UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Hyundai Motor Company Ltd., Hyundai Motor America, Hyundai Motor Manufacturing Alabama, LLC, Kia Motors Corporation, Kia Motors America, Inc., and Kia Motors Manufacturing Georgia, Inc.,
Petitioners

v.

Blitzsafe Texas, LLC,
Patent Owner

U.S. Patent No. 7,489,786
Filing Date: December 11, 2002
Issue Date: February 10, 2009
Title: Audio Device Integration System

Inter Partes Review No.: (Unassigned)

DECLARATION OF CHRIS KYRIAKAKIS, PH.D. IN SUPPORT OF PETITIONER'S REQUEST FOR *INTER PARTES* REVIEW

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EXHIBIT LIST

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1003	Declaration of Chris Kyriakakis, Ph.D.
1004	Joint Claim Construction Chart from *Blitzsafe Texas, LLC v. Honda Motor Co., Ltd. et al.*, 2:15-cv-01274 (E.D. Tex.)(lead case)
1005	Plaintiff's Disclosure Of Asserted Claims And Infringement Contentions (with Appendices A-D) from *Blitzsafe Texas, LLC v. Honda Motor Co., Ltd. et al.*, 2:15-cv-01274 (E.D. Tex.)(lead case)
1006	U.S. Patent No. 7,085,710 ("Beckert '710")
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1009	Clarion AutoPC 310C Owner's Manual, Clarion Co. Ltd. 1998 ("AutoPC Manual")
1010	Universal Serial Bus Specification - Rev. 2.0, April 27, 2000 ("USB 2.0")
1011	Universal Serial Bus Device Class Definition for Audio Data Formats - Release 1.0, March 18, 1998 ("USB ADF")
1012	Sony XR-C5120 FM/AM Cassette Car Stereo Operating Instructions Manual ("Sony XR-C5120 Manual")
1013	Minagawa et al., *Open Architectural Car Multimedia Platform*, Clarion Co., Ltd., Convergence 98 Int'l Congress on Transportation Elec's., October 19-21, 1998 ("Minagawa," Ex. 1013)
1014	Decision Instituting *Inter Partes* Review, Case IPR2015-00421, Paper No. 13 (July 7, 2016)

I. INTRODUCTION

1. I am a tenured Associate Professor in the Department of Electrical Engineering at the University of Southern California ("USC"). I have been retained by Hyundai and Kia as a technical expert to explain how a person of ordinary skill in the art would understand certain terms in the asserted claims of U.S. Patent No. 7,489,786 ("'786 patent").

2. I am being compensated for my time at a consulting rate of $475 per hour. My compensation does not depend on the outcome of this litigation.

3. I have considered the '786 patent, its prosecution history, and the documents cited in this declaration, and I have also applied my own knowledge and experience from more than two decades in the relevant art, as set forth more fully below.

4. I reserve the right to modify or supplement my opinion, as well as the bases for my opinion, based on the nature and content of the documentation, data, proof, and other evidence or testimony that Blitzsafe Texas, LLC or its expert(s) may present or based on any additional discovery or other information provided to me or found by me in this matter.

II. BACKGROUND AND QUALIFICATIONS

5. In this section I have summarized my education, career history, publications, and other relevant information. My curriculum vitae, which includes my qualifications as well as my publications, is attached as Exhibit A.

A. Educational Background

6. I earned my Bachelor of Science degree in Engineering and Applied Science from the California Institute of Technology in 1985. I received my Master of Science degree in Electrical Engineering in 1987 and my Ph.D. in Electrical Engineering in 1993, both from USC. My expertise is audio and acoustic sciences. My research interests lie at the intersection of acoustics, psychoacoustics (the science that studies human perception of sound), and audio signal processing. My recent research has focused on the study of audio systems in challenging environments including automobiles and mobile devices, as well as algorithms for enhancing the performance of voice recognition engines. I have published several technical papers on acoustical measurement and calibration methods that can be applied to listening rooms, movie theaters and automobiles, and developed novel signal processing algorithms for optimizing sound system performance. Other topics I have researched include multichannel audio acquisition and

rendering, virtual microphones and virtual speakers, hybrid headphone-loudspeaker rendering methods, and advanced signal processing techniques for optimizing sound quality in automobiles.

B. Relevant Professional Experience

7. I am the founding Director of the USC Immersive Audio Laboratory with facilities for experimental work in room acoustics, multichannel audio, and psychoacoustics. This laboratory also serves as a unique teaching facility for my undergraduate course in Introduction to Digital Audio and my graduate course in Immersive Audio Signal Processing. Both courses have a major acoustics component that examines the interaction of sound with the acoustical environment (home, movie theater, car). The graduate course was developed through a two-year grant I received from the National Science Foundation entitled "Collaborative Learning in Engineering Using Immersive Environments," and was the first of its kind to assess the impact of audio immersion in student learning. In addition to the courses I teach, I have also supervised and served on Ph.D. dissertation committees for more than 30 students.

8. I am also the founder and Chief Technology Officer of Audyssey Laboratories, a USC spin-off company that develops and licenses audio technology to leading automotive, professional and consumer

electronic companies around the world including Jaguar, Land Rover, Audi, Mercedes Benz, Volvo, IMAX, Denon and Intel. As part of my work at Audyssey, I have developed audio algorithms and designed speakers. These speakers were novel acoustical designs that used a combination of unique enclosures, and audio signal processing to optimize their performance and overcome limitations that arise from small drivers and enclosures. For example, we used signal processing technologies combined with novel acoustical design to extend the bass response of small woofers and passive radiators beyond what was previously possible in small speaker enclosures. The innovations in these designs have received awards, including Popular Science's "Best of What's New."

9. I am also a member of the Audio Engineering Society, an association for professionals in the audio industry. I have published nearly 100 technical papers, including several peer reviewed papers. I have published a book entitled Immersive Audio Signal Processing, and hold several patents in acoustic measurement of loudspeakers in rooms and cars, loudspeaker crossover optimization, and loudspeaker response correction using signal processing. My publications examine various aspects of sound measurement, how sound interacts with the acoustical elements of the environment, novel methods for surround sound recording and reproduction,

and the perception of sound by human listeners. In 2006, I received a World Technology Network Award. This organization presents awards to innovators in several areas in which technology can foster a paradigm change. My award was for innovations in immersive audio that enable new capabilities in media and journalism. Other award recipients at that event included Vice President Al Gore, Google, and Space-X.

10. In the late 1990s and early 2000s, I was a faculty researcher and later Deputy Director of the National Science Foundation's engineering research center established at USC. I was studying the fundamental and technological limitations of immersive audio and the role of acoustics on the performance of loudspeakers and audio systems in homes and cars. In 2003, together with one of my graduate students, I received the award for Best Paper at the Institute of Electrical and Electronics Engineers ("IEEE") Conference on Signals, Systems and Computers.

III. SUMMARY OF MY OPINIONS

11. It is my opinion that each of the claims of the '786 patent challenged by Petitioner (claims 1, 5-8, 10, 14, 23, 24, 57, 60-62, and 64-65) are invalid. The invalidity of these claims is shown by at least the following Grounds of Unpatentability:

Ground	’786 patent Claim	Basis for Rejection
Ground 1	Claims 1, 10, 14, 23, and 24	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710 (Ex. 1006) and Beckert ’164 (Ex. 1007)
Ground 2	Claim 5	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710 (Ex. 1006), Beckert ’164 (Ex. 1007), the AutoPC Manual (Ex. 1009) and USB 2.0 (Ex. 1010)
Ground 3	Claim 6	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710 (Ex. 1006), Beckert ’164 (Ex. 1007) and Beckert ’363 (Ex. 1008)
Ground 4	Claim 7	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710 (Ex. 1006), Beckert ’164 (Ex. 1007), and the AutoPC Manual (Ex. 1009)
Ground 5	Claim 8	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710 (Ex. 1006), Beckert ’164 (Ex. 1007), and the Sony XR-C5120R Manual (Ex. 1012)
Ground 6	Claims 57, 60, 64 and 65	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710 (Ex. 1006), Beckert ’164 (Ex. 1007) and USB ADF (Ex. 1011)
Ground 7	Claim 61	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of

		Beckert ’710 (Ex. 1006), Beckert ’164 (Ex. 1007), USB ADF (Ex. 1011) and the AutoPC Manual (Ex. 1009)
Ground 8	Claim 62	Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710, Beckert ’164, USB ADF and the Sony XR-C5120 Manual

12. In this Declaration, I provide the explanation and support for my opinion that each of the challenged claims are invalid based on these grounds.

A. Legal Principles and Instructions

13. My analysis and opinions are based on my expertise in this technical field, as well as the instructions I have been given by counsel for the legal standards relating to patentability.

1. Priority Date of the ‘786 patent

14. I have been informed by counsel that Blitzsafe has asserted the following as the priority date of the ’786 patent: December 11, 2002. *See* Ex. 1005 at 6.

2. Claim Construction

15. I have been informed by counsel that in performing my analysis and forming my conclusions, I should apply the claim constructions previously adopted by the Panel in the recent institution decision IPR2016-

00421, Paper No. 13 (Ex. 1014). For other claim terms, I have been asked to apply the proposed claim constructions offered by Blitzsafe in *Blitzsafe Texas, LLC v. Honda Motor Co., Ltd. et al.*, 2:15-cv-01274 (E.D. Tex.)(lead case) (Ex. 1004). For terms where Blitzsafe has not explicitly offered a claim construction, I have applied my understanding of Blitzsafe's constructions based on its infringement contentions submitted in *Blitzsafe Texas, LLC v. Honda Motor Co., Ltd. et al.*, 2:15-cv-01274 (E.D. Tex.)(lead case). *See generally*, Ex. 1005 at appendices A, B.

3. Anticipation

16. I have been informed that a patent claim must be novel to be valid. A claim that lacks novelty is invalid.

17. Counsel have informed me that a patent claim is "anticipated" and therefore invalid under 35 U.S.C. section 102, if, among other things, (a) the alleged invention was known or used by others in this country, or patented or described in a printed publication in the United States or a foreign country, before the alleged invention thereof by the patent's applicant(s), or (b) the alleged invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or (e) the invention was described in a patent

granted on an application for patent by another filed in the United States before the invention by the applicant for patent. I understand that the date one year prior to the filing of a patent application is referred to as the "critical date."

18. Counsel have informed me that references or products that fall into one or more of these categories are called "prior art," and that to anticipate a patent claim pursuant to 35 U.S.C. section 102, a single reference must contain all of the elements and limitations described in the claim either expressly or inherently.

19. Counsel have informed me that in deciding whether a single item of prior art anticipates a patent claim, one should consider what is expressly stated or present in the piece of prior art, and what is inherently present. I understand that something is inherent in an item of prior art if it is always present in the prior art or always results from the practice of the prior art. It is my understanding that one of ordinary skill in the art may not have recognized the inherent characteristics or functioning of the prior art at the time.

20. As I mentioned above, counsel have informed me that a patent claim may be invalid under 35 U.S.C. section 102(b) if the invention was in public use before the critical date and was ready for patenting. I understand

that the proper test for the public use prong of 102(b) is whether the purported use: (1) was accessible to the public; or (2) was commercially exploited. I also understand that if the inventor or someone connected to the inventor puts the invention on display or sells it, there is a "public use" within the meaning of 102(b) even though the invention itself may be hidden from view as part of a larger machine or article, if the invention is otherwise used in its natural and intended way and the larger machine or article is accessible to the public.

4. Obviousness

21. Counsel have informed me that a patent claim is "obvious" and therefore invalid under 35 U.S.C. section 103 if the claimed subject matter would have been obvious to a person of ordinary skill in the art as of the priority date of the patent in view of one or more prior art references. I understand that an obviousness analysis must consider: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness (such as unexpected results, commercial success, long-felt but unsolved needs, failure of others, copy by others, licensing, and skepticism of experts). Secondary considerations of non-obviousness may include a long felt but unmet need in the prior art that

was satisfied by the claimed invention of the patent; commercial success of a product or process covered by the claims of the patent and commensurate in scope with those claims; unexpected results achieved by the invention; praise of the invention by others skilled in the art; taking of licenses under the patent by others; and deliberate copying of the invention. Even assuming such indicia exists, it is my understanding that there must be a nexus between any such secondary indicia and the claimed invention.

22. Counsel have informed me that a conclusion of obviousness may be based upon a combination of prior art references, particularly if the combination of elements does no more than yield predictable results. I understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Moreover, I understand that it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. I further understand that to determine obviousness, the courts look to the interrelated teachings of multiple patents, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art.

23. Counsel have informed me that in determining whether a combination of prior art references renders a claim obvious, it is helpful to consider whether there is some teaching, suggestion, or motivation to combine the references and a reasonable expectation of success in doing so. I understand, however, that the teaching, suggestion, or motivation to combine inquiry is not required and may not be relied upon in lieu of the four obviousness factors outlined above.

5. Incorporation by Reference

24. Counsel have informed me that in certain limited circumstances, two or more prior art references may be treated as a single reference if one document, called the "host document," incorporates the disclosure of one or more other documents by reference. To incorporate another document by reference, the host document must identify with detailed particularity what specific material it incorporates, and clearly indicate where that material is found in the other document or documents. Counsel have further informed me that whether the host document describes the material with enough particularity is measured from the perspective of a person reasonably skilled in the art.

B. Person of Ordinary Skill in the Art

25. In my opinion, after having reviewed the ‘786 patent, a person of ordinary skill in the art (“POSITA”) at the time of the alleged invention of the ‘786 patent would have had at least at least a Bachelor’s Degree in Electrical Engineering or equivalent science/engineering degree and at least two years’ experience in signal processing and/or electronic system design, or at least four years’ experience in signal processing and/or electronic system design.

C. Prior Art Patents and Publications

26. I am informed that the claims of the ’786 patent (Ex. 1001) have an effective filing date no earlier than December 11, 2002, which is the filing date of the application that issued as the ’786 patent.

27. I have reviewed claims 1, 5-8, 10, 14, 23, 24, 57, 60-62, and 64-65 of the ’786 patent, as well as its file history, and I understand these claims are directed to an “audio device integration system,” via an interface between a car audio/video system and a portable device.

28. Petitioners rely upon the following patents and publications, all of which I understand are prior art to the claims of the ‘786 patent:

- U.S. Patent No. 7,085,710 to Beckert et al. (“Beckert ’710”, Ex. 1006) was filed on Jan. 7, 1998 and issued on Aug. 1, 2006.

Beckert ’710 is prior art to the ’786 patent under at least 35 U.S.C. §§ 102(a) and (e) (pre-AIA).

- U.S. Patent No. 5,794,164 to Beckert et al. (“Beckert ’164”, Ex. 1007) was filed on Nov. 29, 1995 and issued on Aug. 11, 1998. Beckert ’164 is prior art to the ’786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).
- U.S. Patent No. 6,009,363 to Beckert et al. (“Beckert ’363”, Ex. 1008) was filed as a continuation-in-part of Beckert ’164 on June 24, 1996 and issued on Dec. 28, 1999. Beckert ’363 is prior art to the ’786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).
- The Clarion AutoPC 310C Owner’s Manual (“AutoPC Manual”, Ex. 1009) bears a copyright date of 1998. The AutoPC Manual is prior art to the ’786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).
- The Universal Serial Bus Specification - Rev. 2.0 (“USB 2.0”, Ex. 1010) was published on April 27, 2000. USB 2.0 is prior art to the ’786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).
- The Universal Serial Bus Device Class Definition for Audio Data Formats - Release 1.0 (“USB ADF”, Ex. 1011) was

published on March 18, 1998. USB ADF is prior art to the '786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).

- The Sony XR-C5120R FM/MW/LW Cassette Car Stereo Operating Instructions Manual ("Sony XR-C5120R Manual", Ex. 1012) bears a copyright date of 1999. The Sony XR-C5120R Manual is prior art to the '786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).
- Minagawa et al., *Open Architectural Car Multimedia Platform*, Clarion Co., Ltd., Convergence 98 Int'l Congress on Transportation Elec's. ("Minagawa," Ex. 1013) is dated October 19-21, 1998, and bears a copyright date of 1998. Minagawa is prior art to the '786 patent under at least 35 U.S.C. § 102(b) (pre-AIA).

D. The Beckert References Can Be Treated as a Single Reference

29. The three Beckert references I listed above share the first two named inventors – Richard D. Beckert and Mark M. Moeller – and were assigned to the same original assignee, Microsoft Corp. *See* Ex. 1006, Ex. 1007, and Ex. 1008 at title page. All three Beckert references relate to a vehicle-based computer system that can be used as an automotive entertainment system. *See id.* In addition, two of the patents are related:

Beckert ’363 issued from a continuation-in-part application of the application that issued as Beckert ’164. Accordingly, their disclosures are very similar. *See* Ex. 1007 and Ex. 1008 at title page.

