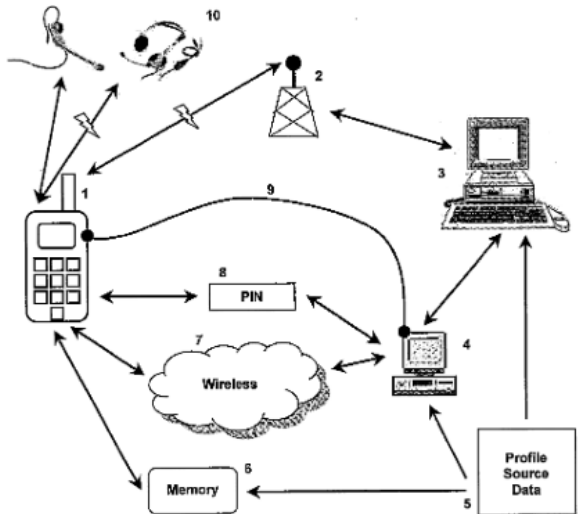
Claims	Prior Art
	impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at [0068] • Use monaural earpiece • User binaural earpiece Radar '349 at [0069] Once the hearing profile is acquired and stored for future use, the audio data can be customized or personalized either at the network system resource and transmitted to the phone, or delivered then personalized at a processor on the mobile phone. Radar '349 at FIG. 1  <pre> graph LR 100[Hearing Profile] --> Sum((Σ)) 101[Personal Preference] --> Sum 103[User Choice] --> Sum 102[Environmental Noise Profile] --> Sum Sum --> 104[Composite or Resultant Profile] 104 --> 105[Audio Processor] 106[Source Audio] --> 105 105 --> 107[Customized Audio] </pre> FIG. 1

