

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,

Petitioner

v.

SONOS, INC.,

Patent Owner.

Case No. IPR2025-00021

U.S. Patent No. 7,571,014

DECLARATION OF DR. DAVID ANDERSON

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d.	[25e]: a memory for storing code for an application module;	51
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- b. [38a]: a screen; [38b]: a screen driver commanding the screen; [38c]: an input interface; 90
- c. [38d]: a network interface; 90
- d. [38e]: a memory for storing code for an application module; 90
- e. [38f]: a processor coupled to the memory, the input interface, the screen driver and the network interface, the processor executing the code in the memory to cause the application module and the screen driver to perform operations of: 90
- f. [38g]: displaying on a screen a list showing a plurality of volume meters, at least one of the volume meters representing an audio volume of one of the players, and another one of the volume meters representing an audio volume of a group of players, if there is such a group; and 91
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d.	[38e]: a memory for storing code for an application module;	140
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f.	[38g]: displaying on a screen a list showing a plurality of volume meters, at least one of the volume meters representing an audio volume of one of the players, and another one of the volume meters representing an audio volume of a group of players, if there is such a group; and	140
g.	[38h]: adjusting one of the volume meters as desired after one of the volume meters from the list is selected, wherein the one of the volume meters is for the group of players, represented by an averaged value of audio volumes of the players in the group, and	145
h.	[38i]: said adjusting of the one of the volume meters includes changing a volume of each of the group of players synchronously in accordance with an adjustment made by a user.....	148
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I. INTRODUCTION

1. I have been retained by Google LLC (“Petitioner”) as an independent expert consultant in this *inter partes* review proceeding before the United States Patent and Trademark Office.

2. I am over 21 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein.

3. I understand that this *inter partes* review proceeding involves U.S. Patent No. 7,571,014 (“the ’014 patent,” EX1001). I have been asked by Petitioner to provide my opinion on whether the claims of the ’014 patent would have been obvious to a person of ordinary skill in the art under the grounds set forth in the Petition for *Inter Partes* Review of the ’014 patent. I have been asked to provide my technical review, analysis, insights, and opinions regarding the prior art references that form the basis for the grounds set forth in the Petition, and any other prior art publications cited in this declaration.

4. Throughout this declaration, I refer to specific pages, figures, and/or line numbers of various exhibits. These citations are illustrative and are not intended to suggest that they are the only support for the propositions for which they are cited.

II. SUMMARY OF OPINIONS

5. This declaration considers claims 16, 19, 23, 25, 32, 35, 38, and 42-43 (“Challenged Claims”) of the ’014 patent. Below, I set forth the opinions I have

formed, the conclusions I have reached, and the bases for these opinions and conclusions. I believe the statements contained in this declaration to be true and correct to the best of my knowledge.

6. Based on my experience and knowledge of the art at the time of the applicable priority date, it is my opinion that the Challenged Claims would have been obvious to one of ordinary skill in the art based on the grounds below:

Ground	Claims Challenged	Basis	Reference(s)
1	25, 32, 35	§103	Geiwitz and Van Hulle
2	16, 19, 23, 38, 42-43	§103	Geiwitz and Aiso
3	25, 32, 35	§103	Allen, Geiwitz, and Van Hulle
4	16, 19, 23, 38, 42-43	§103	Allen, Geiwitz, and Aiso

7. I am being compensated for my time at my normal hourly rate. My compensation is in no way contingent upon the nature of my findings, the presentation of my findings in testimony, or the outcome of this proceeding.

III. QUALIFICATIONS AND BACKGROUND

8. I believe that I am well qualified to serve as a technical expert in this matter based upon my qualifications, discussed in detail below.

9. I am competent to write this declaration.

10. I am an independent consultant. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In

forming my opinions, I have relied on my knowledge and experience in the fields of networking and network-based systems or applications, such as consumer audio systems, and on the documents and information referenced in this declaration.

11. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art. Provided as Exhibit 1004 is a copy of my current curriculum vitae, which details my education and experience, and a list of all other cases in which, during the previous four years, I testified as an expert at trial or by deposition. The following provides a brief overview of some of my experience that is relevant to the matters set forth in this declaration.

12. I am a professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology (“Georgia Tech”) in Atlanta, Georgia. I have been a professor at Georgia Tech since 1999. In 2009 I served as a visiting professor in the Department of Computer Science at Korea University in Seoul, South Korea.

13. I received my Ph.D. in Electrical and Computer Engineering from Georgia Tech in 1999. I received my B.S. and M.S. in Electrical Engineering from Brigham Young University in 1993 and 1994, respectively.

14. In my employment prior to Georgia Tech as well as in my subsequent studies and research, I have worked extensively in areas related to the research, design, and implementation of speech and audio processing systems. In 1983-1987 and again in 1989-1991, I worked as an embedded systems developer for industrial

control equipment and my responsibilities included developing low-level code and protocols for communicating between interconnected systems. Prior to my employment at Georgia Tech, I also developed prototype real-time audio systems for Sonic Innovations in 1993-1994, and various real-time audio processing systems for consulting clients from 1995-1999.

15. As a professor at Georgia Tech, I have taught graduate and undergraduate level courses at Georgia Tech on the implementation of signal processing and embedded systems. For example, I have taught courses on multimedia processing and systems (covering topics including standards and methods for multi-channel and networked multimedia), software design, computer architecture and operating systems, real-time signal processing systems, applications of signal processing (covering topics in audio processing and communications systems), speech recognition systems, statistical machine learning, machine learning for speech, pattern recognition, and adaptive signal processing systems. I also designed and teach a course on signal processing in the context of human perception which covers audio standards and audio system design considerations. These courses and my research have covered many topics relevant to the subject matter of the '014 patent and the prior art cited therein.

16. I have served as principal investigator or co-principal investigator in numerous multi-disciplinary research projects including "Blind Source Separation

for Audio,” “Audio Classification,” “Auditory Scene Analysis,” “Hearing Aid Audio Processing,” “Speaker Driver Sound Enhancement,” “I-Vector Based Voice Quality,” “Analysis of Voice Exercise Using Signal Processing,” and “Smart Homes for Effective and Safe Remote Work During a Pandemic and Beyond.”