30. Moreover, Beckert ’710 expressly incorporates specific disclosure from Beckert ’164 and Beckert ’363. Specifically, Beckert ’710 incorporates details of its computer, support, and faceplate modules 84, 82, and 80 from Beckert ’164:

> A more detailed explanation of the three modules in the vehicle computer system is provided in co-pending US. patent application Ser. No. 08/564,586 entitled “Vehicle Computer System,” which was filed on Nov. 29, 1995 in the names of Richard D. Beckert, Mark M. Moeller, and William Wong. This application is assigned to Microsoft Corporation **and is incorporated herein by reference**.

Ex. 1006 at 7:19-25 (emphasis added).

31. In addition, Beckert ’710 incorporates details of its logic unit 110 from Beckert ’363:

> A detailed description of one implementation of the logic unit 110 is provided in co-pending US. patent application Ser. No. 08/668,781, entitled “Vehicle Computer System With High Speed Data Buffer and Serial Interconnect”, which was filed on Jun. 24, 1996 in the names of Richard D. Beckert, Mark M. Moeller, Ron Randall, and William Wong. This application is assigned to the Microsoft® Corporation **and is incorporated herein by reference**. The logic circuitry described in this disclosure represents another implementation of the logic unit 110 that is more specifically tailored to implement the audio entertainment system.

Ex. 1006 at 7:37-47 (emphasis added).

32. Based on my review of Beckert ’710, Beckert ’164, and Beckert ’363, and my understanding of the rules governing incorporation by reference as they were explained to me by Counsel, it is my opinion that the host document, Beckert ’710 has described the material incorporated from Beckert ’164 and Beckert ’363 with sufficient particularity from the point of view of a POSITA to treat the three references as a single anticipatory reference. Beckert ’164 provides detail about the computer, support and faceplate modules 84, 82, 80 and data interface of the vehicle computer system, and Beckert ’363 provides low-level detail on the operation of the logic unit 110 of the support module. Beckert ’710 explicitly incorporates and references specific disclosure from Beckert ’164 and Beckert ’363. Because the three disclosures describe the same underlying invention and device, a POSITA reading Beckert ’710 would have known to look to Beckert ’164 for additional details on the three modules of the vehicle computer system described in the Beckert patents, and would also have known to look to Beckert ’363 for additional detail on the support unit’s logic unit, especially as it relates to an audio entertainment system.

33. Should the Panel decline to combine the Beckert references by incorporation by reference, it is also my opinion that a POSITA would have found it obvious to combine the teachings of Beckert ’710 with the teachings

of Beckert ’164 and Beckert ’363. The motivation to combine Beckert ’710 with Beckert ’164 and Beckert ’363 is clearly set forth in Beckert ’710’s incorporation by reference of Beckert ’164 and Beckert ’363, as I describe above.

IV. TECHNOLOGY OVERVIEW

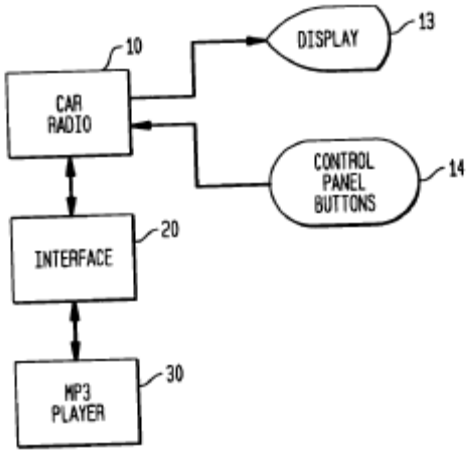
A. Summary of the ’786 patent

34. The ’786 patent is directed to an “audio device integration system” that integrates a car stereo (also referred to as “car radio”) and one or more external or “after-market” devices, such as a CD changer or an MP3 player, that may otherwise be incompatible with the car stereo. *See* Ex. 1001 at abstract; 1:20-35 and FIG. 1. In the context of the ’786 patent, this integration is provided by an “interface,” which is separate from the car stereo and the external device. *Id*

35. The interface converts control signals from the car stereo into a format that is compatible with an after-market external device, thus allowing commands input at the car stereo to control the external device. With reference to Figure 2B of the ’786 patent below, the control panel buttons 14 of the car radio 10 may be used to control the operation of an external device (MP3 player 30) as a result of interface 20 converting the control signals from the car radio 10 into a format compatible with the MP player. Ex. 1001

at 6:1-19. Similarly, the interface receives data from the external device and converts the data into a format compatible with car radio 10 to allow information, such as artist, song title, and track and time information, to be displayed on display 13 of car radio 10. Ex. 1001 at 6:19-24. The interface includes a microcontroller programmed to perform the format conversion for signals sent by the car stereo to the external device to the car stereo. Ex. 1001 at 8:31-9:7.

FIG. 2B



36. The ’786 patent also describes the interface providing one or more auxiliary inputs (inputs 35 in Figure 2E) to allow additional audio devices to be connected. Ex. 1001 at 7:23-29. Devices connected to an auxiliary input may be selectively activated by the microcontroller so that audio from the selected device is channeled to the car stereo. Ex. 1001 at 7:30-37.

37. The interface also generates a "device presence signal" that it transmits to the car stereo to maintain the car stereo in an operational state, such as "prevent[ing] the car stereo from shutting off, entering a sleep mode, or otherwise being unresponsive to signals and/or data from an external source." Ex. 1001 at 12:29-35; 13:15-19; FIGs. 4A and 4B.

B. Summary of the Challenged Claims

38. Independent claim 1 generally recites an interface comprising: (1) a connector connectable to a car stereo, (2) connectors connectable to two (or a plurality of) audio devices, and (3) a microcontroller that a) processes commands from the car stereo into a format compatible with one of the audio devices and transmits them to that audio device, and b) processes data from one of the audio devices into a format compatible with the car stereo and transmits them to the car stereo for display. Claim 1 also requires the microcontroller to switch or select audio devices.

39. Independent claim 57 generally recites an interface comprising: (1) a connector connectable to a car stereo, (2) a connector connectable to an audio device, and (3) a microcontroller that a) generates a "device presence signal" that maintains the car stereo in an operational state and b) processes commands from the car stereo into a format compatible with one of the

audio devices and transmits them to that audio device. Claim 57 further recites an audio device that is an MP3 player.

40. The dependent claims generally add various limitations regarding control and data signals, connection types, device type, and the user interface.

C. Summary of the Prosecution History of the ‘786 patent

41. The application for the ’786 patent, U.S. App. No. 10/316,961 (“the ‘961 application”), was filed on December 11, 2002. See Ex. 1102 (‘786 Patent File History, at 1).

42. In a first Non-Final Office Action dated June 5, 2006, all pending claims were rejected on prior art grounds. Ex. 1002 at 204-230. The Examiner relied primarily on U.S. Patent No. 6,993,615 (Falcon). *Id*. In response, the Applicant distinguished Falcon on the basis that it failed to show an interface “connected between a car stereo and an external audio source.” Ex. 1002. At 267 (Sept. 11, 2006 Amendment). The applicant also distinguished Falcon as “unconcerned with integrating an external audio device, which is ordinarily alien to and incompatible with a car stereo system, for use with the car stereo system.” *Id*. In response, the Examiner issued another Non-Final Office Action on November 14, 2006 rejecting all of the claims on new grounds, relying primarily on U.S. Patent No.

6,163,079 (Miyazaki). Ex. 1002 at 282-326. A final rejection was issued on April 19, 2007, again relying primarily on Miyazaki. Ex. 1002 at 378-442.

43. In response to these Office Actions, the Applicant amended the independent claims to specify that the interface performed a "format" conversion of control commands from the car stereo to the external device. Ex. 1002 at 334-369 (Feb. 14, 2007 Amendment). The Applicant then distinguished Miyazaki because its interface was directed to devices that were "already compatible with each other." Ex. 1002 at 604 (Sept. 6, 2007 Amendment). The Applicant also amended some claims to add "connectors" to the interface (*e.g.*, claim 1 amended to add a "first connector" that connects the interface to the "car stereo" and a "second connector" that connects the interface to the after-market (external) device; application claims 55 and 81 were amended similarly, which issued as claims 57 and 86.) Ex. 1002 at 575-.576; 588-589; 595-596.

44. On February 20, 2008, the Examiner issued a Final Office Action rejecting all of the pending claims on new grounds, relying primarily on U.S. Patent Application Publication No. 2002/0084910 (Owens) and U.S. Patent No. 6,175,789 (Beckert). Ex. 1002 at 616-665. Thereafter, the Applicant filed an Amendment on April 21, 2008. (Ex. 1002 at 678-709.) The Amendment included additional claim language requiring that the

microcontroller be "***pre-programmed*"** to perform the recited format conversion operations (*e.g.*, "for remotely controlling the after-market audio device…" and "for receiving data from the after-market audio device…" E.g., Ex. 1002 at 679 (amendment to claim 1); 1002 at 707-709 (arguing "pre-programmed" aspect as basis for overcoming prior art).

45. A Notice of Allowance followed on July 31, 2008. Ex. 1002 at 1035-1041. The Examiner stated that although interfacing auxiliary after-market devices with a car stereo was known, "the Examiner has not found prior art that teaches or suggests an interface unit containing a ***pre-programmed*** microcontroller that allows for the communication of incompatible audio devices as presented in the independent claims 1, 24, 30, 42, 55, 63 and 72" or "to execute a code portion for generating and transmitting a ***device presence signal*** to a car stereo to maintain the stereo in an operational state responsive to signals from an after-market device as presented in the independent claims 47, 81, 83, 104." Ex. 1002 at 1039-1040 (emphasis added)

D. Claim Construction

46. As I stated above, I understand that a claim subject to *inter partes* review is given its "broadest reasonable construction in light of the specification of the patent in which it appears." I also understand that claim

terms are given their plain meaning, from the perspective of a POSITA, unless that meaning is inconsistent with the specification.

47. I understand that Blitzsafe has taken certain positions as to the scope and meaning of certain claim terms. I was asked to assume those positions are within the scope of the "broadest reasonable interpretation" because Blitzsafe, as the Blitzsafe, considers them proper and appropriate constructions.

48. I further understand that a Panel previously addressing the '786 patent has construed some of the claim terms of the '786 patent in another IPR proceeding. I have applied those constructions below where applicable.

1. "car stereo"

49. The term "car stereo" appears in challenged claims 1, 6, 8, and 57. The '786 patent expressly defines this term:

> [A]s used herein, the terms "car stereo" and "car radio" are used interchangeably and are intended to include all presently existing car stereos and radios, such as physical devices that are present at any location within a vehicle, in addition to software and/or graphically-or display-driven receivers. An example of such a receiver is a software-driven receiver that operates on a universal LCD panel within a vehicle and is operable by a user via a graphical user interface displayed on the universal LCD panel. Further, any future receiver, whether a hardwired or software/graphical receiver operable on one or more displays, is considered within the definition of the terms "car stereo" and "car radio," as used herein, and is within the spirit and scope of the present invention

Ex. 1001 at 5:1-13.

2. integration" / "integrating"

50. The term "integration" appears in challenged claims 1 and 57 while the term "integrating" appears in challenged claim 5. In the underlying litigations, the Petitioners and the Blitzsafe have agreed that these terms mean "Connecting one or more external devices or inputs to an existing car radio or stereo via an interface, processing and handling signals and audio channels, allowing a user to control the devices via the car stereo, and displaying data from the devices on the radio." Ex. 1004 at 9.

3. "interface"

51. The term "interface" appears in challenged claims 1, 5, 6, 10, 14, 57 and 64 and has been construed by the Patent Owner to mean "a device configured to integrate an external device with a car stereo." Ex. 1004 at 15. But in a recent institution decision in Case IPR2015-00421, a Panel of Administrative Patent Judges ("the Panel") interpreted this term as "*a physical unit that connects one device to another and that has a functional and structural identity separate from that of both connected devices*." Ex. 1014 at 15.

4. "device presence signal"

52. The term "device presence signal" appears in challenged claims 6 and 57. Patent Owner has construed this term to mean "a signal indicating an audio device is present." Ex. 1004 at 23. But in the institution of Case

IPR2015-00421, the Panel construed this term as "*a signal indicating that an audio device (claim 57) or video device (claim 86) or portable audio device (claim 92), other than the car stereo, is connected to the interface*."

5. "maintain . . . in an operational station"

53. The term "maintain … in an operational state" appears in challenged claim 57. In the underlying litigations, the Petitioners and the Patent Owner have agreed that this term means "maintain in a state responsive to processed data and audio signals from the external device." Ex. 1004 at 34.

V. ALL CHALLENGED CLAIMS OF THE '786 PATENT ARE UNPATENTABLE

A. Ground 1: Claims 1, 10, 14, 23, and 24 are Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert '710 And Beckert '164

1. Overview of Beckert '710

54. Beckert '710 relates to a vehicle-borne, computer-based audio entertainment system. As shown by the exemplary embodiment of Figure 1, the vehicle audio system has a centralized computer (22) coupled to various external peripheral devices, including a monitor (24) and a faceplate module (48) with a keypad and graphical display. Ex. 1006 at 3:54-4:61.

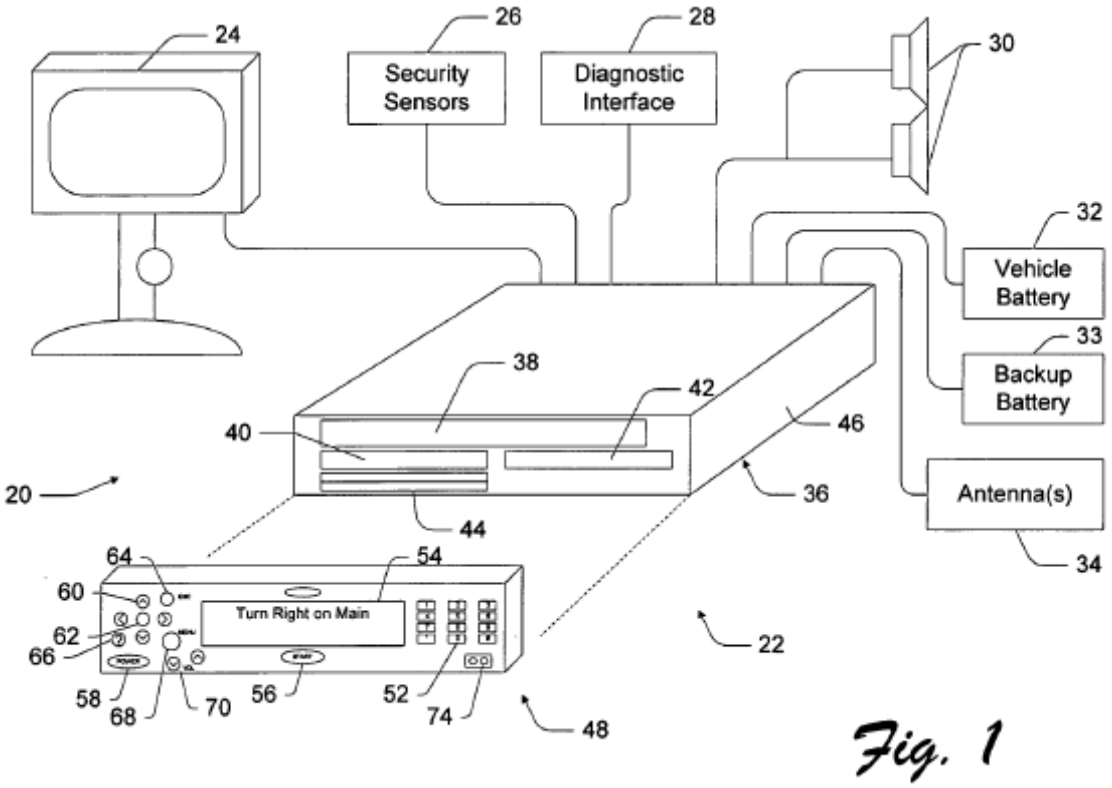


Fig. 1

Ex. 1006, FIG. 1

55. As Figure 2 shows, the computer 22 of the audio entertainment system is divided into a computer module (84) and a support module (82), which is further connected to the faceplate module (80), depicted in Figure 1 as element 48. The support module is also connected to several external peripheral devices, including a CD-ROM changer and TV Tuner, via the well-known USB interface. Ex. 1006 at 5:34-54.