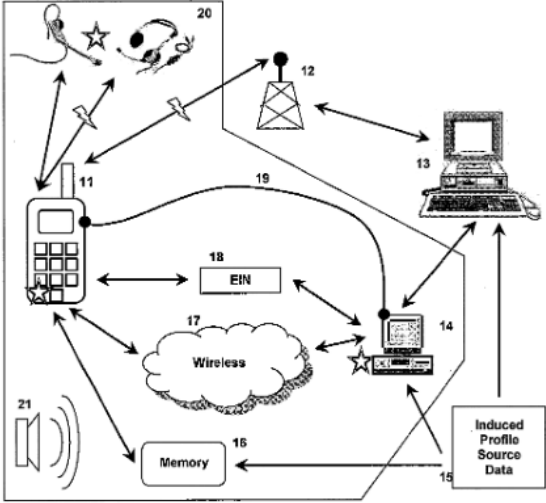
Claims

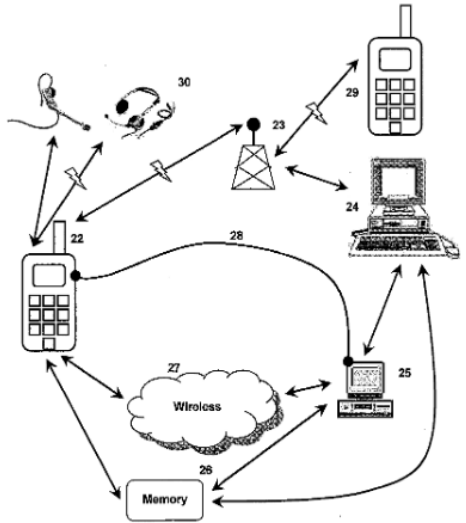
Prior Art

Radar '349 at FIG. 2



Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

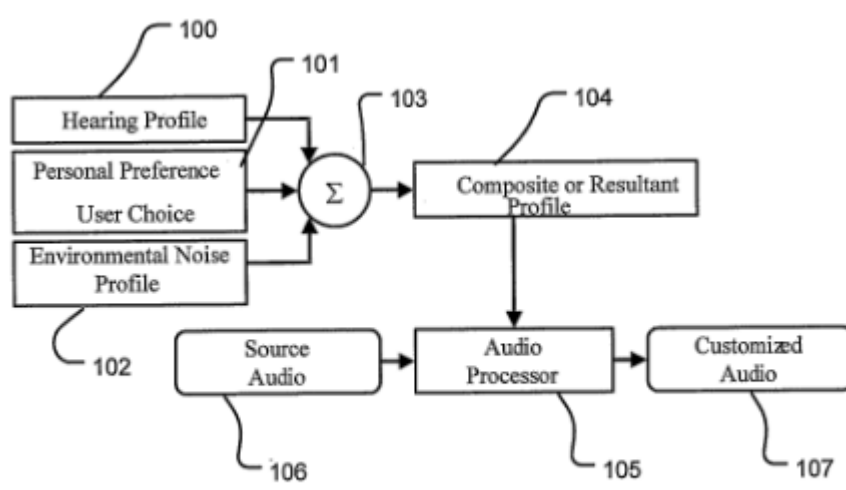
Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 To the extent that Radar '349 does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[75a] a mobile communication device at least for supporting audio output, the mobile communication device configured to store at least a hearing characteristic associated with the user, the stored hearing characteristic associated with the user at least characterizes hearing impairment regarding the user's ability to hear,	Radar '349 expressly or inherently discloses “a mobile communication device at least for supporting audio output, the mobile communication device configured to store at least a hearing characteristic associated with the user, the stored hearing characteristic associated with the user at least characterizes hearing impairment regarding the user's ability to hear,” for example, for the same reasons discussed above for claim elements [1b]. See above at claim [1b]. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[75b] the mobile communication device configured to produce	Radar '349 expressly or inherently discloses “the mobile communication device configured to produce customized audio output signals for the user based on at least the stored hearing characteristics associated

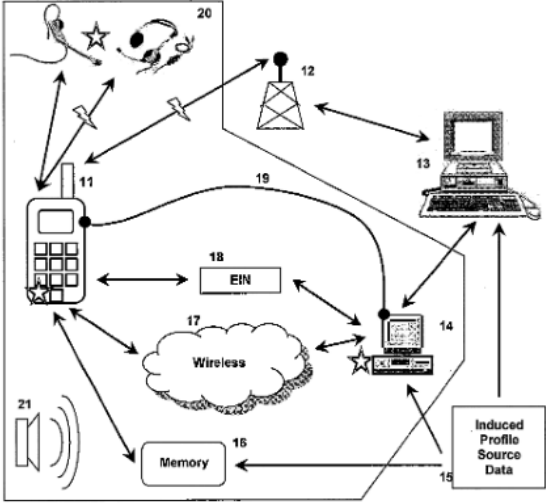
Claims	Prior Art
customized audio output signals for the user based on at least the stored hearing characteristics associated with the user such that the customized audio output signals at least compensate for the hearing impairment regarding the user's ability to hear,	with the user such that the customized audio output signals at least compensate for the hearing impairment regarding the user's ability to hear,” for example, for the same reasons discussed above for claim elements [1c]. <i>See</i> above at claim [1c]. To the extent that Radar ’349 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, with the teachings of Radar ’349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[75c] the mobile communication device configured to produce the customized audio output signals using at least signal amplification, and the mobile communication device configured to transmit the customized audio output signals to the pair of speakers,	Radar ’349 expressly or inherently discloses “the mobile communication device configured to produce the customized audio output signals using at least signal amplification, and the mobile communication device configured to transmit the customized audio output signals to the pair of speakers,” for example, for the same reasons discussed above for claim elements [1d] and [1e]. <i>See</i> above at claims [1d]; [1e]; [24e]. The following citations show examples of where Radar discloses this limitation. Radar ’349 at [0006] Mobile phones are inherently personal communication devices. Radar ’349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar ’349 at [0011] In one embodiment, a personal communication device includes control circuitry which applies a composite profile in processing the audio signals, where the composite profile comprises a set of parameters based upon more than one of the hearing profile of the user, the user preference related

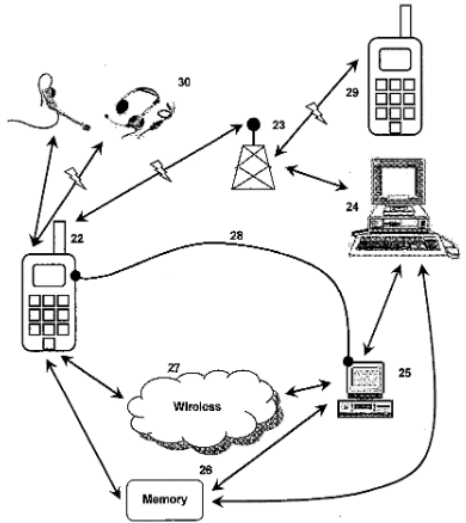
Claims	Prior Art
	hearing, and environmental noise factors. In various embodiments, the control circuitry applies more than one of the hearing profile of the user, the user preference related hearing, and environmental noise factors independently in processing the audio signals. Such processing may be done in series by the control circuitry, or in parallel. Radar '349 at [0017] Fig. 1 is a conceptual block diagram showing the sound processing in a personal communication device according to the present invention. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various embodiments of the present invention. Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0029] As shown in Fig. 1, a audio processor 105 in an personal communication device receives the composite or resultant profile 104, and applies the profile 104 to a source audio stream 106, to provide customized audio 107, which enhances the user's reception of the audio product. Radar '349 at [0036] An input/output controller 210 is coupled to a display 211, to user input devices 212, such as a numerical keypad, a function keypad, and a volume control switch, and to an accessory port (or ports) 213. The accessory port or ports 213 are used for other types of input/output devices, such as binaural and monaural headphones, connections to processing devices such as PDAs, or personal computers, alternative