17. I also have extensive experience with the practical implementation of signal processing algorithms, information theory, signal detection, and related topics through my research and consulting. I have published over 200 papers in reviewed journals and conferences and books and book chapters.

18. I am a named inventor on eight patents, including “Speech activity detector for use in noise reduction system, and methods therefor” (U.S. Patent No. 6,351,731), and “Analog audio signal enhancement system using a noise suppression algorithm” (U.S. Patent No. 7,590,250).

19. I was also a co-founder of Ratrix, LLC, a company that developed efficient algorithms for reliable next-generation wireless communications systems.

20. I am a Senior Member of the Institute of Electrical and Electronics Engineers (“IEEE”) and have been a Member since 1991. I am also a Member of the IEEE Signal Processing Society. From 1994 to 2016, I was also a member of the Acoustical Society of America. In 2003, I served as the Co-Chair for the NSF Symposium on Next Generation Automatic Speech Recognition. In 2004, I received the Presidential Early Career Award for Scientists and Engineers, presented by then-

President George W. Bush, for my work on ultra-low-power signal processing system design.

IV. MATERIALS CONSIDERED

21. In forming my opinions, I have reviewed the following documents and any other document cited in this declaration.

Exhibit	Description
1001	U.S. Patent No. 7,571,014 B1 to Lambourne et al. (“’014 patent”)
1002	Prosecution History of the ’014 patent
1005	International Publication No. WO 03/040839 A1 to Geiwitz (“Geiwitz-PCT”)
1006	U.S. Provisional Application No. 60/339,511 to Geiwitz (“Geiwitz-Provisional”)
1007	U.S. Patent No. 7,403,626 B2 to Aiso et al. (“Aiso”)
1008	U.S. Patent No. 6,703,940 B1 to Allen et al. (“Allen”)
1009	U.S. Patent No. 5,313,524 to Van Hulle et al. (“Van Hulle”)
1010	U.S. Patent Application Publication No. 2005/0131558A1 to Braithwaite et al. (“Braithwaite”)
1011	U.S. Patent No. 5,608,807 to Brunelle (“Brunelle”)
1012	U.S. Patent No. 7,502,480 B2 to Baudisch et al. (“Baudisch”)
1013	Yamaha MusicCAST Digital Audio Server MCX-1000 Owner’s Manual
1014	Yamaha MusicCAST Digital Audio Server MCX-1000 Website
1015	U.S. Patent Application Publication No. 2002/0124097 A1 to Isely et al.

Exhibit	Description
	("Isely")
1016	U.S. Provisional Application No. 60/490,768 filed July 28, 2003 ("768 provisional")
1017	U.S. Patent No. 8,234,395 B2 to Millington
1018	<i>Sonos, Inc. v. D&M Holdings Inc. d/b/a The D+M Group et al.</i> , Case No. 1:14-cv-1330, D.I. No. 221, Claim Construction Order (D. Del. Jan. 18, 2017).
1019	File History of Reexamination Control No. 90/013,882
1020	<i>Sonos, Inc. v. Linkplay Technology Inc. et al.</i> , Case No. 1:24-cv-00131-JNR, D.I. No. 188, Joint Claim Construction Chart (D. Del. June 5, 2025)
1021	<i>Sonos, Inc. v. Google LLC</i> , Case No. 2:20-cv-00169-JAK-DFM, June 2025 E-mail Exchange Between Parties Concerning Claim Construction
1022	The Bose® Lifestyle® 50 System, Owner's Guide, dated October 17, 2001
1024	U.S. Patent No. 2,338,551 to Stanko ("Stanko")
1026	U.S. Patent Application Publication No. 2004/0179695 A1 to Terada et al. ("Terada")
1027	U.S. Patent No. 7,742,609 B2 to Yeakel et al. ("Yeakel")

22. I have also relied on my education, experience, research, training, and knowledge in the relevant art, and my understanding of any applicable legal principles described in this declaration.

23. All the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my understanding of how a person of ordinary skill in the art would have understood the claims of the '014 patent.

24. I reserve the right to supplement and amend any of my opinions in this declaration based on documents, testimony, and other information that becomes available to me after the date of this declaration.

V. LEGAL STANDARDS

25. I am not a lawyer. My understanding of the legal standards to apply in reaching the conclusions in this declaration is based on discussions with counsel for Petitioner, my experience applying similar standards in other patent-related matters, and my reading of the documents submitted in this proceeding. In preparing this declaration, I have tried to faithfully apply these legal standards to the Challenged Claims.

26. I have been informed that there are two ways in which prior art may render a patent claim unpatentable. First, I have been informed that the prior art can “anticipate” a claim. Second, I have been informed that the prior art can render a claim “obvious” to a person of ordinary skill in the art. I understand that a claim is patentable if it was not anticipated and would not have been obvious in view of the prior art as of the effective filing date of the patent.

27. I have been informed that a dependent claim is a patent claim that refers back to another patent claim. I have been informed that a dependent claim includes all the limitations of the claim to which it refers.

28. I have been asked to provide my opinions as to whether the cited prior art discloses or renders obvious the Challenged Claims from the perspective of a person of ordinary skill in the art as of the '014 patent's priority date of June 5, 2004, as discussed in more detail below.

29. I have been informed that in *inter partes* review proceedings, such as this one, the party challenging the patent bears the burden of proving unpatentability by a preponderance of the evidence. I understand that a preponderance of the evidence means "more likely than not."

30. For the purposes of this declaration, I have been asked to provide my opinions on issues regarding unpatentability. I have been informed of the following legal standards, which I have applied in forming my opinions.

A. Level of Ordinary Skill

31. I have been informed that a person of ordinary skill in the art is determined by considering several factors, including the (i) type of problems encountered in the art; (ii) prior art solutions to those problems; (iii) rapidity with which innovations are made; (iv) sophistication of the technology; and (v) educational level of active workers in the field.

32. I have been instructed to assume that a person of ordinary skill in the art is not a specific real individual but rather a hypothetical individual having the qualities reflected by the factors discussed above.