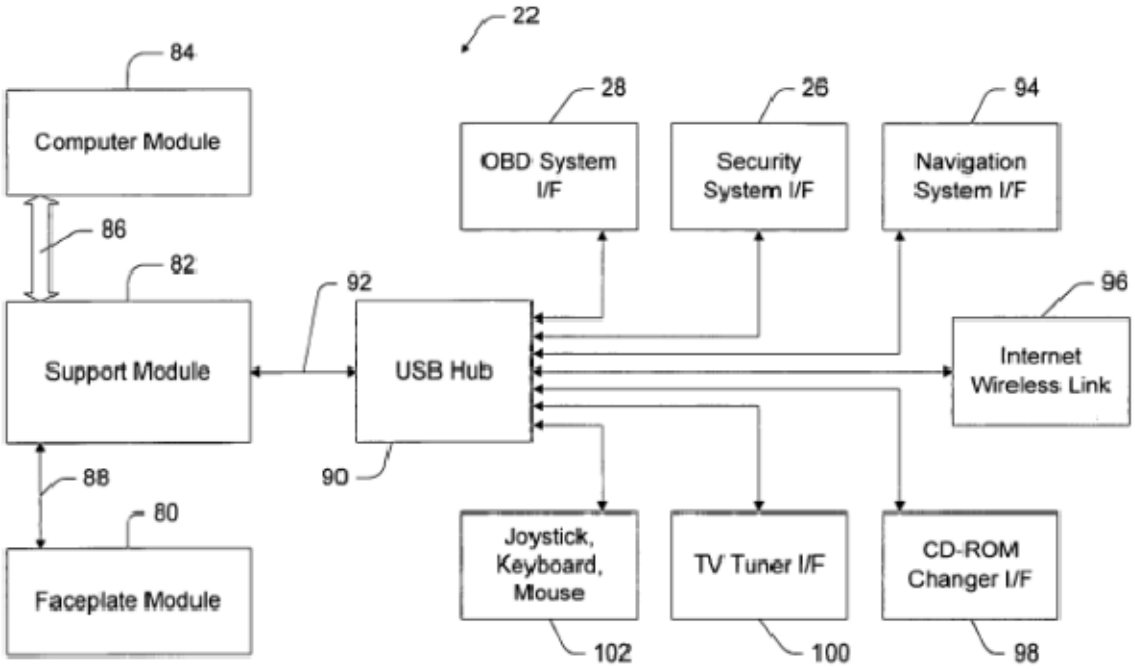


Fig. 2

Ex. 1006, FIG. 2. Beckert ’710 expressly incorporates by reference certain specific disclosures of Beckert ’164 and Beckert ’363, described more fully below. *See* Ex. 1006 at 7:19-25 and 7:37-47.

2. Overview of Beckert ’164

56. Beckert ’164, like Beckert ’710, relates to a vehicle computer system supporting entertainment, navigation, communications, security, diagnostics, and other applications. Ex. 1007, Abstract. More specifically, Beckert ’164 addresses the problem of integrating traditionally diverse and separate automotive systems by building them on top of a general purpose computing platform. Ex. 1007 at 1:65 -2:9. In particular, Beckert ’164

details the computer, faceplate and support modules of the computing system. *See* Beckert ’710, Ex. 1006 at 7:19-25

> In one implementation, the vehicle computer system has two independent processors. One processor . . . is provided on a computer module which mounts to a stationary base unit of the housing that resides in the vehicle dashboard or other location. The operating system runs on this processor to support the vehicle-related applications and to additionally provide all of the functionality typically afforded by a personal computer. Another processor . . . is provided on a faceplate module that detachably connects to the base unit. . . . A third module, known as the support module, resides in the stationary base unit. The support module contains a storage drive (which also functions as an entertainment player), power supply, multimedia audio driver for the entertainment system, and a communications bus.

Ex. 1007 at 2:22-39.

3. A POSITA Would Have Found it Obvious to Combine Beckert ’710 with Beckert ’164

57. Beckert ’710 expressly incorporates the details of the computing module, support module, and faceplate modules set forth in Beckert ’164 by reference. Ex. 1006 at 7:19-25 (“A more detailed explanation of the three modules in the vehicle computer system is provided in [Beckert ’164]”). As such, it is my opinion that there is express motivation to combine Beckert ’164 with Beckert ’710.

58. In addition to the express teaching and motivation to combine Beckert ’164 with Beckert ’710, it is my opinion that a person of ordinary skill in the art at the time after reading Beckert ’710 would have known to

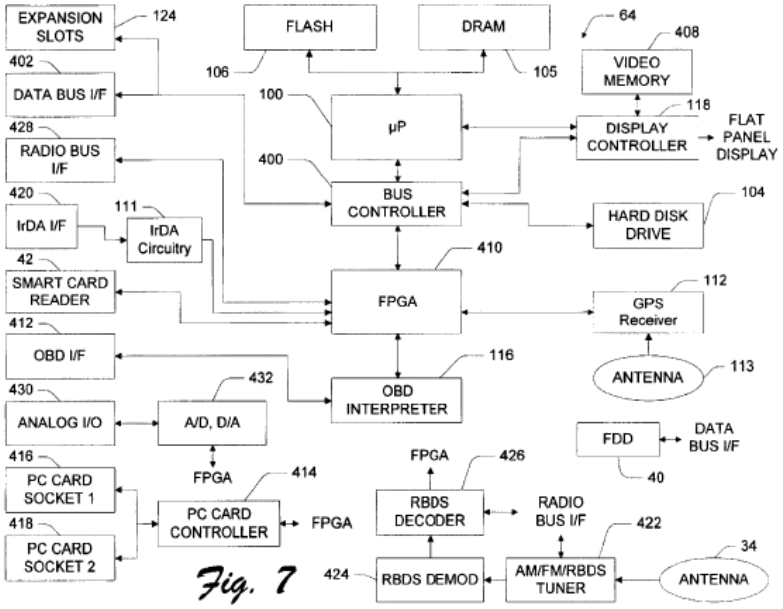
look to Beckert ’164 for additional details on the three modules of the vehicle computer system (described in the Beckert patents) as a use of known technique to improve a similar device in the same way.

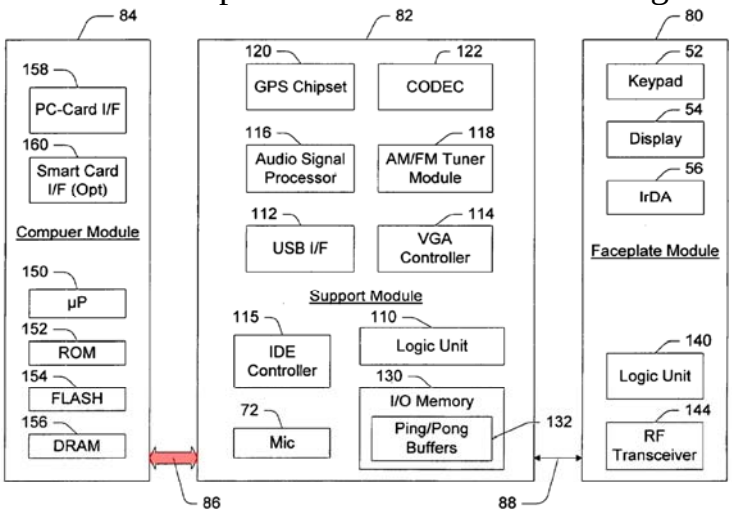
59. Moreover, it is my opinion that the use of the known technique from Beckert ’164 to improve Beckert ’710 would have yielded a predictable result.

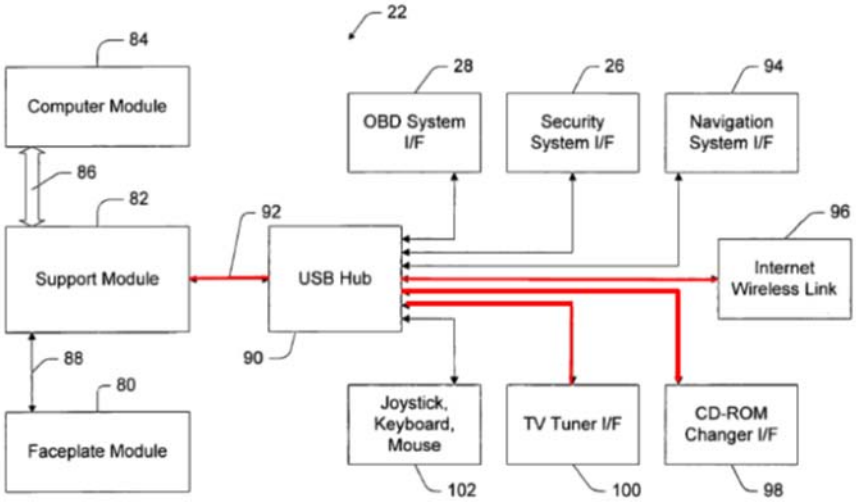
4. Application of Beckert ’710 and Beckert ’164 to Claims 1, 10, 14, 23, and 24

a. Claim 1

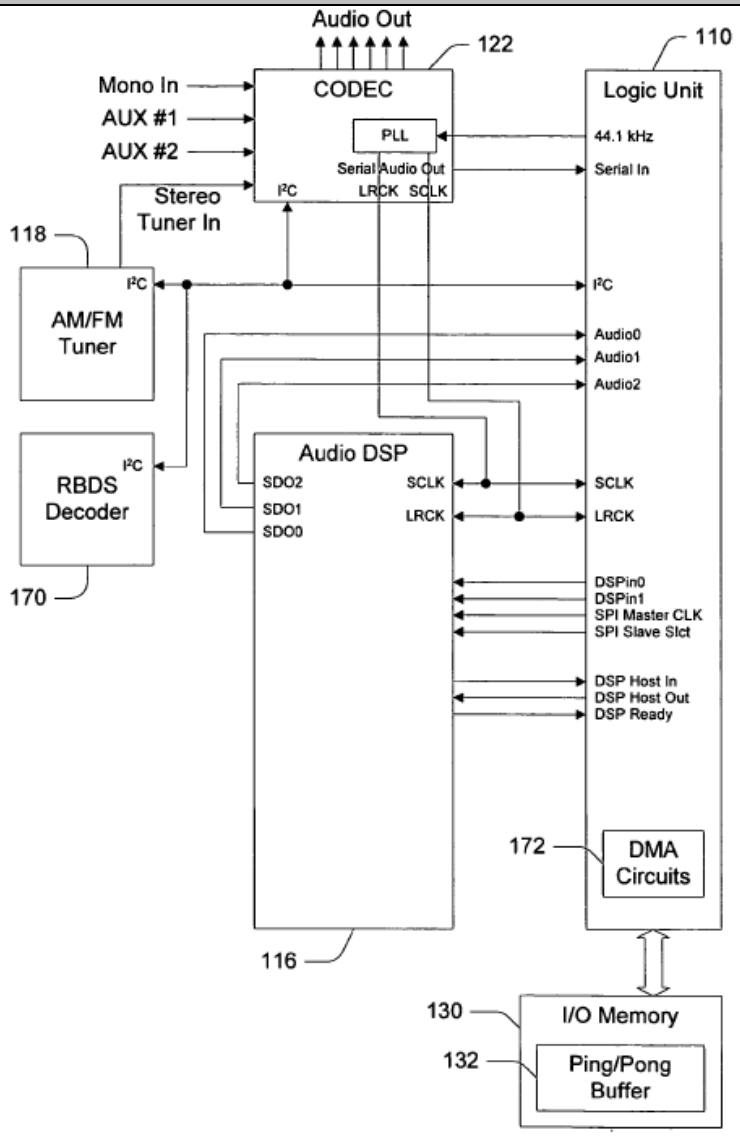
Claim 1	Beckert ’710 and Beckert ’164
[a] An audio device integration system comprising:	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses an audio device integration system. > This invention relates to audio entertainment systems for vehicles. More particularly, this invention relates to a vehicle computer system that implements an audio entertainment system. Ex. 1006 at 1:6-9
[b] a first connector electrically connectable to a car stereo;	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses a first connector electrically connectable to a car stereo: Beckert ’710 discloses a computer module, which corresponds to the broad construction of “car stereo” in the ’786 patent: > The computer module 84 supports any variety of applications that the vehicle user might desire. Ex. 1006 at 7:4-5. Additional details of the audio entertainment system of Beckert ’710 are found in the disclosure of Beckert ’164, which Beckert ’710 expressly incorporates by reference. Beckert ’164 provides “a more detailed explanation of the [computer module, support

Claim 1	Beckert ’710 and Beckert ’164
	module, and faceplate module] in the vehicle computer system.” Ex. 1006 at 7:19-25. Beckert ’164 discloses: [T]he computer module supports the navigation, security, diagnostics, communications, and ***entertainment systems***. . . . Ex .1007 at 3:15-17. The computer module is illustrated in Figure 7 of Beckert ’164:  *Fig. 7* Ex. 1007 at 3:57-58 (“FIG. 7 is a functional block diagram of the computer module”). The computer module 64 also includes at least one flat panel display controller 118 to control the flat panel monitor 24. *Id.* at 9:36-38. The computer module 64 is equipped with a second radio receiver unit consisting of an AM/FM tuner 422 connected to receive an RF signal from antenna 34, a demodulator 424, and a decoder 426. The second radio receiver unit can be

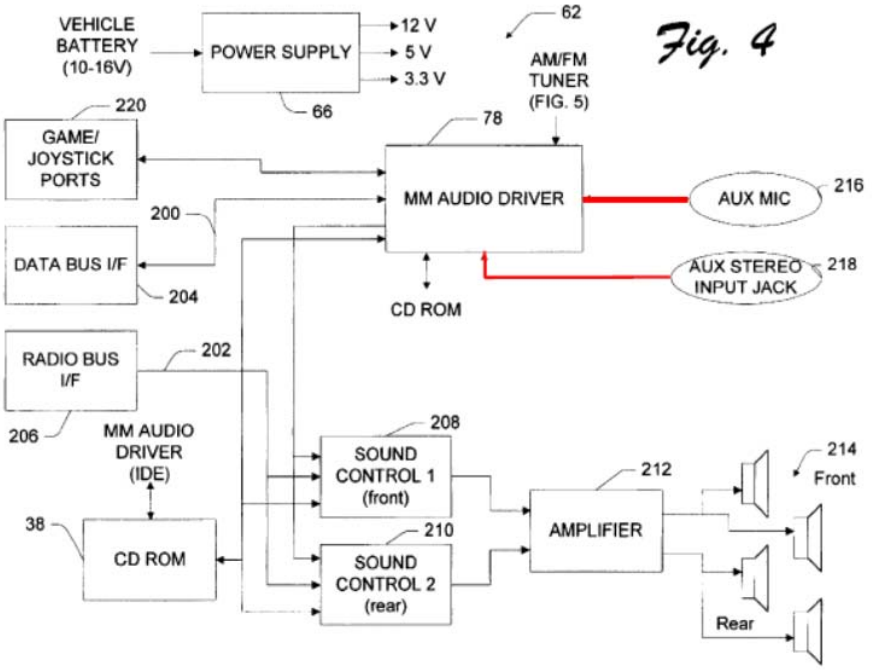
Claim 1	Beckert ’710 and Beckert ’164
	used to receive radio signals for timed recording of radio programming for later playback. Additionally, the second radio receiver can be used to receive both the FM subcarrier and audio programming of the primary FM channel. Such FM subcarrier might carry weather, news, sports, financial, traffic, paging, or other information. *Id.*at 10:37-46. Beckert ’710 shows a first electrical connector (86) electrically connectable to the computer module in annotated Figure 3:  Fig. 3 Ex. 1006 at FIG. 3; *see also id.* at 3:34-36 (“FIG. 3 is a block diagram of the vehicle computer system according to one implementation having a faceplate module, a support module, and a computer module.”). Beckert ’710 also discloses: The computer module 84 is operatively connected to the support module 72 via a multi-bit bus 86. Ex. 1006 at 5:37-39. When plugged in, the computer module 84 is connected to the PCI bus 86 to communicate with

Claim 1	Beckert ’710 and Beckert ’164
	the support module 82. Ex. 1006 at 6:65-67. Accordingly, in my opinion, one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 discloses a first connector electrically connectable to a car stereo.
[c] a second connector electrically connectable to an after-market audio device external to the car stereo;	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses a second connector electrically connectable to an aftermarket audio device external to the car stereo. As annotated below, the “second connector” is the USB bus, which extends from the support module 82 and connects to external audio devices, for example through a USB Hub 90:  Fig. 2 Ex. 1006 at FIG. 2; *see also id.* at 3:31-33 “FIG. 2 is a diagrammatic illustration of the vehicle computer system interfaced with multiple external peripheral devices.”). Beckert ’710 further discloses: The support module 82 is also connected to a universal serial bus (USB) hub 90 via a USB serial I/F connector 92. The USB hub 99 provides connections to many peripheral devices (e.g., up to 128 devices). Example peripheral devices include

Claim 1	Beckert ’710 and Beckert ’164
	the OBD (On Board Diagnostic) system 28, the security system 26, navigation system 94, a wireless link 96 to the Internet, a CD-ROM changer 98, a TV tuner 100, and user I/O devices such as a joystick, keyboard or a mouse 102. This USB hub 90 could be separate as shown in FIG. 2 or it could be integrated into one or more of the USB peripherals. Ex. 1006 at 5:44-54.
[d] a third connector electrically connectable to one or more auxiliary input sources external to the car stereo and the after-market audio device;	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses a third connector electrically connectable to one or more auxiliary input sources external to the car stereo and the after-market audio device. Beckert ’710 discloses a logic unit with traces for auxiliary inputs AUX#1, AUX#2, and Mono In, each of which are a third connector electrically connectable to one or more auxiliary input sources external to the car stereo:

Claim 1	Beckert ’710 and Beckert ’164
	 *Fig. 4* Ex. 1006 at FIG 4; *see also id.* at 3:37-38. (“FIG. 4 is a block diagram of a logic unit and audio DSP implemented in the support module of the computer system.”) In addition, according to Beckert ’164’s more detailed disclosure of the support module 82, the “third connector” is shown below by the annotated lines between the MM AUDIO DRIVER and AUX MIC and AUX STEREO INPUT JACK. *Compare* Ex. 1005 (Patent Owner’s Infringement Chart) Appendix A at 52.