Claims	Prior Art
	communication channels such as an infrared port or Universal Serial Bus USB port, a portable storage device port, and other things. Radar '349 at [0037] In this embodiment of the present invention, the composite or resultant hearing profile 104 of Fig. 1 is stored in the read/write program memory 208. In addition, instructions for algorithms are stored in the memory 207-209 for use in applying the profile information during the processing of the audio signals. Radar '349 at [0045] The effect environmental noise on auditory perception is to reduce the dynamic range available for sounds above the masking level of the environmental noise and to cause abnormal loudness perception of sound heard simultaneously with the noise. Sound ID's Full Frequency Dynamic Compression (FFDC) replicates the compressive function of the healthy cochlea, compressing sound such that the audio signal is no longer distorted in the auditory system and perception is restored to normal. Radar '349 at [0046] Compression is functionally an automatic gain control (AGC) within the personal communication device, where the gain reduces as the signal level increases. In order to properly compensate for reduced audibility from the environmental noise, the compression processes the signal in the same way that the cochlea's AGC processes sound in a quiet environment. The input-output function of such a compressor when measured with a quasi-steady-state pure-tone will have a compressive region that has a slope less than or equal to one over a wide dynamic input range (>40 dB), with possible linear regions below and above the compressive region. The gain and compression ratio can vary with frequency and will be monotonic with the noise power in that frequency region. The slope of the compressive region can have values that restore loudness perception to normal in that frequency region, and will have slopes that range from 1 (no compression) to 1/3 (3:1 compression). Because the amount of gain added at any frequency is a function of the power of the signal in that frequency region, the compressor calculates power and applies gain using auditory filter bandwidths that replicate normal critical bands in human hearing. The AGC may be implemented using software executed by a processor in the personal communication device, or by dedicated circuits, or by a combination of these techniques. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the

Claims	Prior Art																																																												
	aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0054] Accessories 20 to the mobile phone 11 may be used to sense noise, calculate an induced hearing impairment, or even provide computational resources to customize audio. Accessories 20 such as headsets may be used to sense the local noise environment at the user's ear, and send that information to the mobile phone 11 either via a wire link or a wireless link, as shown on the diagram. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets. Radar '349 at Table 1 TABLE 1 <table><tr><td>Hearing profile acquisition</td><td>A</td><td>Test algorithm local</td><td>Sound generation local</td></tr><tr><td></td><td>1</td><td></td><td></td></tr><tr><td></td><td>A2</td><td>Test algorithm local</td><td>Sound generation remote</td></tr><tr><td></td><td>A3</td><td>Test algorithm remote</td><td>Sound generation remote</td></tr><tr><td></td><td>A4</td><td>Test algorithm remote</td><td>Sound generation local</td></tr><tr><td></td><td>A5</td><td>Choice matrix</td><td>Sound generation local</td></tr><tr><td></td><td>A6</td><td>Choice matrix</td><td>Sound generation remote</td></tr><tr><td>Profile transfer and storage</td><td>B1</td><td>No user interaction</td><td>Local storage</td></tr><tr><td></td><td>B2</td><td>User interaction</td><td>Local storage</td></tr><tr><td></td><td>B3</td><td>Transfer to remote</td><td>Local storage</td></tr><tr><td></td><td>B4</td><td>Transfer to local</td><td>Remote storage</td></tr><tr><td></td><td>B5</td><td>User interaction</td><td>Remote storage</td></tr><tr><td></td><td>B6</td><td>No user interaction</td><td>Remote storage</td></tr><tr><td>Customization of audio data</td><td>C1</td><td>Remote customization</td><td>Delivery to local</td></tr><tr><td></td><td>C2</td><td>Generic audio delivery</td><td>Customization locally</td></tr></table>	Hearing profile acquisition	A	Test algorithm local	Sound generation local		1				A2	Test algorithm local	Sound generation remote		A3	Test algorithm remote	Sound generation remote		A4	Test algorithm remote	Sound generation local		A5	Choice matrix	Sound generation local		A6	Choice matrix	Sound generation remote	Profile transfer and storage	B1	No user interaction	Local storage		B2	User interaction	Local storage		B3	Transfer to remote	Local storage		B4	Transfer to local	Remote storage		B5	User interaction	Remote storage		B6	No user interaction	Remote storage	Customization of audio data	C1	Remote customization	Delivery to local		C2	Generic audio delivery	Customization locally
Hearing profile acquisition	A	Test algorithm local	Sound generation local																																																										
	1																																																												
	A2	Test algorithm local	Sound generation remote																																																										
	A3	Test algorithm remote	Sound generation remote																																																										
	A4	Test algorithm remote	Sound generation local																																																										
	A5	Choice matrix	Sound generation local																																																										
	A6	Choice matrix	Sound generation remote																																																										
Profile transfer and storage	B1	No user interaction	Local storage																																																										
	B2	User interaction	Local storage																																																										
	B3	Transfer to remote	Local storage																																																										
	B4	Transfer to local	Remote storage																																																										
	B5	User interaction	Remote storage																																																										
	B6	No user interaction	Remote storage																																																										
Customization of audio data	C1	Remote customization	Delivery to local																																																										
	C2	Generic audio delivery	Customization locally																																																										