B. Prior Art

33. I have been advised and understand that the information used to evaluate whether an invention was novel and not obvious when made is generally referred to as “prior art.” I understand that prior art includes patents and printed publications that existed before the priority date of the patent. I have been informed and understand that a patent or published patent application is prior art if it was filed before the priority date of the claimed invention and that a printed publication is prior art if it was publicly available before the priority date.

C. Anticipation

34. I have been informed that under 35 U.S.C. § 102, a patent claim is unpatentable for anticipation if the claimed subject matter was patented or described in a printed publication before the effective filing date of the claimed invention. I have been informed that this is referred to as unpatentability by anticipation. I have been informed that a patent claim is anticipated under § 102 if a single prior art reference discloses all limitations of the claimed invention.

35. I understand that a patent claim is anticipated only if each and every element as set forth in the claim is described in a single prior art reference. I also

understand that, to be considered anticipatory, the prior art reference does not need to use the same words as the claims or provide as many details as the patent's specification; rather, it must only be enabling and describe the claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention. I further understand that to be an anticipatory reference, a prior art reference must disclose all elements of the claim arranged or combined in the same way stated in the claim.

36. I also understand that in order for a patent claim to be anticipated, each and every element set forth in the claim must be found, either expressly or inherently, in a single prior art reference, such that a person of ordinary skill in the art could practice the invention without undue experimentation. A claim limitation that is not expressly found in a prior art reference is "inherent" if the prior art necessarily functions in accordance with, or includes, the limitation. It is acceptable to consider evidence outside the prior art reference to determine whether a limitation is necessarily present.

37. I understand that a dependent claim incorporates by reference all elements of the claim from which it depends. For this reason, I understand that if a reference fails to disclose one or more elements of an independent claim, it cannot anticipate any claims that depend from the independent claim.

D. Obviousness

38. I have been informed that for obviousness under 35 U.S.C. § 103, a patent claim is unpatentable if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art to which said subject matter pertains at the time the invention was made. I have been informed that this is referred to as unpatentability by obviousness.

39. I have been informed that an obviousness analysis includes the following considerations: (i) the scope and content of the prior art; (ii) the differences between the prior art and the claims at issue; (iii) the level of ordinary skill in the pertinent art; and (iv) evidence of secondary indicia of nonobviousness (if available).

40. I have been informed that the relevant time for considering whether a claim would have been obvious to a person of ordinary skill in the art is the time of the alleged invention. For my obviousness analysis, the date of the alleged invention is June 5, 2004, as discussed below.

41. I have been informed that a reference may be modified or combined with other references or with a person of ordinary skill in the art's own knowledge if the person would have found the modification or combination obvious. I have also been informed that a person of ordinary skill in the art is presumed to know all the

relevant prior art, and the obviousness analysis may take into account the inferences and creative steps that a person of ordinary skill in the art would employ.

42. I have been informed that whether a prior art reference renders a patent claim obvious is determined from the perspective of a person of ordinary skill in the art. I have also been informed that, while there is no requirement that the prior art contain an express suggestion to combine known elements to achieve the claimed invention, and while a suggestion to combine known elements to achieve the claimed invention may come from the prior art as a whole or individually and may consider the inferences and creative steps a person of ordinary skill in the art would employ, as filtered through the knowledge of one skilled in the art, obviousness grounds cannot be sustained by mere conclusory statements and must include some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.

43. In determining whether a prior art reference could have been combined with another prior art reference or other information known to a person having ordinary skill in the art, I have been informed that the following principles may be considered: (a) a combination of familiar elements according to known methods is likely to be obvious if it yields predictable results; (b) the substitution of one known element for another is likely to be obvious if it yields predictable results; (c) the use of a known technique to improve similar items or methods in the same way is likely

to be obvious if it yields predictable results; (d) the application of a known technique to a prior art reference that is ready for improvement to yield predictable results; (e) any need or problem known in the field and addressed by the reference can provide a reason for combining the elements in the manner claimed; (f) a person of ordinary skill often will be able to fit the teachings of multiple references together like a puzzle; and (g) the proper analysis of obviousness requires a determination of whether a person of ordinary skill in the art would have a “reasonable expectation of success”—but not “absolute predictability” of success—in achieving the claimed invention by combining prior art references.

44. I have been informed that, when a work is available in one field, design alternatives and other market forces can prompt variations of it, either in the same field or in another. I have been informed that if a person of ordinary skill in the art could have implemented a predictable variation and would have seen the benefit of doing so, that variation is likely to have been obvious. I have been informed that, in many fields, there may be little discussion of obvious combinations, and in these fields, market demand—not scientific literature—may drive design trends. I have been informed that, when there was a design need or market pressure and there are a finite number of predictable solutions, a person of ordinary skill in the art would have had a good reason to pursue those known options.

45. I have been informed that the law permits the application of “common sense” in examining whether a claimed invention would have been obvious to a person skilled in the art. For example, I have been informed that combining familiar elements according to known methods and in a predictable way may suggest obviousness when such a combination would yield nothing more than predictable results. I understand, however, that a claim is not obvious merely because every claim element is disclosed in the prior art, and that a party asserting obviousness must still provide a specific motivation to combine or modify the references as recited in the claims and explain why one skilled in the art would have reasonably expected to succeed in doing so.

46. I have been informed that there is no rigid rule that a reference or combination of references must contain a “teaching, suggestion, or motivation” to combine references. But I also understand that the “teaching, suggestion, or motivation” test can be a useful guide in establishing a rationale for combining elements of the prior art. I have been informed that this test poses the question as to whether there is an express or implied teaching, suggestion, or motivation to combine prior art elements in a way that realizes the claimed invention, and that it seeks to counter impermissible hindsight analysis.

47. I am not aware of any evidence of secondary considerations that would support a determination of nonobviousness of the claimed subject matter in the '014 patent.

48. I have been informed that, in an obviousness analysis, prior art must be analogous to the patent being considered. I have been informed that a prior art reference is considered to be analogous, or in the same field of art, if the reference is either (1) in the same field of endeavor as the challenged patent, regardless of the problems the challenged patent and the prior art address; or (2) reasonably pertinent to the particular problem being solved by the challenged patent.