Claim 1	Beckert ’710 and Beckert ’164

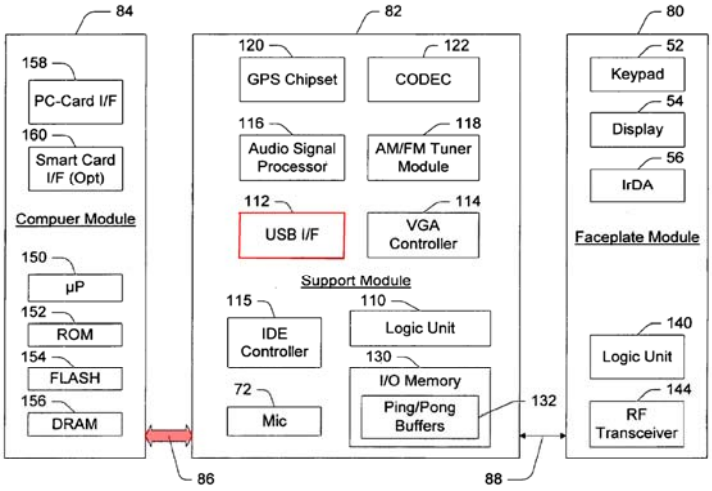


Ex. 1007 at FIG. 4; *see also id.* at 3:50-51 (“FIG. 4 is a functional block diagram of the support module.”).

> The audio sources are generally categorized into two kinds: foreground audio sources and background audio sources. Foreground audio sources include a computer wave file output and text-to-speech output. Foreground audio sources are mixed with active background audio sources. The foreground audio sources are controlled by the wave-out API. In contrast, the background audio sources include AM/FM tuner, CD player, ***auxiliary inputs***, and other sources from the USB. Background sources are controlled by the audio source control API.

Ex. 1006 at 13:22-31 (emphasis added).

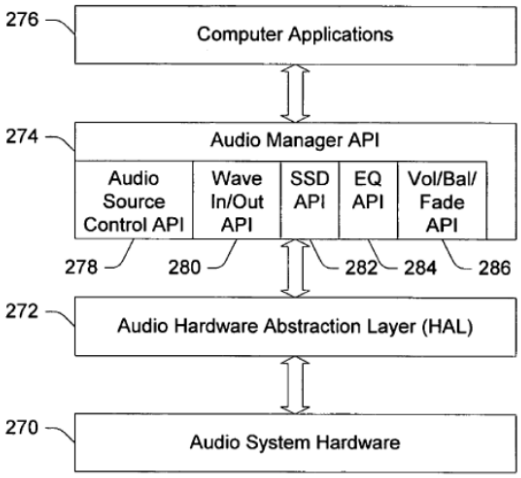
Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 discloses a third connector electrically connectable to one or more auxiliary input sources external to the car stereo and the after-market audio device.

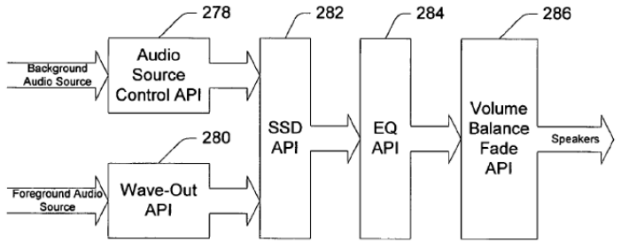
Claim 1	Beckert ’710 and Beckert ’164
[e] an interface connected between said first and second electrical connectors for channeling audio signals to the car stereo from the after-market audio device,	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses an interface connected between said first and second electrical connectors for channeling audio signals to the car stereo from the after-market audio device: Beckert ’710 discloses a support module connected to the car stereo (i.e., the computer module) through a first interface (PCI bus 86), and connected to external after-market audio devices through a USB bus (as shown in Beckert ’710 Figure 2, below). The support module is thus “connected between said first and second electrical connectors” for channeling audio signals to the car stereo from the after-market audio device.”  Fig. 3 Ex. 1006 at FIG. 3; *see also id.* at 3:34-36 (“FIG. 3 is a block diagram of the vehicle computer system according to one implementation having a faceplate module, a support module, and a computer module.”). Moreover, according to Beckert ’710: > The support module 82 has several hardware interfaces. A USB interface 112 is driven from the PCI bus 86 and provides the interconnection to the various USB peripherals shown in FIG. 2. Ex. 1006 at 6:5-8. In addition, Beckert ’710 discloses: > The support module 82 has several hardware

Claim 1	Beckert ’710 and Beckert ’164
	interfaces. A USB interface 112 is ***driven from the PCI bus 86 and provides the interconnection to the various USB peripherals*** shown in FIG. 2. A separate USB hub may be required as shown . . . if some of the attached peripherals do not incorporate one or more USB peripherals than supported directly by the support module are attached. Ex. 1006 at 6:5-11 (emphasis added).
[f] said interface including a microcontroller in electrical communication with said first and second electrical connectors, said microcontroller pre-programmed to execute:	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses said interface including a microcontroller in electrical communication with said first and second electrical connectors, and pre-programmed to execute certain functions described below. Beckert ’710 discloses logic unit 110 of the support module, which can also provide USB interface functionality and can be implemented as a customized processor. Ex. 1006 at 6:17-18 (“It is noted that the USB interface 112 and VGA controller 114 could be incorporated into the logic unit 110”); *see also id.* at FIG. 3. Beckert ’710 discloses that the logic unit of the support module includes a microcontroller: The support module is formed as part of a stationary base unit of the housing that resides in the vehicle dashboard or other location. It has its own logic unit that can be implemented in a field programmable gate array (FPGA), application specific integrated circuit (ASIC), ***customized processor***, or the like. Ex. 1006 at 1:65-2:3 (emphasis added). Beckert ’710 also discloses that logic unit 110 is in electrical communication with the first electrical connector (via PCI bus 86): The logic unit 110 and microprocessor 150 are

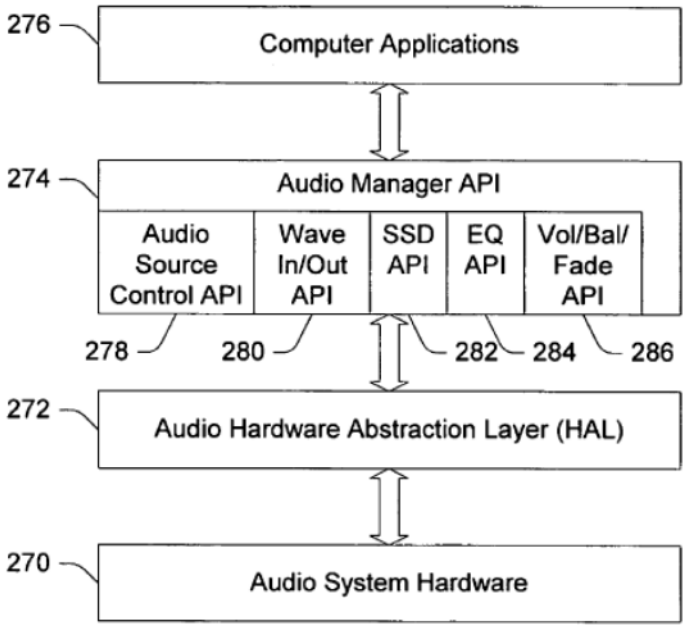
Claim 1	Beckert ’710 and Beckert ’164
	interfaced using a bus, such as PCI bus 86. Ex. 1006 at 7:28-30. Beckert ’710 also discloses that logic unit 110 is in electrical communication with the second electrical connector (USB line 92): The support module 82 is also connected to a universal serial bus (USB) hub 90 via a USB serial I/F connector 92. Ex. 1006 at 5:44-45; 6:17-18 (“It is noted that the USB interface 112 and VGA controller 114 could be incorporated into the logic unit 110”).
[g] a first pre-programmed code portion for remotely controlling the after-market audio device using the car stereo by receiving a control command from the car stereo through said first connector in a format incompatible with the after-market audio device,	It is my opinion that Beckert ’710 discloses a first pre-programmed code portion for remotely controlling the after-market audio device using the car stereo by receiving a control command from the car stereo though said first connector in a format incompatible with the after-market audio device: Beckert ’710’s audio entertainment system addressed the problem of integrating incompatible after-market devices with car stereos: Modern vehicles are typically equipped with several independent electronic systems. For instance, most modern vehicles have a sound system and a security system . . . . While these various electronics systems have proven useful to vehicle users, ***there is a drawback in that the systems are unrelated and incompatible***. Each system employs separate proprietary dedicated processors or ASICs . . . which execute incompatible proprietary software. Ex. 1006 at 1:13-34 (emphasis added); *see also* Ex. 1007 at 1:25-60. Beckert ’710 expressly discloses pre-programmed applications that are enabled by the API to control the functionality of the audio system:

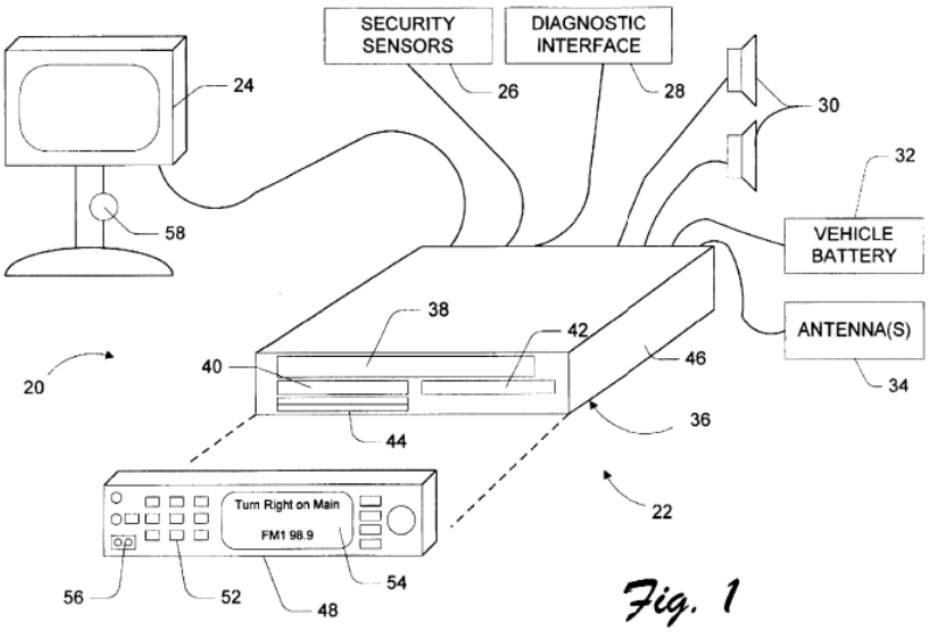
Claim 1	Beckert ’710 and Beckert ’164
	The audio entertainment system of Beckert ’710 is based on a general purpose computer, and is capable of running many types of programs by sending a control command from the computer module (e.g., from computer applications) to the support module, and eventually to after-market audio devices through the USB interface: According to another aspect, the computer system provides an ***audio manager API*** (application program interface) to enable applications running on the computer to control the various audio sources ***without knowing the hardware and implementation details of the underlying sound system***. Different audio devices and their drivers control different functionality of the audio system, such as equalization, volume controls and surround sound decoding. The audio manager API transfers ***calls made by the applications*** to the appropriate device driver(s). Ex. 1006 at 2:64-3:6 (emphasis added). The audio sources are generally categorized into two kinds: foreground audio sources and background audio sources. . . . . [T]he background audio sources include AM/FM tuner, CD player, auxiliary inputs, and other sources from the USB. Background sources are controlled by the audio source control API. Ex. 1006 at 13:22-31.
[h] processing the received control command into a formatted command compatible with the after-	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses processing the retrieved control command into a formatted command compatible with the after-market audio device, and transmitting the formatted command to the after-market audio device through said second connector for execution by the after-market audio device. The computer system 20 supports an audio

Claim 1	Beckert ’710 and Beckert ’164
market audio device, and transmitting the formatted command to the after-market audio device through said second connector for execution by the after-market audio device;	entertainment system. As noted above, the logic unit 110 in support module 82 performs many of the functions for the audio entertainment system. This invention is directed to the audio architecture for an audio entertainment system, such as that implemented in the computer system 20. Ex. 1006 at 7:49-54. Beckert ’710 further describes using a hardware abstraction layer (HAL) to process received commands from the car stereo into formatted commands for transfer to the audio system hardware connected through the second connector (e.g., the USB bus). A POSITA would understand that command translation is at the core of HAL functionality by enabling software to communicate with different types of hardware devices.:  Fig. 8 Ex. 1006 at FIG. 8; *see also id*. at 3:44-45 (“FIG. 8 shows an audio/software hardware interface architecture.”). Moreover, Beckert ’710 discloses: According to another aspect, the computer system provides an audio manager API (application

Claim 1	Beckert ’710 and Beckert ’164
	program interface) to enable applications running on the computer to control the various audio sources without knowing the hardware and implementation details of the underlying sound system. Different audio devices and their drivers control different functionality of the audio system, such as equalization, volume controls and surround sound decoding. The audio manager API transfers calls made by the applications to the appropriate device driver(s). Beckert ’710 at 2:64 – 3:6 (emphasis added). FIG. 8 shows the application-to-hardware architecture. The audio hardware 270 forms the lowest level in the architecture. An audio hardware abstraction layer (HAL) 272 defines a basic interface layer between the audio related drivers for the hardware 270 and the audio manager API layer 274. Atop the audio manager API 274 are the applications 276. ***The audio manager API 274 defines the APIs to access and control the underlying audio system***. Ex. 1006 at 13:7-15 (emphasis added).  *Fig. 9* FIG. 9 shows how the audio manager API modules control the audio flow path. The audio source control API 278 is used to select the background audio source. It serves as the coordinator between the different audio applications that control different pieces of the

Claim 1	Beckert ’710 and Beckert ’164
	audio system. Ex. 1006 at 13:37-42. The audio sources are generally categorized into two kinds: foreground audio sources and background audio sources. . . . . [T]he background audio sources include AM/FM tuner, CD player, auxiliary inputs, and other sources from the USB. Background sources are controlled by the audio source control API. Ex. 1006 at 13:22-31. In the USB context, it is my opinion that a POSITA would understand that commands issued by the car stereo (e.g., from the Computer Applications 276 in Figure 8 of Beckert ’710, above) are converted through the Audio Manager API and the hardware abstraction layer to be able to communicate with a connected USB audio hardware device.
[i] a second pre-programmed code portion for receiving data from the after-market audio device through said second connector in a format incompatible with the car stereo, processing the received data into formatted data	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses a second pre-programmed code portion for receiving data from the after-market audio device through said second connector in a format incompatible with the car stereo, processing the received data command into formatted data compatible with the car stereo, and transmitting the formatted data to the car stereo through said first connector for display by the car stereo. As discussed above with respect to elements [g] and [h], Beckert ’710 in view of Beckert ’164 is directed to integrating incompatible audio devices into a car audio system through the use of general purpose computer with a hardware abstraction layer for controlling a plurality of audio devices. Moreover, Beckert ’710’s Figure 8 shows that the data flows between the car stereo/computer and the underlying audio hardware flows bidirectionally; data is transmitted *to* the car stereo/computer as data and commands are sent from the car stereo/computer:

Claim 1	Beckert ’710 and Beckert ’164
compatible with the car stereo, and transmitting the formatted data to the car stereo through said first connector for display by the car stereo; and	 *Fig. 8* Ex. 1006 at FIG. 8; *see also id*. at 3:44-45 (“FIG. 8 shows an audio/software hardware interface architecture.”). Beckert ’164 further discloses that the car stereo can output visual data on a large general-purpose display: > The computer 22 can output visual data to the LCD 54 at the faceplate, or to the monitor 24. The display 54 is preferably a back lit LCD. The monitor 24 is preferably a small flat panel display (e.g., 6.4” screen) that is movably mounted on a stand or yoke and remotely located from the computer. . . . The type of data displayed on the monitor can range widely from word instructions concerning the vehicle’s performance, to diagrammatic directions used by the navigation

Claim 1	Beckert ’710 and Beckert ’164
	system, to video movies for in-car entertainment. Ex. 1007 at 5:17-27.  Fig. 1 Ex. 1007 at FIG. 1. Beckert ’710 also discloses an Audio Source Control API for retrieving information on a specific audio source. TABLE 1 Audio Source Control API 278 Name — Function GetNumSources — Returns the total number of registered audio sources. GetSourceCaps — Provides information on a specific audio source. RegisterCallback — Registers a callback thread. SelectSource — Selects the specific audio source to play. Ex. 1006 at 13:48-55. Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 discloses a second pre-programmed code portion for receiving data from the after-

<table>
<tr><th>Claim 1</th><th>Beckert ’710 and Beckert ’164</th></tr>
<tr><td></td><td>market audio device through said second connector in a format incompatible with the car stereo, processing the received data command into formatted data compatible with the car stereo, and transmitting the formatted data to the car stereo through said first connector for display by the car stereo.</td></tr>
<tr><td>[j] a third pre-programmed code portion for switching to one or more auxiliary input sources connected to said third electrical connector.</td><td>It is my opinion that Beckert ’710 in view of Beckert ’164 discloses a third pre-programmed code portion for switching to one or more auxiliary input sources connected to said third electrical connection.

Beckert ’710 discloses a CD player as an auxiliary input source and switching to that auxiliary input source. For example, according to Beckert ’710:

The audio source control API 278 is used to select the background audio source. It serves as the coordinator between the different audio applications that control different pieces of the audio system. For example, while the AM/FM tuner is playing and the operator elects to play a CD, the audio source control API 278 serves to coordinate stopping the tuner and starting the CD player. Table 1 lists the functions of the audio source control API 278.

TABLE 1

Audio Source Control API 278

Name — Function
GetNumSources — Returns the total number of registered audio sources.
GetSourceCaps — Provides information on a specific audio source.
RegisterCallback — Registers a callback thread.
SelectSource — Selects the specific audio source to play.

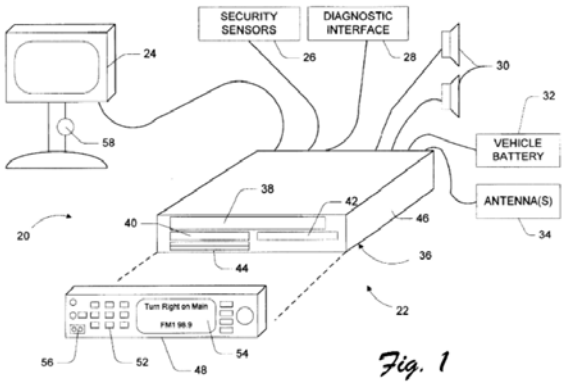
Ex. 1006 at 13:40-55 (emphasis added).

If an application wants to play an audio source, it calls SelectSource with the audio source ID as its parameter. The audio manager API deselects any current audio source and selects the source requested by the application. To deselect the</td></tr>
</table>

Claim 1	Beckert ’710 and Beckert ’164
	current audio source, the audio manager API traverses through the link list structure and informs each source or dependent device of its termination. To select the new source, it informs the source and dependent devices of their initiation. Ex. 1006 at 14:61 – 15:3.

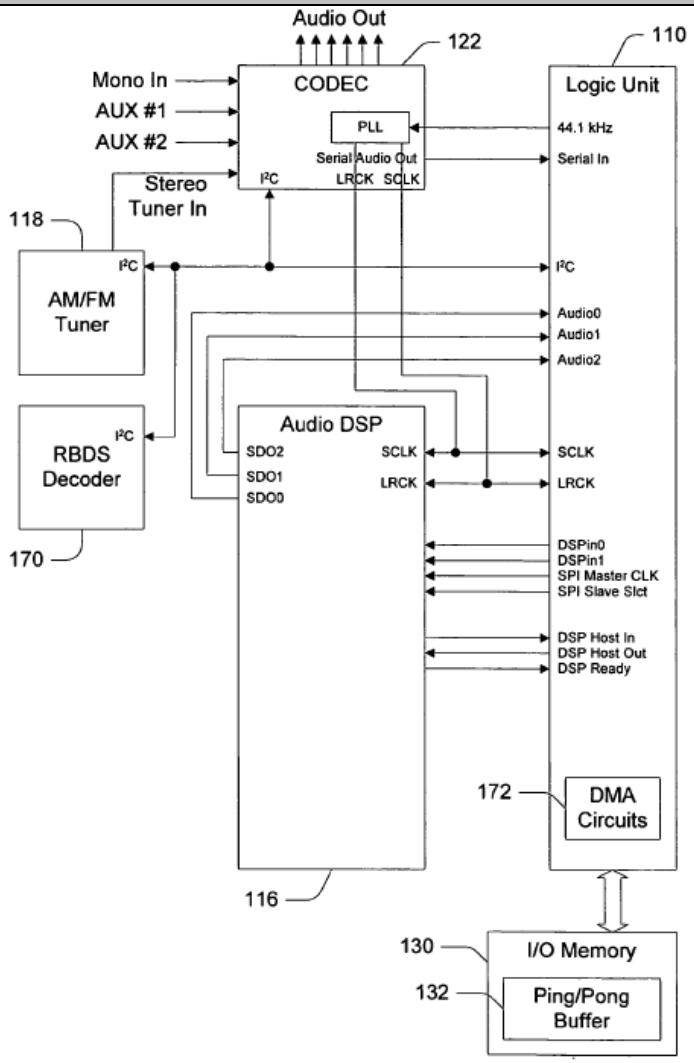
b. Claim 10

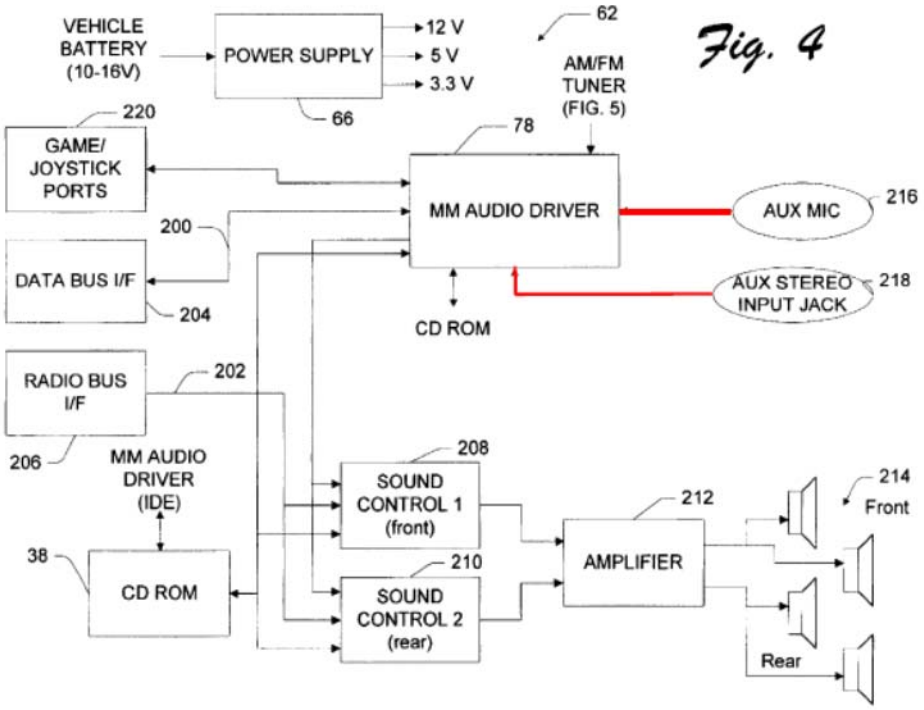
Claim 10	Beckert ’710 and Beckert ’164
The apparatus of claim limitation 1, wherein said interface processes video information generated by the after-market audio device.	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses that said interface processes video information generated by the after-market audio device. Beckert ’710 does not expressly disclose that said interface processes video information generated by the after-market audio device. Beckert ’164, however, discloses that the car stereo can output movies on a general-purpose display: The computer 22 can output visual data to the LCD 54 at the faceplate, or to the monitor 24. The display 54 is preferably a back lit LCD. The monitor 24 is preferably a small flat panel display (e.g., 6.4” screen) that is movably mounted on a stand or yoke and remotely located from the computer. . . . The type of data displayed on the monitor can range widely from word instructions concerning the vehicle’s performance, to diagrammatic directions used by the navigation system, to ***video movies*** for in-car entertainment. Ex. 1007 at 5:17-27 (emphasis added).

Claim 10	Beckert ’710 and Beckert ’164
	 Fig. 1 Ex. 1007 at FIG. 1. Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 discloses that said interface processes video information generated by the after-market audio device.

c. Claim 14

Claim 14	Beckert ’710 and Beckert ’164
The apparatus of claim limitation 1, wherein audio signals from the one or more auxiliary input sources are selectively channeled to the car stereo by said interface.	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses audio signals being selectively channeled to the car stereo by the claimed interface. Beckert ’710 discloses a logic unit with traces for auxiliary inputs AUX#1, AUX#2, and Mono In, each of which comprise a third connector electrically connectable to one or more auxiliary input sources external to the car stereo:

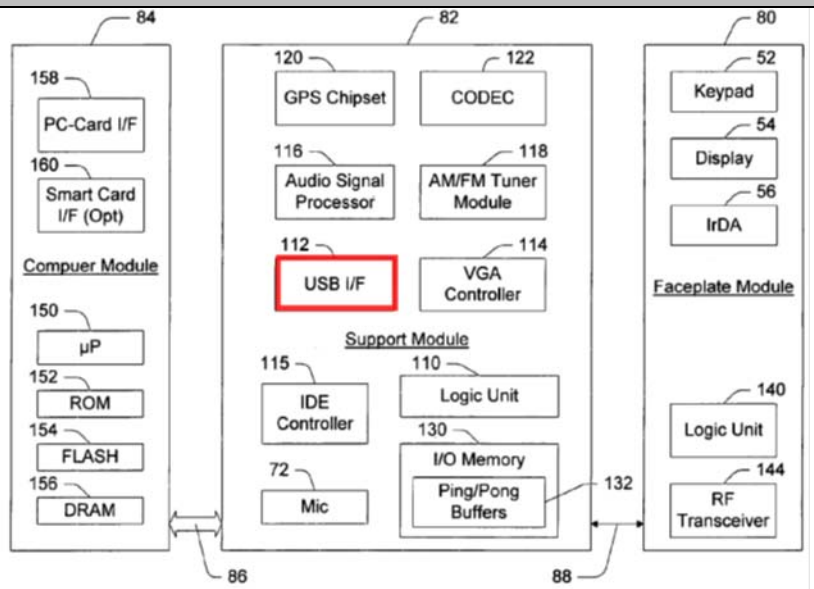
Claim 14	Beckert ’710 and Beckert ’164
	 *Fig. 4* Ex. 1006 at FIG 4; *see also id.* at 3:37-38. (“FIG. 4 is a block diagram of a logic unit and audio DSP implemented in the support module of the computer system.”) Beckert ’164 provides additional disclosure of the support module 82’s auxiliary input lines:

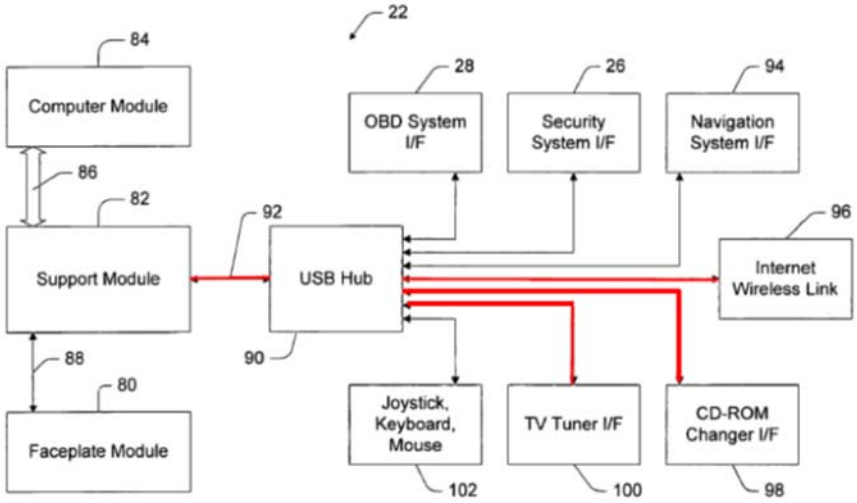
Claim 14	Beckert ’710 and Beckert ’164
	 Ex. 1007 at FIG. 4; *see also id*. at 3:50-51 (“FIG. 4 is a functional block diagram of the support module.”). In addition, Beckert ’710 discloses: > The audio entertainment system is primarily supported by the logic unit and audio DSP of support module. The support module can accommodate multiple audio sources such as CD player, CD changer, AM/FM tuner, auxiliary 1, auxiliary two, computer wave outputs and a microphone. The support module receives the data from the sources, processes it in the audio DSP, and outputs the data to the speaker system or other destination, such as a USB peripheral or memory in the computer module. Ex. 1006 at 2:17-25. > The audio sources are generally categorized into two kinds: foreground audio sources and background audio sources. Foreground audio

Claim 14	Beckert ’710 and Beckert ’164
	sources include a computer wave file output and text-to-speech output. Foreground audio sources are mixed with active background audio sources. The foreground audio sources are controlled by the wave-out API. In contrast, the background audio sources include AM/FM tuner, CD player, auxiliary inputs, and other sources from the USB. Background sources are controlled by the audio source control API. Ex. 1006 at 13:22-31. Accordingly, it is my opinion that a POSITA at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 discloses audio signals being selectively channeled to the car stereo by the claimed interface.

d. Claim 23

Claim 23	Beckert ’710 and Beckert ’164
The apparatus of claim limitation 1, further comprising a bus connection established between the after-market audio device and said interface.	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses a bus connection established between the after-market audio device and said interface.

Claim 23	Beckert ’710 and Beckert ’164
	 Fig. 3 Ex. 1006 at FIG. 3; *see also id.* at 3:34-36 (“FIG. 3. Is a block diagram of the vehicle computer system according to one implementation having a faceplate module, a support module, and a computer module.”). Moreover, Beckert ’710 discloses: > The support module 82 has several hardware interfaces. A USB interface 112 is driven from the PCI bus 86 and provides the interconnection to the various USB peripherals shown in FIG. 2. Ex. 1006 at 6:5-8.

Claim 23	Beckert ’710 and Beckert ’164
	 *Fig. 2* Ex. 1006 at FIG. 2; *see also id.* at 3:31-33 (“FIG. 2 is a diagrammatic illustration of the vehicle computer system interfaced with multiple external peripheral devices.”). In addition, according to Beckert ’710: > The support module 82 is also connected to a ***universal serial bus*** (USB) hub 90 via a USB serial I/F connector 92. The USB hub 99 provides connections to many peripheral devices (e.g., up to 128 devices). Example peripheral devices include the OBD (On Board Diagnostic) system 28, the security system 26, navigation system 94, a wireless link 96 to the Internet, a CD-ROM changer 98, a TV tuner 100, and user I/O devices such as a joystick, keyboard or a mouse 102. This USB hub 90 could be separate as shown in FIG. 2 or it could be integrated into one or more of the USB peripherals. Ex. 1006 at 5:44-54 (emphasis added).

e. Claim 24

Claim 24	Beckert ’710 And Beckert ’164
The apparatus of claim limitation 23, wherein the bus connection comprises a Universal Serial Bus (USB) connection.	It is my opinion that Beckert ’710 in view of Beckert ’164 discloses the bus connection comprises a USB connection. *See* discussion of claim 23 above.