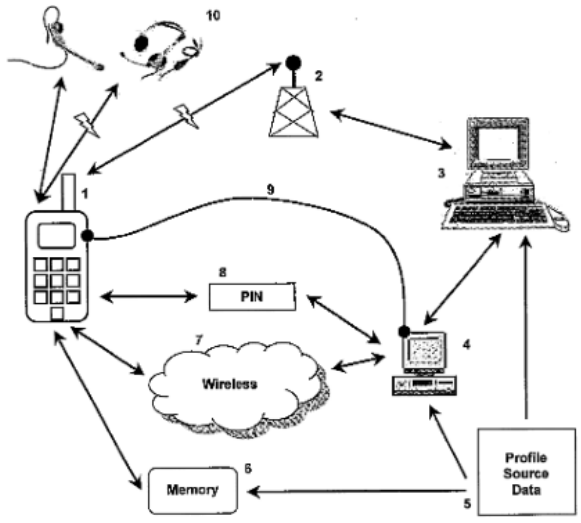
Claims	Prior Art
	Radar '349 at [0063] Customization of audio data can be accomplished by using systems remote from the mobile phone, and delivering the customized or personalized audio to the mobile phone for playback. The alternative is to deliver unprocessed audio to the mobile phone, and use the resources of the mobile phone or an accessory to personalize the audio. Radar '349 at [0069] Once the hearing profile is acquired and stored for future use, the audio data can be customized or personalized either at the network system resource and transmitted to the phone, or delivered then personalized at a processor on the mobile phone. Radar '349 at FIG. 1  <pre> graph TD subgraph 100 [] direction TB HP[Hearing Profile] PPU[Personal Preference User Choice] ENP[Environmental Noise Profile] end 101((Σ)) 104[Composite or Resultant Profile] 102[Source Audio] 106[Source Audio] 105[Audio Processor] 107[Customized Audio] HP --> 101 PPU --> 101 ENP --> 101 101 --> 104 104 --> 105 102 --> 106 106 --> 105 105 --> 107 </pre> FIG. 1

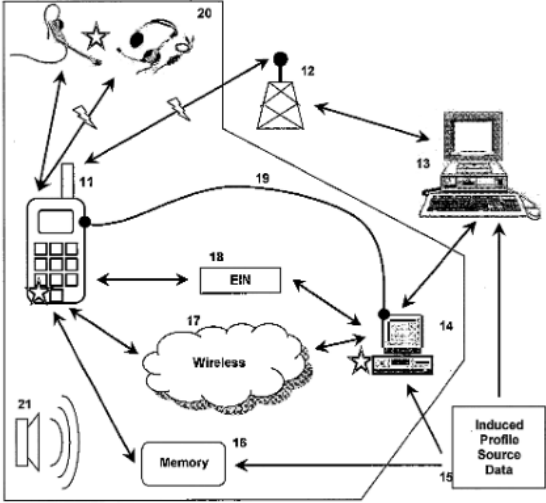
Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