VI. TECHNOLOGY OVERVIEW

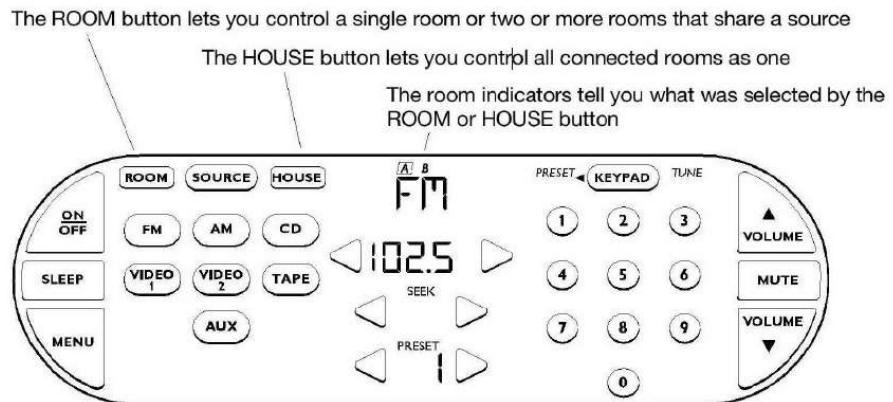
49. Audio systems with multiple output devices have been known for many years. For example, in the 1970's, the Pioneer SX-727 allowed a user to select speaker pairs or groups of speaker pairs for audio playback. Available speaker outputs were displayed for selection around a knob, and the knob indicator showed which speaker pairs or groups of speaker pairs were selected. The selected output devices could play back synchronized audio. A volume control was a manual knob but showed the current volume level for all speakers and allowed for gain adjustment.

50. Although many of the basic concepts of playing back audio in multiple locations remained, by the early 2000's, home audio systems had evolved so that it

was common to have network connectivity instead of simple speaker wire for the playback devices, and displays and remotes or touchscreens in place of knobs, sliders, and/or switches. For example, in 2001, Bose® released its Lifestyle® 50 System, which was a “unique” system that “place[d] all system operations in the palm of your hand.” EX1022, 4. “The interactive Personal music center is a clear departure from convention, communicating with the system through a two-way radio data link. The result for you is full control of this entertainment system as you move about your home.” EX1022, 4. For example, the Lifestyle® 50 System included a controller with an adaptive display that could even operate more than one room at a time. EX1022, 20-35 (displaying different screens on the controller), 41.

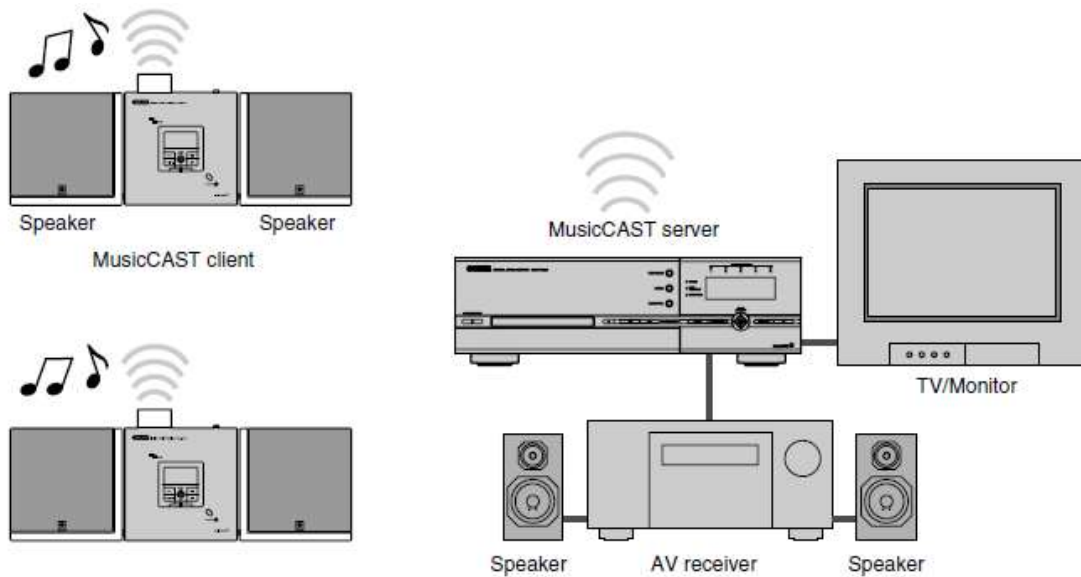
Figure 48

Example display for a two-room system



EX1022, 41, Fig. 48.

51. By 2003, Yamaha had released its MusicCAST system that enabled users to store music on a server device and wirelessly play it back on other devices. EX1013, 9; EX1014, 1.



EX1013, 9.

52. The MusicCAST system featured wired and wireless networking, a remote control for controlling the server and client playback devices, and a screen (TV/Monitor) to display menus and settings. EX1013, 13-17. Playback on clients could be synchronized (“Stop and start playback of the songs displayed on the Client Playback screen on all MusicCAST clients simultaneously.”) EX1013, 95. Clients could be added using an on-screen menu system, generating a list of available clients. EX1013, 106-107.

53. Allen (EX1008) describes “audio systems having remote controllers, and more particularly audio systems having transceiving remote control with variable displays.” EX1008, 1:3-5. Allen’s systems used a touchscreen remote control to route audio to different rooms over a wireless data link. EX1008, 5:11-49

It had flexible volume control, permitting the user to set the volume in different devices independently or to affect the volume of all devices collectively while maintaining volume offset between individual devices. EX1008, 2:11-33, 5:54-58. In addition, playback was synchronized between rooms sharing an audio source according to user instructions. EX1008, 3:66-4:13.

54. Geiwitz (EX1005, EX1006) describes a programmable and expandable building automation and control system with an open architecture platform supporting devices for various building functions including audio playback. EX1005, 4:6-11, 17:4-18:30, 25:15-26:5. As discussed in more detail below, Geiwitz's system had significant flexibility in grouping audio devices and controlling and displaying playback volume on an individual or composite basis. EX1005, Abstract, 17:4-18:15, 19:5-20:20, Figs. 1, 14; EX1006, 21, 62-67, 172.