B. Ground 2: Claim 5 is Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710, Beckert ’164, the AutoPC Manual and USB 2.0

1. Overview of the AutoPC Manual

60. The AutoPC Manual describes the operation of Clarion’s AutoPC 310C product, and specifically describes using USB for plug-and-play installation of hardware:

> Hardware is also installed or removed automatically. For most external devices, Auto PC uses the Universal Serial Bus (USB) Controller to sense when these devices are attached or detached.

Ex. 1009 at 143.

61. Contemporaneous publications further demonstrate that the AutoPC was a commercial embodiment of the inventions disclosed in Beckert ’710, Beckert ’164 and Beckert ’363. *See, e.g.*, Ex. 1013. Clarion and Microsoft co-developed an automotive PC entertainment system that

supports voice control and uses the same three-module hardware architecture as Beckert ’710, Beckert ’164 and Beckert ’363describe. [DELETED] at 4.

2. Overview of USB 2.0.

62. USB 2.0 specifies the hardware and software features of the second revision of the well-known Universal Serial Bus standard.

> This document defines an industry-standard USB. The specification describes the bus attributes, the protocol definition, types of transactions, bus management, and the programming interface required to design and build systems and peripherals that are compliant with this standard.
>
> The goal is to enable such devices from different vendors to interoperate in an open architecture. . . . It is intended that the specification allow system OEMs and peripheral developers adequate room for product versatility and market differentiation without the undue burden of carrying obsolete interfaces or losing compatibility

Ex. 1011 at 1.

3. A POSITA Would Have Considered it Obvious to Combine the Auto PC Manual and USB 2.0 with Beckert ’710 and Beckert ’164

63. It is my opinion that a person of ordinary skill in the art at the time of the ’786 patent, with knowledge of the AutoPC Manual, USB 2.0, Beckert ’710 and Beckert ’164, would have considered it obvious to combine the respective teachings of the AutoPC Manual and USB 2.0 with the combined teachings of Beckert ’710 and Beckert ’164. Specifically, it is my opinion that a person of ordinary skill in the art at the time of the ’786 patent upon reading the AutoPC Manual, which describes using USB to

automatically detect and add external hardware, would find it obvious to combine its teachings with the USB 2.0 specification, which sets forth the requirements for complying with the USB standard. The rationale for doing so includes combining prior art elements according to a known methods to yield predictable results and the use of known technique to improve a similar device in the same way.

64. Moreover, it is my opinion that it would have been obvious to try the resulting combination as it amounts to merely choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

65. Additionally, it is my opinion that a person of ordinary skill in the art at the time of the ’786 patent upon reading the AutoPC Manual and the Beckert references would notice the strong similarities in their respective descriptions of an automotive entertainment system based on a general-purpose computer running a Windows operating system (Ex. 1009 at 1) featuring USB support (*id.* at 31, 143) and a detachable faceplate (*id.* at 2, 6-9, 159).

4. Application of the Combination of Beckert ’710, Beckert ’164, the Auto PC Manual, and USB 2.0 to Claim 5.

Claim 5	Beckert ’710 in View of Beckert ’164, the AutoPC Manual and USB 2.0
The apparatus of claim limitation 1, wherein said interface further comprises a plug-and-play mode for automatically detecting a device type of the after-market audio device connected to said second electrical connector and integrating the after-market audio device based upon the device type.	It is my opinion that Beckert ’710 in view of Beckert ’164, the AutoPC Manual and USB 2.0 discloses a plug-and-play mode (i.e., USB) for automatically detecting a device type of the after-market audio device connected to said second electrical connector and integrating the after-market audio device based upon the device type. As discussed with respect to claim 1, the “second electrical connector” of Beckert ’710 is the USB bus. Beckert ’710 in view of Beckert ’164 does not specifically disclose a plug and play mode for automatically detecting a device type of the after-market audio device. As shown below, the Auto PC Manual states that USB is used to install or remove hardware automatically and to detect when other devices are attached or detached. **Chapter 13 – Adding/Removing Software and Hardware** Auto PC allows you to install new programs and hardware to utilize additional information and entertainment services while on the road. *Software automatically installed or removed* Auto PC provides automatic installation or removal of programs using either a CD or a CF Card. *USB assists automatic installation or removal* Hardware is also installed or removed automatically. For most external devices, Auto PC uses the Universal Serial Bus (USB) Controller to sense when these devices are attached or detached. **Caution: Do not drive or turn off the ignition** while doing installation of programs using CD or CF Card. **To add a program** Insert the program’s installation CD or CF Card into the Auto PC. Follow the instructions that the installation program displays. Installed programs automatically appear at the end of the Start menu program list. Ex. 1009 at 143. **Installing hardware options** Auto PC allows you to add new hardware, such as a cellular phone, CD changer, or GPS unit. Contact your dealer to have upgrades or maintenance done on your system.

Claim 5	Beckert ’710 in View of Beckert ’164, the AutoPC Manual and USB 2.0
	Ex. 1009 at 144. At the time of the ’786 patent, it was well known that USB is a plug-and-play compatible, automatically-configuring bus. Indeed, plug-and-play was one of the major motivations for creating and adopting USB as a standard: • **Ease-of-use** The lack of flexibility in reconfiguring the PC has been acknowledged as the Achilles’ heel to its further deployment. The combination of user-friendly graphical interfaces and the hardware and software mechanisms associated with new-generation bus architectures have made computers less confrontational and easier to reconfigure. However, from the end user’s point of view, the PC’s I/O interfaces, such as serial/parallel ports, keyboard/mouse/joystick interfaces, etc., do not have the attributes of plug-and-play. Ex. 1010 at 1. USB automatically detects a device type via device descriptors: **9.5 Descriptors** USB devices report their attributes using descriptors. A descriptor is a data structure with a defined format. Each descriptor begins with a byte-wide field that contains the total number of bytes in the descriptor followed by a byte-wide field that identifies the descriptor type. Using descriptors allows concise storage of the attributes of individual configurations because each configuration may reuse descriptors or portions of descriptors from other configurations that have the same characteristics. In this manner, the descriptors resemble individual data records in a relational database. Where appropriate, descriptors contain references to string descriptors that provide displayable information describing a descriptor in human-readable form. The inclusion of string descriptors is optional. However, the reference fields within descriptors are mandatory. If a device does not support string descriptors, string reference fields must be reset to zero to indicate no string descriptor is available. Ex. 1010 at 260.

Claim 5	Beckert ’710 in View of Beckert ’164, the AutoPC Manual and USB 2.0
	9.6.1 Device A device descriptor describes general information about a USB device. It includes information that applies globally to the device and all of the device’s configurations. A USB device has only one device descriptor. A high-speed capable device that has different device information for full-speed and high-speed must also have a device_qualifier descriptor (see Section 9.6.2). The DEVICE descriptor of a high-speed capable device has a version number of 2.0 (0200H). If the device is full-speed only or low-speed only, this version number indicates that it will respond correctly to a request for the device_qualifier desciptor (i.e., it will respond with a request error). The *bcdUSB* field contains a BCD version number. The value of the *bcdUSB* field is 0xJJMN for version JJ.M.N (JJ – major version number, M – minor version number, N – sub-minor version number), e.g., version 2.1.3 is represented with value 0x0213 and version 2.0 is represented with a value of 0x0200. The *bNumConfigurations* field indicates the number of configurations at the current operating speed. Configurations for the other operating speed are not included in the count. If there are specific configurations of the device for specific speeds, the *bNumConfigurations* field only reflects the number of configurations for a single speed, not the total number of configurations for both speeds. If the device is operating at high-speed, the *bMaxPacketSize0* field must be 64 indicating a 64 byte maximum packet. High-speed operation does not allow other maximum packet sizes for the control endpoint (endpoint 0). All USB devices have a Default Control Pipe. The maximum packet size of a device’s Default Control Pipe is described in the device descriptor. Endpoints specific to a configuration and its interface(s) are described in the configuration descriptor. A configuration and its interface(s) do not include an endpoint descriptor for the Default Control Pipe. Other than the maximum packet size, the characteristics of the Default Control Pipe are defined by this specification and are the same for all USB devices. The *bNumConfigurations* field identifies the number of configurations the device supports. Table 9-8 shows the standard device descriptor. Ex. 1010 at 261. Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164, the AutoPC Manual and USB 2.0 discloses a plug-and-play mode (i.e., USB) for automatically detecting a device type of the after-market audio device connected to said second electrical connector and integrating the after-market audio device based upon the device type.

C. Ground 3: Claim 6 is Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710, Beckert ’164 and Beckert ’363

1. Overview of Beckert ’363

66. Like Beckert ’710 and Beckert ’164, Beckert ’363 relates to a vehicle computer entertainment system. Ex. 1008, Abstract. More specifically, Beckert ’363 focuses on the implementation details of the vehicle computer system’s support module, with a particular emphasis on the logic unit 90 as depicted in Figure 3. *See also* Ex. 1006, Beckert ’710 at 7:37-47.

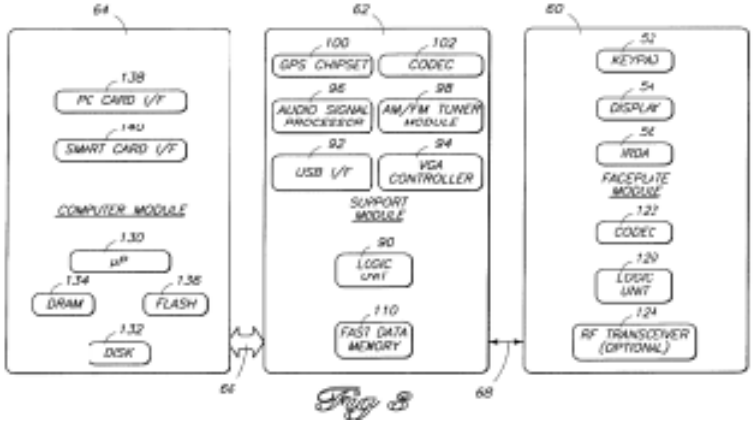


Fig. 3

2. A POSITA Would Have Considered it Obvious to Combine Beckert ’363 with Beckert ’710 and Beckert ’164

67. As I discussed above, it is my opinion that a person of ordinary skill in the art would have known to look to Beckert ’164 for additional detail on the support module of Beckert ’710, and would also have known to look to Beckert ’363 for additional detail on the support unit’s logic unit,

especially as it relates to the detailed operation of the buses and various electrical signals used in the audio entertainment system.

68. Beckert ’363 is expressly incorporated by reference into Beckert ’710. Ex. 1006 at 7:37-47. As such, there is an express motivation to combine Beckert ’363 with Beckert ’710 (and Beckert ’164).

69. In addition to the express teaching and motivation to combine Beckert ’363 with Beckert ’710 and Beckert ’164, it is my opinion that a person of ordinary skill in the art at the time of the ’786 patent after reading Beckert ’710 would have known to look to Beckert ’363 for additional details on the logic unit of the vehicle computer system (described in the Beckert patents) as a use of known technique to improve a similar device in the same way.

70. Moreover, it is my opinion that the use of the known known technique from Beckert ’363 to improve Beckert ’710 (and Beckert ’164) would have yielded a predictable result.

3. Application of Beckert ’710 in view of Beckert ’164 and Beckert ’363 to Claim 6

Claim 6	Beckert ’710 in View of Beckert ’164 and Beckert ’363
The apparatus of claim limitation 1, wherein said interface generates a	It is my opinion that Beckert ’710 in view of Beckert ’164 and Beckert ’363 discloses that the interface generates a device presence signal for maintaining the car stereo in a state responsive to processed data and audio signals. As discussed above, Beckert ’710’s support module corresponds

Claim 6	Beckert ’710 in View of Beckert ’164 and Beckert ’363
device presence signal for maintaining the car stereo in a state responsive to processed data and audio signals.	to the “interface” of the ’786 patent. Beckert ’710 in view of Beckert ’164, however, does not specifically disclose that its support module generates a device presence signal for maintaining the car stereo in a state responsive to processed data and audio signals Beckert ’363, which is incorporated by reference into Beckert ’710, specifically provides a detailed disclosure of the operation of a logic unit specially adapted to be used in an audio entertainment system (*see* Ex. 1006 at 7:37-47) as follows: The USB interface of Beckert ’710 is driven from a PCI bus: > The support module 62 has several hardware interfaces. A USB interface 92 is driven from the PCI bus 66 and provides the interconnection to the various USB peripherals shown in FIG. 2. Ex. 1008 at 6:24-26. The PCI bus 66 connecting the support module 62 to the computer module 64 is connected to the internal bus structure 140 via latches 150, 152, and 154, and a PCI bus interface 156. The PCI connection has primary control over the internal bus structure 140. The USB interface 92 and the VGA controller 94 are devices on the PCI bus interconnect, or they may be incorporated into the logic unit 90.Ex. 1008 at 8:8-14. > The bus arbiter 148 controls the bus ownership and has selection logic to transition between a PCI bus request and a DMA request. The bus arbiter circuit 148 generally tries to grant one-half of the bus bandwidth to the PCI bus 66 and one-half to the DMA processes. When the arbiter decodes an active request, it initiates a bus cycle state machine and the active request grants the bus to either the PCI bus or to one of the internal DMA circuits. > As noted above, signals received from the PCI bus 66 have priority on the address/data bus 140. The

Claim 6	Beckert ’710 in View of Beckert ’164 and Beckert ’363
	PCI bus signals are input into the logic unit 90 as 32-bit multiplexed signals consisting of address/data bits plus the PCI control/timing signals. When a PCI bus cycle begins, the logic unit 90 decodes the address. If the address corresponds to a mapped I/O port in or controlled by logic unit 90 or to a memory location within fast data memory 110, the logic unit 90 drives a device select signal back to the PCI master at the computer module 64, which in turn sets a PCI BUS REQUEST bit inside the logic unit 90. The bus arbiter 148 grants the PCI bus 66 access to the internal address/data bus 140 at the next opportunity. While this is happening the PCI bus is held in a wait state until the logic unit 90 asserts a target ready signal. The bus arbiter 148 grants the PCI bus interface circuit 156 access to the internal bus when the PCI BUS GRANT signal is active. This initiates a bus cycle state machine in the logic unit, which generates an internal read or write bus cycle. If the logic unit starts a write cycle, it waits for an initiator ready signal from the PCI bus to indicate that the write data is valid. For a read cycle, the internal bus cycle completes and the data is latched in the output data latch 154 of the PCI interface circuit. The logic unit 90 then asserts the target ready signal to allow the PCI master of the PCI bus 66 to complete the bus cycle. Ex. 1008 at 9:12-45 (emphasis added) Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 and Beckert ’363 discloses that the interface generates a device presence signal for maintaining the car stereo in a state responsive to processed data and audio signals.

D. Ground 4: Claim 7 is Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert '710, Beckert '164 and the AutoPC Manual

1. A POSITA Would Have Considered it Obvious to Combine the Auto PC Manual with Beckert '710 and Beckert '164

71. In my opinion, it would have been obvious for a POSITA in the relevant time period to combine the AutoPC Manual with Beckert '710 and Beckert '164 for at least the reasons set forth above. As previously described, Beckert '710 and Beckert '164 disclose an audio entertainment system that can obtain information from an after-market audio device. With respect to claim 7, a person of ordinary skill in the art at the time of the '786 patent would have known to look to the AutoPC Manual's description of the display of well-known information like track and time information, for example on the faceplate of Beckert '710 and Beckert '164.