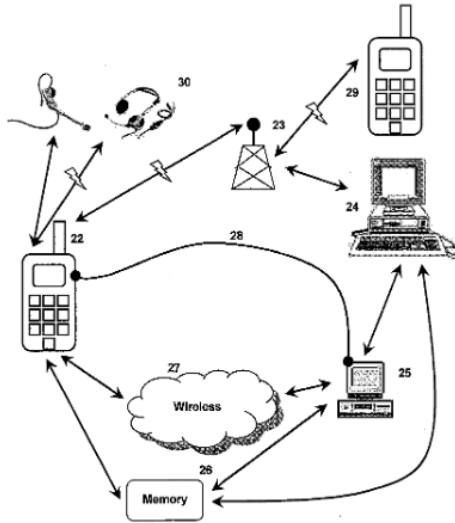
Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 To the extent that Radar '349 does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[75d] wherein each of the speakers is configured to receive at least a portion of the customized audio output signals transmitted by the mobile communication device, and	Radar '349 expressly or inherently discloses “wherein each of the speakers is configured to receive at least a portion of the customized audio output signals transmitted by the mobile communication device,” for example, for the same reasons discussed above for claim element [1f]. <i>See above at claims [1f]; [24f].</i> To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[75e] wherein each of the speakers is configured to generate at least a portion of the customized audio output for the user in accordance	Radar '349 expressly or inherently discloses “wherein each of the speakers is configured to generate at least a portion of the customized audio output for the user in accordance with at least the portion of the customized audio output signals being received,” for example, for the same reasons discussed above for claim element [1g].

Claims	Prior Art
with at least the portion of the customized audio output signals being received.	<i>See</i> above at claims [1g]; 24[g]. To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
76. A personal audio system as recited in claim 75, wherein each of the speakers being configured to be at least partially inserted into an ear of the user.	Radar '349 expressly or inherently discloses “[a] personal audio system as recited in claim 75, wherein each of the speakers being configured to be at least partially inserted into an ear of the user.” For example, as described above for claim element [1a], it would have been obvious to a POSITA that Radar’s headphones could be or could include ear buds could be partially inserted into the ears of a user and Rader also discloses that the headphones can be binaural headphones, which the POSITA would understand to include one speaker for each ear bud. The following citations show examples of where Radar discloses this limitation. Radar '349 at [0009] A personal communication device according to the present invention comprises a transmitter/receiver coupled to a communication medium for transmitting and receiving audio signals; control circuitry that controls transmission, reception and processing of call and audio signals; a transducer such as an internal speaker, an external speaker, and a speaker in an attached headset; and an internal microphone, an external microphone, and a microphone in an attached headset. The control circuitry includes logic applying one or more of a hearing profile of the user, a user preference related hearing, and environmental noise factors in processing the audio signals. In various embodiments of the invention, the control circuitry includes instruction memory and an instruction execution processor such as a digital signal processor. Radar '349 at [0019] Fig. 3 illustrates a communication network, such as a telephone network, providing for hearing profile generation and transfer according various embodiments of the present invention. Radar '349 at [0020] Fig. 4 illustrates a communication network, such as a telephone network, providing for induced hearing loss profile generation according to environmental factors, and transfer of such profile according various embodiments of the present invention.

Claims	Prior Art
	Radar '349 at [0021] Fig. 5 illustrates a communication network, such as a telephone network, providing many ways in which audio can be transferred to and from a mobile phone, and the components where audio processing can be accomplished, according to the present invention. Radar '349 at [0050] Accessories 10 to the mobile phone may be used in conjunction with the mobile phone and any of the aforementioned subsystems. Accessories 10 may include, for example, monaural or binaural headphones worn by the user. The binaural headphones would allow for gathering of a hearing profile for each ear, which may become more prevalent as mobile phones become stereo audio playback devices. The accessories 10 could communicate with the mobile phone either through direct wire link or wireless link, as shown in Fig. 3. Radar '349 at [0060] Customized audio data could be presented to the user through the mobile phone or through accessories 30 such as headsets.

Claims	Prior Art
	Radar '349 at FIG. 3  FIG. 3

Claims	Prior Art
	Radar '349 at FIG. 4  FIG. 4

Claims	Prior Art
	Radar '349 at FIG. 5  FIG. 5 To the extent that Radar '349 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, with the teachings of Radar '349, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.