55. Isely (EX1015) discloses "systems and methods for dynamic distribution of audio signals at a site based on defined zones within the site." EX1015, [0011], [0035]-[0041], Fig. 1.

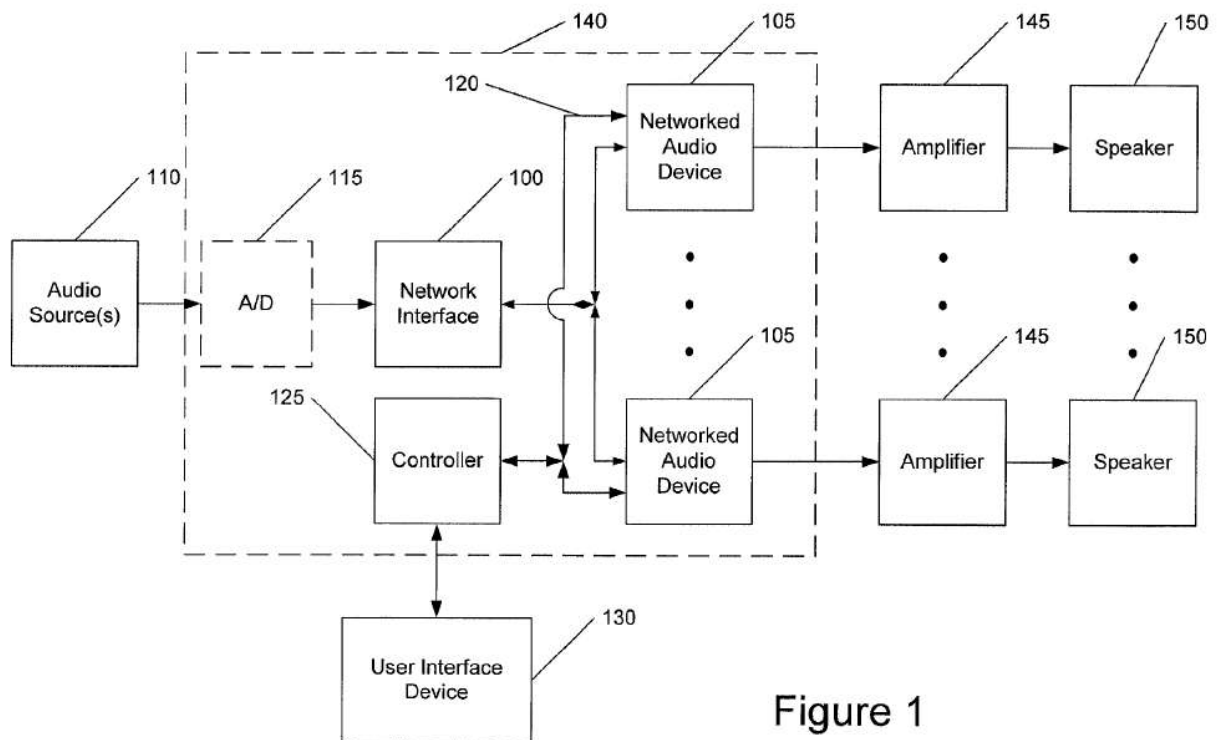


Figure 1

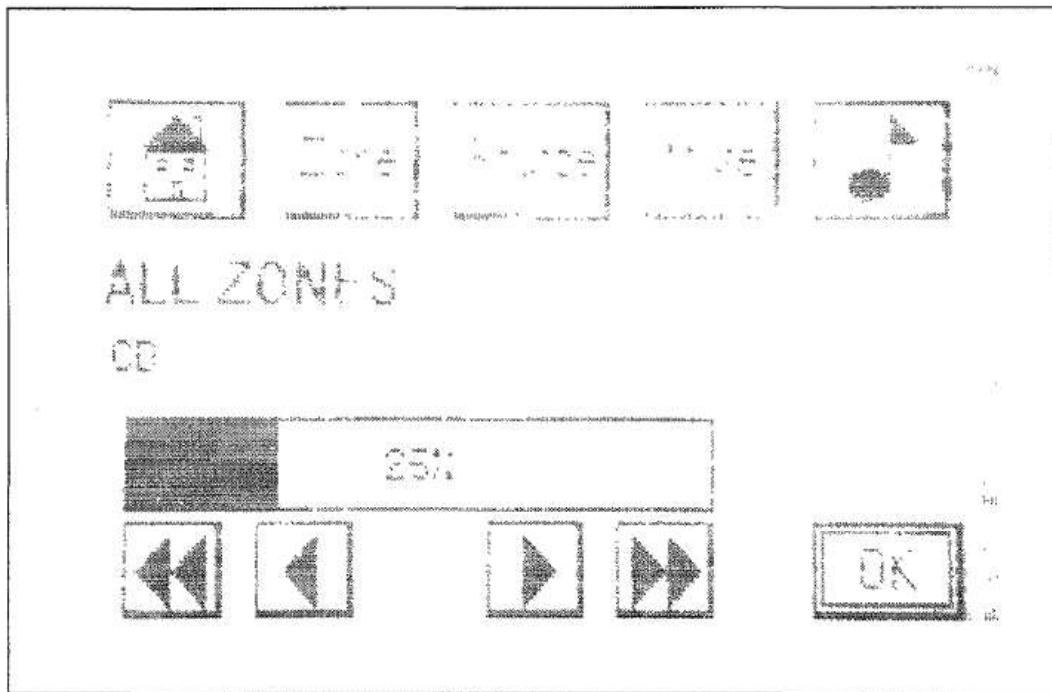
EX1015, Fig. 1. Isely's system included a user interface and a zone manager with audio mixing software and a means to flexibly create zones and route audio to these zones. EX1015, [0043]-[0046]. It further described ways of controlling the volume level independently in each room or zone or to have relative volume control—adjusting the volume in multiple rooms in a relative fashion. EX1015, [0047]-[0049], [0053].

56. Inventions like those described above rely on wired or wireless communications to connect their devices, which enable users to enjoy audio content throughout their homes, among other environments.