72. The rationale for doing so includes combining prior art elements according to known methods to yield predictable results and the use of known technique to improve a similar device in the same way. Moreover, it would have been obvious to try the resulting combination as it amounts to merely choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

2. Application of Beckert ’710 in View of Beckert ’164 and the Auto PC Manual to Claim 7.

Claim 7	Beckert ’710 in View of Beckert ’164, and the AutoPC Manual
The apparatus of claim limitation 1, wherein said second pre-programmed code portion processes data generated by the after-market audio device including track and time information.	It is my opinion that Beckert ’710 in view of Beckert ’164 and the AutoPC Manual discloses a pre-programmed code portion that processes data generated by the after-market audio device including track and time information. Although Beckert ’710 in view of Beckert ’164 discloses a faceplate module and interfacing with an aftermarket audio device, the combination does not specifically disclose processing data that includes track and time information. However, the Auto PC Manual reveals that the faceplate of the Clarion Auto PC displayed track and time information from the CD changer: **Chapter 5 – Using the CD Player** The Auto PC CD Player program gives you access to advanced play functions using speech commands. Using speech commands, you can: • Play and pause the CD • Delete the current track from the tracks played for the current CD • Play tracks randomly • Go to the next or previous track • Go to the next CD (if you have the optional CD changer)  Using the control panel keys, you can also fast forward, rewind, or enter a track number. You can also go to the CD Player options menu where you can control which tracks to play and change the display options for the CD Player. Ex. 1009 at 43. Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 and the AutoPC Manual discloses a pre-programmed code portion that processes data generated by the after-market audio device including track and time information.

E. Ground 5: Claim 8 is Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710, Beckert ’164 and the Sony XR-C5120R Manual

1. Overview of the Sony XR-C5120R Manual

73. The Sony XR-C5120R Manual describes the operation of a fairly typical automotive head unit and cassette player of the late 1990s, to which a user could connect external CD and Mini-disc (MD) players. Ex. 1012 at 2.

2. A POSITA Would have Considered it Obvious to Combine the Auto PC Manual and the Sony XR-C5120R Manual with Beckert ’710 and Beckert ’164.

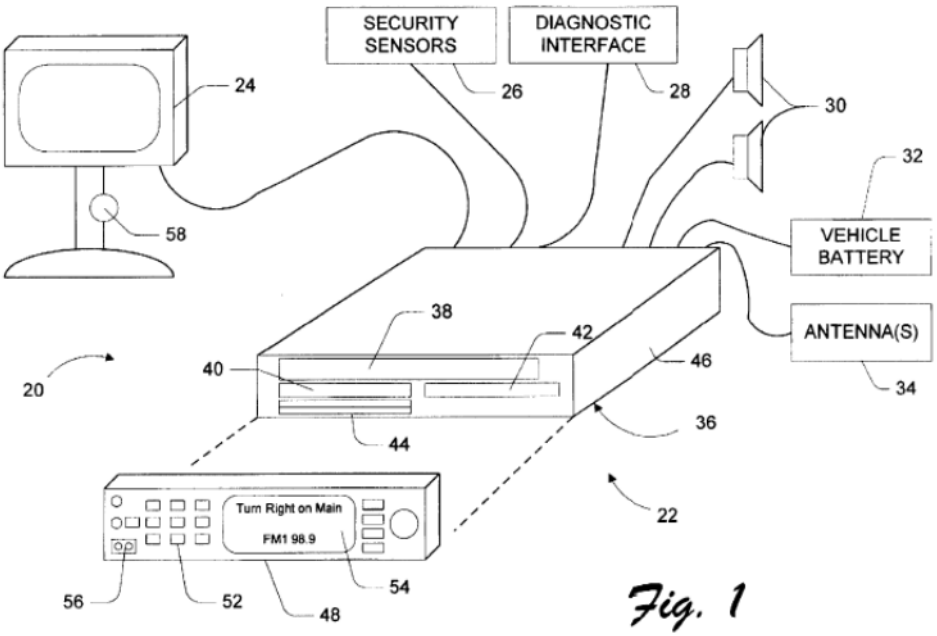
74. As I previously described, Beckert ’710 and Beckert ’164 disclose an audio entertainment system that can obtain information from an after-market audio device. With respect to claim 8, it is my opinion that a person of ordinary skill in the art would have known to look to descriptions of well-known existing head units like the Sony XR-C5120R for details on displaying well-known information like song title and artist information, for example on the faceplate of Beckert ’710 and Beckert ’164.

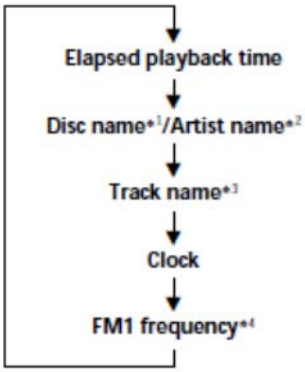
75. The rationale for doing so includes combining prior art elements according to known methods to yield predictable results and the use of known technique to improve a similar device in the same way.

76. Moreover, it is my opinion that it would have been obvious to try the resulting combination as it amounts to merely choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

3. Application of Beckert ’710 in View of Beckert ’164 and the Sony XR-C5120R Manua

Claim 8	Beckert ’710 in View of Beckert ’164 and the Sony XR-C5120R Manual
The apparatus of claim limitation 1, wherein said second pre-programmed code portion processes data generated by the after-market audio device including song title and artist information.	It is my opinion that Beckert ’710 in view of Beckert ’164 and the Sony XR-C1520R Manual discloses a pre-programmed code portion that processes data generated by the after-market audio device including song title and artist information. Although Beckert ’710 in view of Beckert ’164 does not expressly disclose the display of song title and artist information from an after-market device, one of ordinary skill in the art at the time of the ’786 patent would have found it obvious to modify the combination to include this functionality. For example, Beckert ’164 discloses that the car stereo can output visual data on a large general-purpose display: > The computer 22 can ***output visual data to the LCD 54 at the faceplate, or to the monitor 24***. The display 54 is preferably a back lit LCD. The monitor 24 is preferably a small flat panel display (e.g., 6.4” screen) that is movably mounted on a stand or yoke and remotely located from the computer. . . . ***The type of data displayed on the monitor can range widely*** from word instructions concerning the vehicle’s performance, to diagrammatic directions used by the navigation system, to video movies for in-car entertainment. Ex. 1007 at 5:17-27 (emphasis added).

Claim 8	Beckert ’710 in View of Beckert ’164 and the Sony XR-C5120R Manual
	 Ex. 1007 at FIG. 1. Moreover, by the time of the claimed priority date of the ’786 patent, car radio head units had the capability for displaying information such as track name (“song title”), and artist names. For instance, another prior art head unit, the Sony XR-C5120R, expressly discloses displaying this information.

Claim 8	Beckert ’710 in View of Beckert ’164 and the Sony XR-C5120R Manual
	Changing the display item Each time you press (DSPL) during CD, CD TEXT, or MD playback, the item changes as follows:  Ex. 1012 at 18. A person of ordinary skill in the art would have recognized the advantages of displaying such metadata information related to the various types of data sources supported by Beckert ’710 and Beckert ’164, and given the Auto PC’s flexible and extensible architecture (as disclosed by Beckert ’710 and Beckert ’164), would have found it obvious to modify the system of Beckert ’710 and Beckert ’164 to support the display of song title and artist name information. Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 and the Sony XR-C5120R Manual discloses a pre-programmed code portion that processes data generated by the after-market audio device including song title and artist information.

F. Ground 6: Claims 57, 60, 64 and 65 are Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert '710, Beckert '164 and USB ADF

1. Overview of USB ADF

77. USB ADF describes the Audio Data Formats supported by the Audio Device Class, as set forth in the core USB Audio Specification. Ex. 1011 at 6. Most relevant here, USB ADF specifies how MPEG-formatted data is handled USB Audio Device Class compliant devices. *E.g.*, *id.* at 16-17.

2. A POSITA Would Have Considered it Obvious to Combine USB ADF with Beckert '710 and Beckert '164

78. As I previously discussed, in my opinion Beckert '710 in combination with Beckert '164 describe a vehicle entertainment system based on generic computer hardware that accepts peripheral audio devices over a USB connection. It is my opinion that a person of ordinary skill in the art would naturally look to the relevant USB specifications, including USB ADF, for additional information about how to communicate with USB audio devices connected to a USB-capable computer.

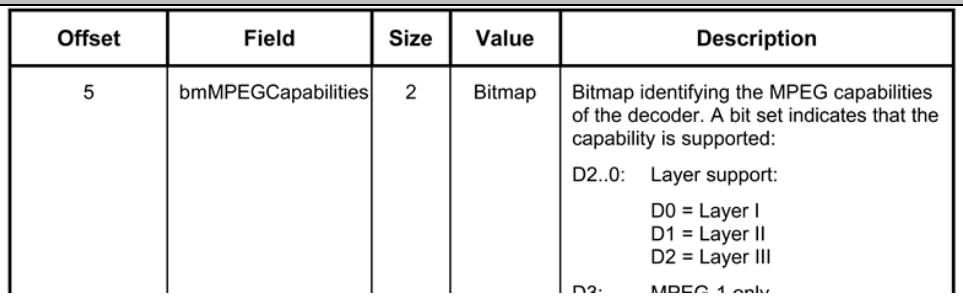
79. The rationale for doing so includes combining prior art elements according to known methods to yield predictable results and the use of known technique to improve a similar device in the same way.

80. Moreover, it is my opinion that it would have been obvious to try the resulting combination as it amounts to merely choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

3. Application of Beckert ’710 in View of Beckert ’164 and USB ADF to Claims 57, 60, 64, and 65

a. Claim 57

Claim 57	Beckert ’710 in View of Beckert ’164 and USB ADF
[a] An audio device integration system comprising:	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses an audio device integration system. *See* discussion of claim limitation 1[a] in Ground 1.
[b] a first electrical connector connectable to a car stereo;	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses a first electrical connector connectable to a car stereo. *See* discussion of claim limitation 1[b] in Ground 1.
[c] a second electrical connector connectable to a portable MP3 player external to the car stereo	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses a second electrical connector connectable to a portable MP3 player external to the car stereo. Beckert ’710 and Beckert ’164 do not specifically disclose connecting to a portable MP3 player. Portable MP3 players were well known in the art at the time of the ’786 invention. For example, the USB specifications expressly define a USB Device Class Definition for MP3 players:

Claim 57	Beckert ’710 in View of Beckert ’164 and USB ADF
	 Offset / Field / Size / Value / Description 5 / bmMPEGCapabilities / 2 / Bitmap / Bitmap identifying the MPEG capabilities of the decoder. A bit set indicates that the capability is supported: D2..0: Layer support: D0 = Layer I D1 = Layer II D2 = Layer III D3: MPEG-1 only Ex. 1011 at 17. Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 and USB ADF discloses a second electrical connector connectable to a portable MP3 player external to the car stereo.
[d] an interface connected between said first and second electrical connectors for transmitting audio from a portable MP3 player to a car stereo,	Beckert ’710 in view of Beckert ’164 and USB ADF discloses an interface connected between said first and second electrical connectors for transmitting audio from a portable MP3 player to a car stereo. *See* discussion of claim limitation 1[e] in Ground 1.
[e] said interface including a microcontroller in electrical communication with said first and second electrical connectors, said microcontroller	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses that said interface includes a microcontroller in electrical communication with said first and second electrical connectors, said microcontroller pre-programmed to execute a first pre-programmed code portion for generating a device presence signal and transmitting the signal to the car stereo to maintain the car stereo in an operational state. *See* discussion of claim limitation 1[f] in Ground 1..

Claim 57	Beckert ’710 in View of Beckert ’164 and USB ADF
pre-programmed to execute: a first pre-programmed code portion for generating a device presence signal and transmitting the signal to the car stereo to maintain the car stereo in an operational state; and	
[f] a second pre-programmed code portion for remotely controlling the MP3 player using the car stereo by receiving a control command from the car stereo through said first electrical connector in a format incompatible with the MP3 player,	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses a second pre-programmed code portion for remotely controlling the MP3 player using the car stereo by receiving a control command from the car stereo through said first electrical connector in a format incompatible with the MP3 player, processing the control command into a formatted control command compatible with the MP3 player, and transmitting the formatted control command to the MP3 player through said second electrical connector for execution by the MP3 player. *See* discussion of claim limitation 1[g] in Ground 1.

Claim 57	Beckert ’710 in View of Beckert ’164 and USB ADF
processing the control command into a formatted control command compatible with the MP3 player, and transmitting the formatted control command to the MP3 player through said second electrical connector for execution by the MP3 player.	

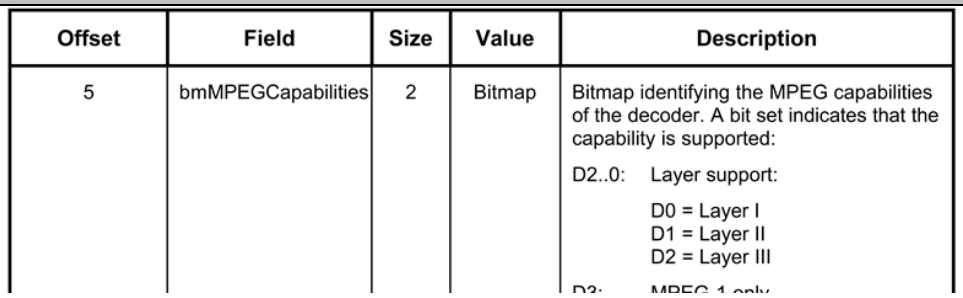
b. Claim 60

Claim 60	Beckert ’710 in View of Beckert ’164 and USB ADF
The system of claim limitation 57, wherein said microcontroller is pre-programmed to execute a third code portion for receiving data from the MP3 player in a format	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses that said microcontroller is pre-programmed to execute a third code portion for receiving data from the MP3 player in a format incompatible with the car stereo, processing received data into formatted data compatible with the car stereo, and transmitting formatted data to the car stereo for display thereby. *See* discussion of claim limitation 1[i] in Ground 1.

Claim 60	Beckert ’710 in View of Beckert ’164 and USB ADF
incompatible with the car stereo, processing received data into formatted data compatible with the car stereo, and transmitting formatted data to the car stereo for display thereby.	

c. Claim 64

Claim 64	Beckert ’710 in View of Beckert ’164 and USB ADF
The apparatus of claim limitation 57, further comprising a bus connection established between the MP3 player and said interface.	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses a bus connection established between the MP3 player and said interface. *See* discussion of claim 23 in Ground 1. To the extent Beckert ’710 and Beckert ’164 do not specifically disclose connecting to a portable MP3 player, a POSITA would have considered it obvious to use a portable MP3 player as a source of music files as set forth in the ’786 patent. Portable MP3 players were well known in the art at the time of the ’786 invention. For example, the USB specifications expressly define a USB Device Class Definition for MP3 players:

Claim 64	Beckert ’710 in View of Beckert ’164 and USB ADF
	

Offset	Field	Size	Value	Description
5	bmMPEGCapabilities	2	Bitmap	Bitmap identifying the MPEG capabilities of the decoder. A bit set indicates that the capability is supported: D2..0: Layer support: D0 = Layer I D1 = Layer II D2 = Layer III D3: MPEG-1 only

Ex. 1011 at 17.

Accordingly, it is my opinion that one of ordinary skill in the art at the time of the ’786 invention would have determined that Beckert ’710 in view of Beckert ’164 and USB ADF discloses a second electrical connector connectable to a portable MP3 player external to the car stereo.

In this combination, the bus connection would comprise of the connection on the USB bus of Beckert ’710 and Beckert ’363.

d. Claim 65

Claim 65	Beckert ’710 in View of Beckert ’164 and USB ADF
The apparatus of claim limitation 64, wherein the bus connection comprises a Universal Serial Bus (USB) connection.	It is my opinion that Beckert ’710 in view of Beckert ’164 and USB ADF discloses that the bus connection comprises a Universal Serial Bus (USB) connection. *See* discussion of claim 24 in Ground 1.

G. Ground 7: Claim 61 is Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710, Beckert ’164, USB ADF and the AutoPC Manual

1. A POSITA Would Have Considered it Obvious to Combine the Auto PC Manual with Beckert ’710, Beckert ’164, and USB ADF

81. Claim 61 is identical to claim 7 except for the express recitation of an MP3 player. As I discuss above, in my opinion it would have been obvious to combine the AutoPC Manual with Beckert ’710 and Beckert ’164. It is my opinion that a person of ordinary skill in the art would have known to look to the AutoPC Manual’s descriptions of USB peripherals and the display of well-known information like track and time information from USB-based MP3 players, whose data format is provided by USB ADF.

82. The rationale for doing so includes combining prior art elements according to known methods to yield predictable results and the use of known technique to improve a similar device in the same way.