57. These references all disclose flexible systems that allow users to use at least a controller to manage devices within their systems. EX1005, 1:14-18, 14:4-10, 25:26-29; EX1006, 1, 5-6, 62-67, 85-88, 121-126; EX1008, 3:11-20; *see also* EX1015, [0053]. These controllers contained displays with visual controls or touchscreens that further improved a user's ability to easily control their audio systems. EX1005, 25:26-26:8; EX1006, 21, 56-59, 64; EX1008, 5:50-6:13, 6:53-7:16. They further provided users with the ability to create different zones. EX1005, 25:26-26:8; EX1006, 61-62; EX1008, 3:13-20, 4:8-17. This flexibility enabled users to, for example, control the volume or audio playback across multiple zones or rooms in sync. EX1005, 25:30-26:8; EX1006, 63-67; EX1008, 4:8-17.

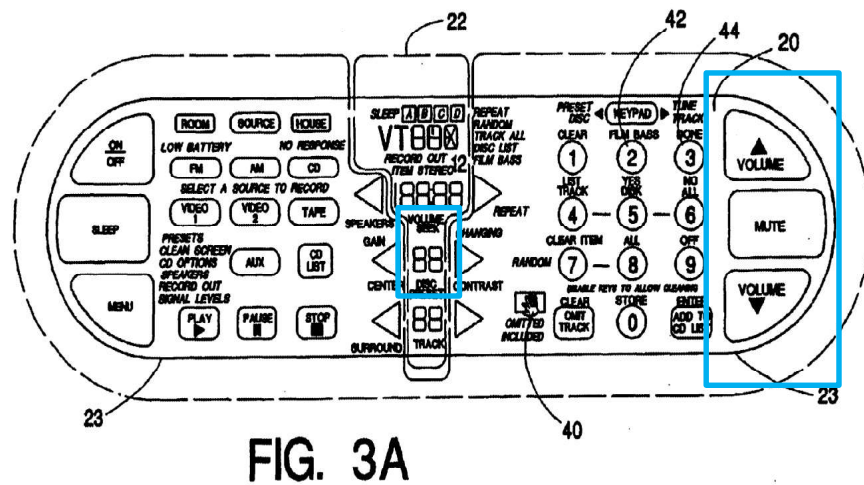
58. The use of controllers to adjust volume across audio players was well known in the early 2000s. For example, Geiwitz discloses a group volume control function where the volume for all zones being controlled is controlled simultaneously in the same fashion. EX1005, 25:15-26:8; EX1006, 63, Fig. 103.

Figure 103



EX1006, 63, Fig. 103. As shown above, Figure 103 displays a user interface displaying a volume meter for simultaneously adjusting the volume of ALL ZONES. EX1006, 62-63.

59. Allen similarly describes how the volume of its audio devices “can be set individually, or adjusted collectively. If the volume is changed collectively, all rooms are adjusted accordingly from their starting position, and any offset between the rooms is remembered.” EX1008, 5:54-58, Fig. 3A.



EX1008, Fig. 3A.

VII. THE '014 PATENT

A. Overview of the '014 Patent

60. The '014 patent discloses “techniques for controlling a plurality of players, grouping some of the players, manipulating audio characteristics of the players individually or in groups.” EX1001, 4:11-14.

61. For example, the '014 patent describes: in the morning, players in the bedroom, bathroom, and den are grouped for the broadcast news from a radio station; in the evening, players in the living room and den are grouped for music from a compact disc; over the weekend, players in the den, living room, and kitchen are grouped for party music. EX1001, 1:50-2:13.

62. The '014 patent discloses that it would be difficult for traditional multi-zone audio systems controlled by a pre-programmed controller to dynamically group

the players as required for such situations and control audio volume of players as a group. EX1001, 1:50-2:13. The '014 patent describes a solution that uses a controller to perform the following:

- A. Selecting players to form a zone group wherein any one of the players in the zone group serves as a zone group head;
- B. Synchronizing all players in the zone group in accordance with the zone group head; and
- C. Adjusting a volume meter for the zone group to adjust volume of each player of the group synchronously.

EX1001, 3:6-21, 4:11-37.

63. As shown below, the controller provides a screen graphical user interface for controlling audio source playback, grouping players, de-grouping a group, or adjusting audio volume of individual or a group of players. EX1001, 2:41-46, 4:28-35, 7:43-8:37, 9:7-9, 9:61-67, 14:6-29, Figs. 2B-4B, 7A-7D.

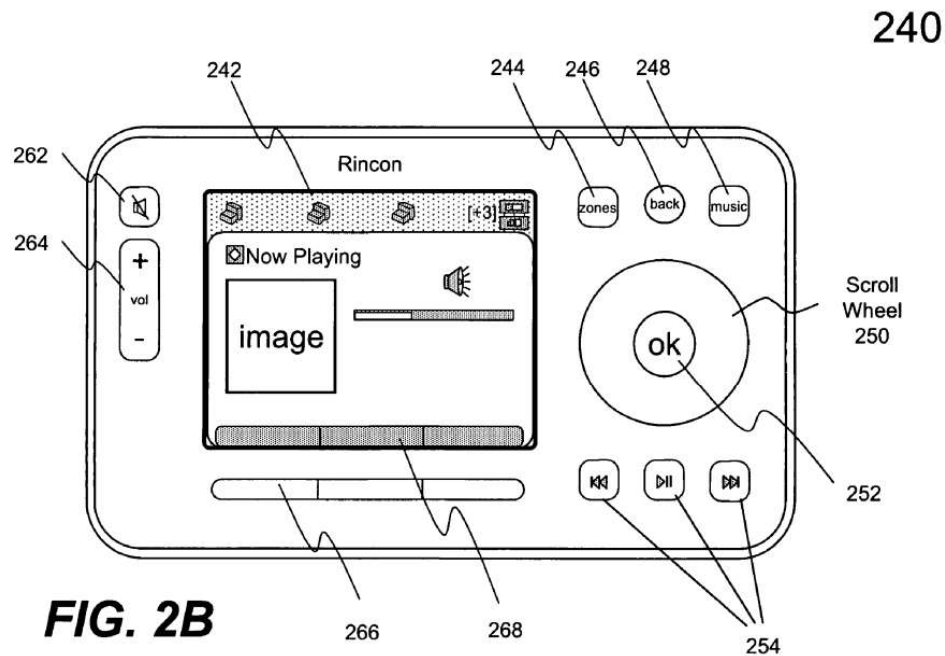


FIG. 2B

EX1001, Fig. 2B.

B. Prosecution History

64. I understand that the Examiner initially rejected the original claims as obvious over various references, including U.S. Patent Application Publication No. 2007/0038999 to Millington, but noted that original claims 21 and 45 would be allowable if written into independent form because “[t]he prior art of record does not appear to teach an average volume level to represent volumes of the players in the group.” EX1002, 214-26. In response, the Applicant added Mr. Millington as co-inventor of the instant application. EX1002, 197. The Applicant then argued that prior art reference U.S. Patent Application Publication No. 2007/0038999 was not prior art. EX1002, 197.

65. The Examiner issued a second Non-Final Rejection again rejecting the pending claims as obvious over certain prior art but finding allowable subject matter in using an “average volume level to represent volumes of the players in the group.” EX1002, 154-65. In response, the Applicant amended the independent claims to include this limitation. EX1002, 125-33. The Examiner then issued a Notice of Allowance, finding the pending claims patentable because “the prior art does not teach or reasonably suggest an average volume level to represent volumes of the players in the group, wherein an average volume level of a player is analogous to the volume gain of a player.” EX1002, 111.

C. Reexamination

66. I understand that a party requested reexamination of claims 1, 8, 16, 18, 21, 25, and 38 of the '014 patent. EX1019, 1409. Reexamination started, and the Examiner issued a Non-Final Rejection rejecting the pending claims as obvious over various references. EX1019, 1099-295. In response, the Applicant amended the pending claims to correct a typographical error but did not change the substance of the claims. EX1019, 899-908. The Applicant presented arguments for why the cited references did not teach the claimed features. EX1019, 878-98. The Examiner then issued a Notice of Intent to Issue a Reexam Certificate finding claims 1, 8, 16, 18, 21, 25, and 38 patentable based on a declaration submitted by Applicant's expert. EX1019, 18-19. The Examiner further concluded that the cited references did not

teach or suggest “adjusting a volume meter represented by an averaged value of audio volumes of the players in the group’ in combination with the limitations of the claim as a whole.” EX1019, 19.

D. Priority Date

67. The application of the ’014 patent (U.S. Patent Application No. 10/861,653) was filed on June 5, 2004. EX1001, Cover (21)-(22). The ’014 patent appears to be a continuation-in-part of U.S. Patent Application No. 10/816,217 (“’217 application”), filed on April 1, 2004, which issued as U.S. Patent No. 8,234,395. EX1001, Cover (63); EX1017, Cover (21). The ’217 application claims priority to Provisional Application No. 60/490,768 (“’768 provisional”), filed on July 28, 2003. EX1017, code (60); EX1016.

68. I understand for a non-provisional application to receive the benefit of an earlier-filed patent application’s filing date, the specification of that earlier-filed patent application must contain a written description of the invention claimed in the non-provisional application, and must include details of the manner and process of making and using the invention claimed in the non-provisional application, in full, clear, concise, and exact terms to enable a person of ordinary skill in the art to practice the invention.

69. It is my opinion that the Challenged Claims of the ’014 patent are not entitled to claim priority to the ’768 provisional or the ’217 application. This is

because neither the '768 provisional nor the '217 application discloses or suggests “a volume meter represented by an averaged value of audio volumes of the players in the group.” *See generally* EX1016; EX1017. Any support for this limitation was first added to the specification in the continuation-in-part application for the '014 patent. All Challenged Claims require a volume meter “represented by an averaged value of audio volumes of the players in the group.” Thus, it is my opinion that the Challenged Claims of the '014 patent cannot claim priority earlier than June 5, 2004, the filing date of the '014 patent.

VIII. CLAIM CONSTRUCTION

70. I have been instructed that the “intrinsic record” includes the '014 patent itself, including the claims, description, and figures (EX1001), and the '014 patent’s prosecution history, which I understand is the record of proceedings at the U.S. Patent and Trademark Office (“Patent Office”) concerning the patent (EX1002; EX1019). I understand that, like the claims and written description, the prosecution history provides evidence to a person of ordinary skill in the art of how the inventor intended their patent to be understood and how the Patent Office understood the patent. I understand that the inventor is permitted to apply a special definition to the terms or to limit the scope of claim terms in their patent claims, which may differ from the term’s plain and ordinary meaning. That special definition or limitation on

scope may be provided in the patent's written description, the patent's prosecution history, or both.

71. I understand that claim interpretation may also be informed by "extrinsic evidence" (that is, evidence outside of the patent record itself). I have been informed that extrinsic evidence may include dictionaries, technical treatises, and other materials evidencing the meaning of a claim term and the understanding held by a person of ordinary skill in the art in the relevant time period.

72. I have been informed that the claim constructions listed below have been agreed to for the '014 patent in this case, as copied from EX1021.

Claim Term	Agreed Construction
"player"	"data network device configured to process and output audio" (EX1021, 3)
"network interface"	"physical component of a device that provides an interconnection with a data network" (EX1021, 4-5)
"synchronizing all players"	"causing all players to playback the same multimedia at the same time" (EX1021, 6)

73. Based on my review, I understand that the constructions for the “players” and “network interface” terms are also consistent with the District Court’s order in *Sonos, Inc. v. D&M Holdings Inc. d/b/a The D+M Group et al.*, the Examiner’s construction in the *ex parte* reexamination (Control No. 90/013,882) of the ’014 patent, and the parties’ agreed upon constructions in *Sonos, Inc. v. Linkplay Technologies Inc. et al.* EX1018, 1; EX1019, 6; EX1020, 1.

74. I also understand that, in *Sonos, Inc. v. Linkplay Technologies Inc. et al.*, Linkplay proposed a construction for “zone player” in other patents. EX1020, 4 (“data network device configured to process and output audio to a defined location”). This construction does not impact my analysis below.