83. Moreover, it is my opinion that it would have been obvious to try the resulting combination as it amounts to merely choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

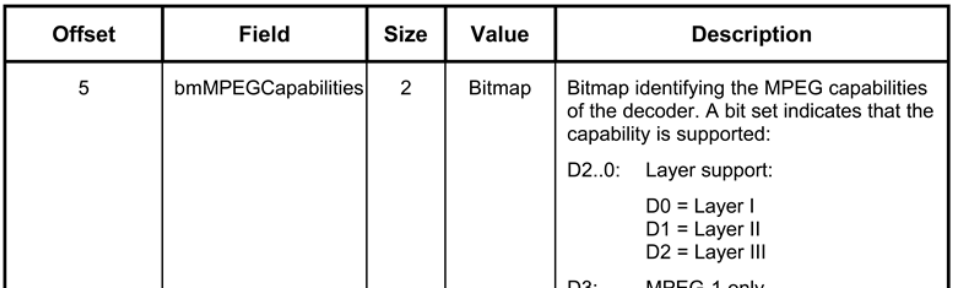
2. Application of Beckert ’710 in View of Beckert ’164, USB ADF and the Auto PC Manual to Claim 61

<table>
<tr><th>Claim 61</th><th>Beckert ’710 in View of Beckert ’164, USB ADF and the AutoPC Manual</th></tr>
<tr><td>The apparatus of claim limitation 60, wherein said third code portion processes data generated by the MP3 player including track and time information.</td><td>It is my opinion that Beckert ’710 in view of Beckert ’164, USB ADF and the AutoPC Manual discloses that said third code portion processes data generated by the MP3 player including track and time information.

See discussion of claim 7 in Ground 4.

Beckert ’710 and Beckert ’164 do not specifically disclose connecting to a portable MP3 player.

To the extent Beckert ’710 and Beckert ’164 do not specifically disclose processing track and time information generated by an MP3 player, it is my opinion that USB ADF showed that portable MP3 players were well known in the art at the time of the ’786 invention. For example, the USB specifications expressly define a USB Device Class Definition for MP3 players:

 
<table>
<tr><th>Offset</th><th>Field</th><th>Size</th><th>Value</th><th>Description</th></tr>
<tr><td>5</td><td>bmMPEGCapabilities</td><td>2</td><td>Bitmap</td><td>Bitmap identifying the MPEG capabilities of the decoder. A bit set indicates that the capability is supported:
D2..0: Layer support:
D0 = Layer I
D1 = Layer II
D2 = Layer III
D3: MPEG-1 only</td></tr>
</table>

Ex. 1011 at 17.</td></tr>
</table>

H. Ground 8: Claim 62 is Obvious Under 35 U.S.C. § 103(a) (pre-AIA) in Light of Beckert ’710, Beckert ’164, USB ADF, the AutoPC Manual and the Sony XR-C5120 Manual

1. A POSITA Would Have Considered it Obvious to Combine the Auto PC Manual and the Sony XR-

C5120 Manual with Beckert ’710, Beckert ’164, and USB ADF

84. Claim 62 is identical to claim 8 except for the express recitation of an MP3 player. As discussed above, in my opinion it would have been obvious to combine the Sony XR-C5120 Manual with Beckert ’710 and Beckert ’164. It is my opinion that a person of ordinary skill in the art would have known to look to Beckert ’710 and Beckert ’164’s descriptions of USB peripherals and the display of well-known information like title and artist information from USB-based MP3 players, whose data format is provided by USB ADF.

85. The rationale for doing so includes combining prior art elements according to known methods to yield predictable results and the use of known technique to improve a similar device in the same way.

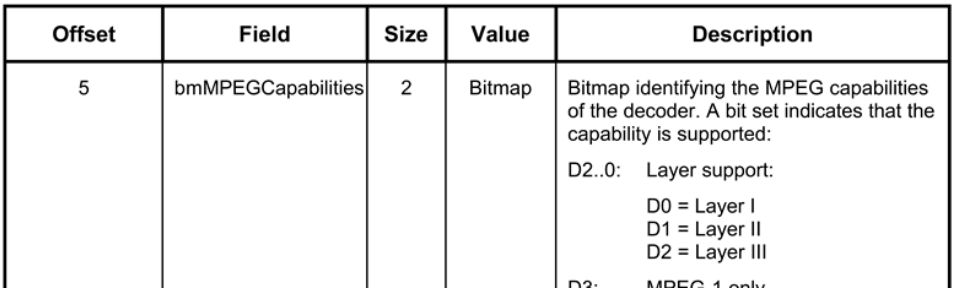
86. Moreover, it is my opinion that it would have been obvious to try the resulting combination as it amounts to merely choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

2. Application of Beckert ’710 in View of Beckert ’164, USB ADF, the Auto PC Manual and the Sony XR-C5120 Manual

<table>
<tr><th>Claim 62</th><th>Beckert ’710 in View if Beckert ’164, USB ADF, the AutoPC Manual and the Sony XR-C5120 Manual</th></tr>
<tr><td>The apparatus of claim limitation 60, wherein said third code portion processes data generated by the MP3 player including song title and artist information.</td><td>It is my opinion that Beckert ’710 in view of Beckert ’164, USB ADF, the AutoPC Manual and the Sony XR-C5120 Manual discloses that said third code portion processes data generated by the MP3 player including song title and artist information.

See discussion of claim 8 in Ground 5.

To the extent Beckert ’710 and Beckert ’164 do not specifically disclose processing title and artist information generated by an MP3 player, it is my opinion that USB ADF showed that portable MP3 players were well known in the art at the time of the ’786 invention. For example, the USB specifications expressly define a USB Device Class Definition for MP3 players:

 
<table>
<tr><th>Offset</th><th>Field</th><th>Size</th><th>Value</th><th>Description</th></tr>
<tr><td>5</td><td>bmMPEGCapabilities</td><td>2</td><td>Bitmap</td><td>Bitmap identifying the MPEG capabilities of the decoder. A bit set indicates that the capability is supported:
D2..0: Layer support:
D0 = Layer I
D1 = Layer II
D2 = Layer III
D3: MPEG-1 only</td></tr>
</table>

Ex. 1011 at 17.
.</td></tr>
</table>

VI. CONCLUSION

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Date: July 21, 2016

Chris Kyriakakis, Ph.D.

EXHIBIT A

Prof. Chris Kyriakakis

Contact

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Education

PhD	**University of Southern California (USC)**	
1993	Electrical Engineering	
MS	**University of Southern California (USC)**	
1987	Electrical Engineering	
BS	**California Institute of Technology (Caltech)**	
1985	Engineering and Applied Science	

Appointments

Associate Professor	**USC**	
2002-Present	Electrical Engineering	
Assistant Professor	**USC**	
1996-2002	Electrical Engineering	
Research Fellow	**USC**	
1993-1996	Electrical Engineering	

Research Areas

Immersive audio signal processing, room equalization, room acoustics, multichannel audio streaming, microphone array processing, head-related transfer function modeling, adaptive algorithms for virtual microphones, virtual loudspeakers, multichannel audio rendering

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Honors and Awards

2006 World Technology Network Award

James P. Clark, Chairman of the World Technology Network: "The World Technology Awards program is a very inspiring way to identify and honor the most innovative people and organizations in the technology world…We look forward to assisting Prof. Kyriakakis continue to help create our collective future and change our world."

2004 National Academy of Engineering: Frontiers of Engineering Session Chairman

2003 Best Paper Award: IEEE 37th Asilomar Conference on Signals, Systems, & Computers

Professional Service (Past and Current)

Society Memberships

Member of the Audio Engineering Society (AES)

Member of the Acoustical Society of America (ASA)

Member of the IEEE

Member IEEE Technical Committee on Multimedia

Member of AES Technical Committee on Multichannel and Binaural Audio

Member of AES Technical Committee on Audio for Games

Reviewer

National Science Foundation

European Union

IEEE Transactions on Multimedia

IEEE Transactions on Signal Processing

IEEE Transactions on Audio, Speech, and Language Processing

Association for Computing Machinery (ACM)

European Association for Signal Processing (EURASIP)

IEEE International Conference on Multimedia and Expo

IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

IEEE Workshop on Applications of Signal Processing to Audio (WASPAA)

IEEE Workshop on Multimedia Signal Processing

ACM Special Interest Group on Graphics and Interactive Techniques (SIGGRAPH)

European Signal Processing Conference (EUSIPCO)

Audio Engineering Society

Acoustical Society of America

Published Books

1. D. Yang, C.-C. Kuo, and C. Kyriakakis, *"High Fidelity Multichannel Audio Coding,"* Hindawi Press, New York, (2004).
2. S. Bharitkar and C. Kyriakakis, *"Immersive Audio Signal Processing,"* Springer-Verlag, New York, (2006).

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1. Audio Content Enhancement Using Bandwidth Extension Techniques. US 8,705,764 April 2014.
2. Room Acoustic Response Modeling and Equalization with Linear Predictive Coding and Parametric Filters. US 8,363,853 January 2013.
3. Cross-Over Frequency Selection and Optimization of Response Around Crossover. US 8,363,852 January 2013.
4. Stereo Expansion with Binaural Modeling. US 8,229,143 July 2012.
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7. System and Method for Automatic Multiple Listener Room Correction with Low Order Filters. US 8,005,228 August, 2011.
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9. Cross-Over Frequency Selection and Optimization of Response Around Cross-Over. US 7,826,626 November 2010.
10. System and Method for Automatic Room Acoustic Correction in Multi-Channel Audio Environments. US 7,769,183 August 2010.
11. Phase Equalization for Multi-Channel Loudspeaker-Room Responses. US 7,720,237 May 2010
12. System and Method for Automatic Multiple Listener Room Acoustic Correction with Low Filter Orders. US 7,567,675 July 2009

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February 19, 2016	**The Atlantic:** Hearing the Lost Sounds of Antiquity http://www.theatlantic.com/technology/archive/2016/02/byzantine-angel-wings/470076/
September 14, 2015	**UCLA Newsroom:** Measuring the sound of angels singing http://newsroom.ucla.edu/stories/measuring-the-sound-of-angels-singing
February 5, 2015	**Gizmodo:** No, women's voices are not easier to understand than men's voices http://gizmodo.com/no-siri-is-not-female-because-womens-voices-are-easier-1683901643
September 30, 2014	**IEEE Spectrum:** Why mobile voice quality still stinks and how to fix it http://spectrum.ieee.org/telecom/wireless/why-mobile-voice-quality-still-stinksand-how-to-fix-it
June 21, 2012	**NPR All Things Considered:** He'll Retune Your Living Room http://www.npr.org/blogs/therecord/2012/06/21/155501975/hell-retune-your-living-room
Sept. 5, 2011	**New York Times:** Sound, the Way the Brain Prefers to hear it http://www.nytimes.com/2011/09/06/science/06sound.html?_r=1&pagewanted=all
Nov. 29, 2006	**Widescreen Review:** Chris Kyriakakis wins 2006 World Technology Award http://www.widescreenreview.com/news_detail.php?id=12381
Nov. 27, 2006	**Wall Street Journal:** More Universities Increasing Support for Campus Start-Ups http://online.wsj.com/article/SB116459586525233246.html?mod=todays_us_nonsub_marketplace
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2. C. S. Lin and C. Kyriakakis, “Removing Additive Noise via Neuro-Fuzzy Based Reinforcement Learning,” Journal of the Acoustical Society of America, 124(2), 1026-1037, (2008)
3. D. Cantzos and C. Kyriakakis, “Quality Enhancement of Compressed Audio Based on Statistical Conversion,” EURASIP Journal on Audio, Speech, and Music Processing, vol. 2008, p. 1-15, (May 2008).
4. S. Bharitkar and C. Kyriakakis, “Visualization of Multiple Listener Room Acoustic Equalization with Sammon Map,” IEEE Transactions on Speech and Audio Processing, 15(2), 542-551, (2007).
5. P. G. Georgiou and C. Kyriakakis, “Robust Maximum Likelihood Source Localization: The Case for Sub-Gaussian versus Gaussian,” IEEE Transactions on Speech and Audio Processing, 14(4), 1470-1480, (2006).
6. P. G. Georgiou and C. Kyriakakis, “Maximum Likelihood Parameter Estimation under Impulsive Conditions, a Sub-Gaussian Signal Approach,” EURASIP Signal Processing Journal, 10, 3061-3075 (2006).
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11. R. Zimmermann, C. Kyriakakis, C. Shahabi, C. Papadopoulos, A. A. Sawchuk, U. Neumann, “The Remote Media Immersion System: Internet Meets the Future Home Theater,” IEEE Multimedia Magazine, March 2004.
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Using Eigenfilters," IEEE Transactions on Multimedia, vol. 5(3), 329-338, (2003).

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16. A. Mouchtaris, P. Reveliotis, and C. Kyriakakis, "Inverse Filter Design for Immersive Audio Rendering over Loudspeakers," IEEE Transactions on Multimedia, **2**(2), 77-87, (2000).
17. P. Georgiou, C. Kyriakakis, and P. Tsakalides, "Alpha Stable Modeling of Noise and Robust Time-Delay Estimation in the Presence of Impulsive Noise," IEEE Transactions on Multimedia, **1**(3), 291-301, (1999).
18. C. Kyriakakis, P. Tsakalides, and T. Holman, "Surrounded by Sound: Immersive Audio Acquisition and Rendering Methods," IEEE Signal Processing Magazine, **16**(1), 55-66, (1999).
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20. C. Kyriakakis, "Fundamental and Technological Limitations of Immersive Audio Systems," Proceedings of the IEEE, **86**(5), 941-951, (1998).

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2. S. Bharitkar and C. Kyriakakis, "Comparison between Spherical Headmodels and HRTFs in Upmixing for Headphone Based Virtual Surround and Stereo Expansion", Proceedings of the AES 129th Convention in San Francisco, CA, November 4-7, 2010.
3. C. S. Lin, "Design of Phase Equalizer for Rational Filter Banks Using Minimax Approach", IEEE International Symposium on Industrial Electronics, June 2009.
4. D. Cantzos and C. Kyriakakis, "Bandwidth Extension of Low Bitrate Compressed Audio Based on Statistical Conversion", Proceedings of IEEE ICME 2009.
5. S. Bharitkar, C. Kyriakakis, T. Holman, "Variable-Octave Complex Smoothing for Loudspeaker-Room Response Equalization", IEEE International Conference on Consumer Electronics (ICCE 2008), Las Vegas, NV, 9-13 Jan., 2008.
6. D. Cantzos, A. Mouchtaris, and C. Kyriakakis, "Synthesis of Enhanced Audio from Low Bitrate Compressed Audio Based on Unit Selection and Statistical Conversion Methods," 42nd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, Oct. 26, 2008.
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10. J. Peterson and C. Kyriakakis, “Analysis of Fast Localization Algorithms for Acoustical Environments,” 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
11. S. Bharitkar and C. Kyriakakis, “Comparison Between Time Delay Based and Nonuniform Phase Based Equalization for Multichannel Loudspeaker-Room Responses,” 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
12. S. Bharitkar and C. Kyriakakis, “Optimization of the Bass Management Filter Parameters for Multichannel Audio Applications,” 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
13. S. Bharitkar and C. Kyriakakis, “Objective Function for Automatic Multiposition Equalization and Bass Management Filter Selection,” Audio Engineering Society, New York, October, 2005.
14. S. Sundaram and C. Kyriakakis, “Phantom Audio Sources With Vertically Separated Speakers,” Audio Engineering Society, New York, October, 2005.
15. S. Bharitkar and C. Kyriakakis, “Optimization of Crossover Frequency and Crossover Region Response for Multichannel Acoustic Applications,” 13th European Signal Processing Conference (EUSIPCO 2005), Antalya, Turkey, September, 2005.
16. J. Peterson and C. Kyriakakis, “Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments,” International Conference on Acoustics, Speech, and Signal Processing (ICASSP ’05), Philadelphia, March 2005.
17. J. Peterson and C. Kyriakakis, “Choosing Candidate Locations for Source Localization,” Joint Workshop on Hands-Free Speech Communication and Microphone Arrays (HSCMA ’05), Rutgers, March 2005.
18. C. Papadopoulos, C. Kyriakakis, A. A. Sawchuk, X. He, “Cyberseer: 3D Audio-Visual Immersion for Network Security and Management,” Workshop on Visualization

and Data Mining for Computer Security (VizSEC/DMSEC) 2004, Fairfax, VA, October, 2004.

19. H. Huang and C. Kyriakakis, "Binaural Noise Reduction Combining Binaural Analysis and Spectral Subtraction," Proc. 38th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA. Nov. 2004.
20. H. Huang and C. Kyriakakis, "Computationally Efficient Blind Dereverberation of Audio Signals," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
21. M. Boueri and C. Kyriakakis, "Audio Signal Decorrelation based on a Critical Band Approach," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
22. S. Bharitkar and C. Kyriakakis, "Nonlinear Projection Algorithm for Evaluating Multiple Listener Equalization Algorithm Performance," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
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