75. Additionally, I understand that Patent Owner previously asserted that “any one of the players in the group serves as a zone group head” recited in claim 25 should be given its plain and ordinary meaning. EX1020, 18. Patent Owner’s definition of plain and ordinary meaning was that this term “does not require that ‘each of the players in an [already] existing zone group can serve as the zone group head for that [already existing] zone group.’” EX1020, 18.

76. I have been asked for the purposes of this declaration to apply these constructions and the plain and ordinary meaning of the claim terms as they would have been understood by a person of ordinary skill in the art as of the priority date

of the '014 patent. It is my opinion that the prior art relied on in the Petition discloses each of these constructions, and the plain and ordinary meaning of all other terms.

IX. LEVEL OF ORDINARY SKILL

77. In rendering the opinions set forth in this declaration, I have been asked to consider the '014 patent's claims and the prior art through the eyes of a person of ordinary skill in the art (which I may also refer to as "one skilled in the art," "skilled artisan," "POSITA," or similar variations). I have considered factors such as the educational level and years of experience of those working in the pertinent art, the types of problems encountered in the art, the teachings of the prior art, patents and publications of other persons or companies, and the sophistication of the technology.

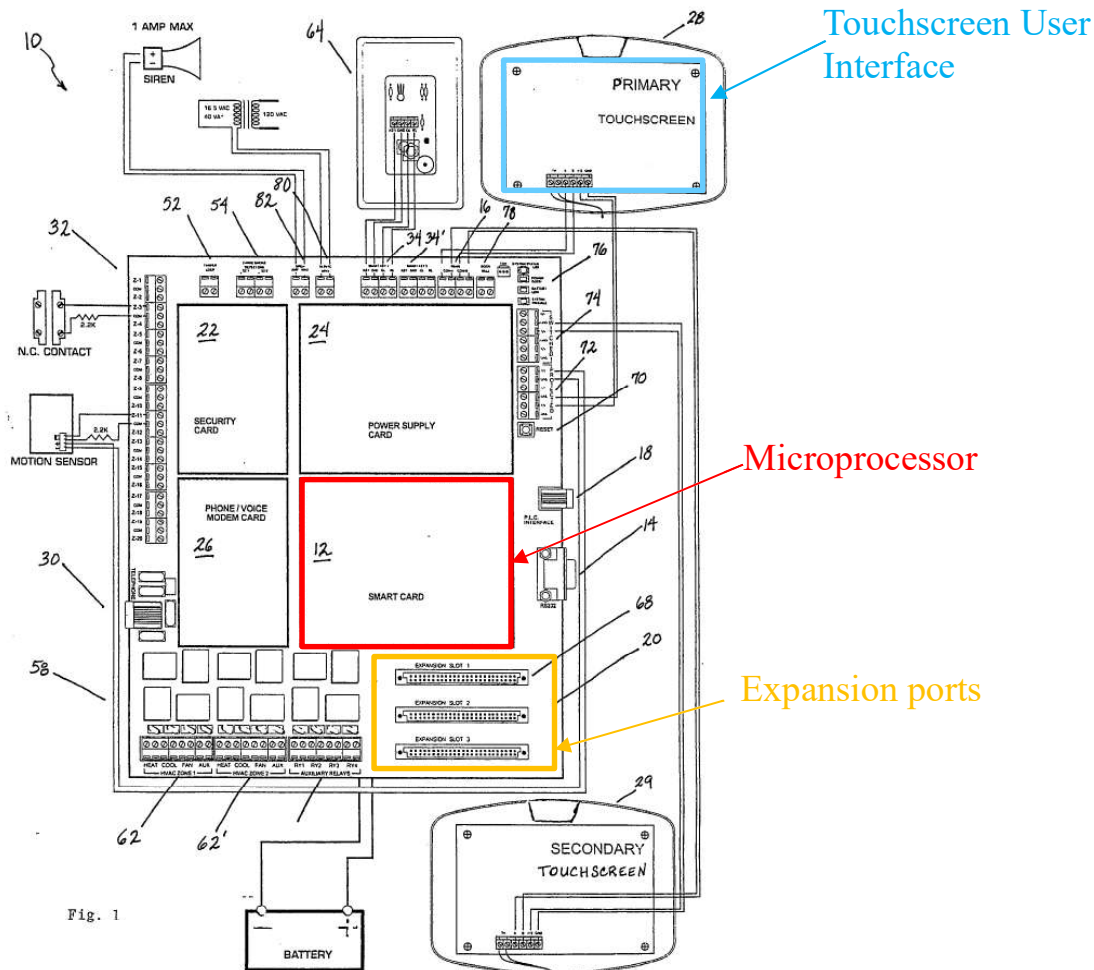
78. Taking the factors described in the Legal Standards–Level of Ordinary Skill section into consideration, it is my opinion that a person of ordinary skill in the art ("POSITA") at the time of the purported invention would have had the equivalent of a four-year degree from an accredited institution in computer science, computer engineering, electrical engineering, or an equivalent thereof, and approximately four years of professional experience in the fields of networking and network-based systems or applications, such as consumer audio systems, or an equivalent level of skill, knowledge, and experience. Additional education could substitute for professional experience, and significant work experience could substitute for formal education. I met this criteria for a POSITA.

X. OVERVIEW OF PRIOR ART

A. Geiwitz (Geiwitz-PCT (EX1005) Incorporating Geiwitz-Provisional (EX1006))

79. I understand that both Geiwitz-PCT (EX1005) and Geiwitz-Provisional (EX1006) qualify as prior art because both were publicly accessible as of the May 15, 2003, publication date of Geiwitz-PCT. I have been asked to consider Geiwitz-PCT (EX1005) and Geiwitz-Provisional (EX1006) as one because Geiwitz-PCT incorporates Geiwitz-Provisional by reference. EX1005, 1:8-10, 19:15-17, 35:7-10.

80. Geiwitz describes a control system 10 for automation and control of devices and operations in a building, such as lighting and entertainment. EX1005, 1:14-18, 3:25-4:3, 10:9-17, Fig. 1; EX1006, 1-3.



EX1005, Fig. 1 (annotated).

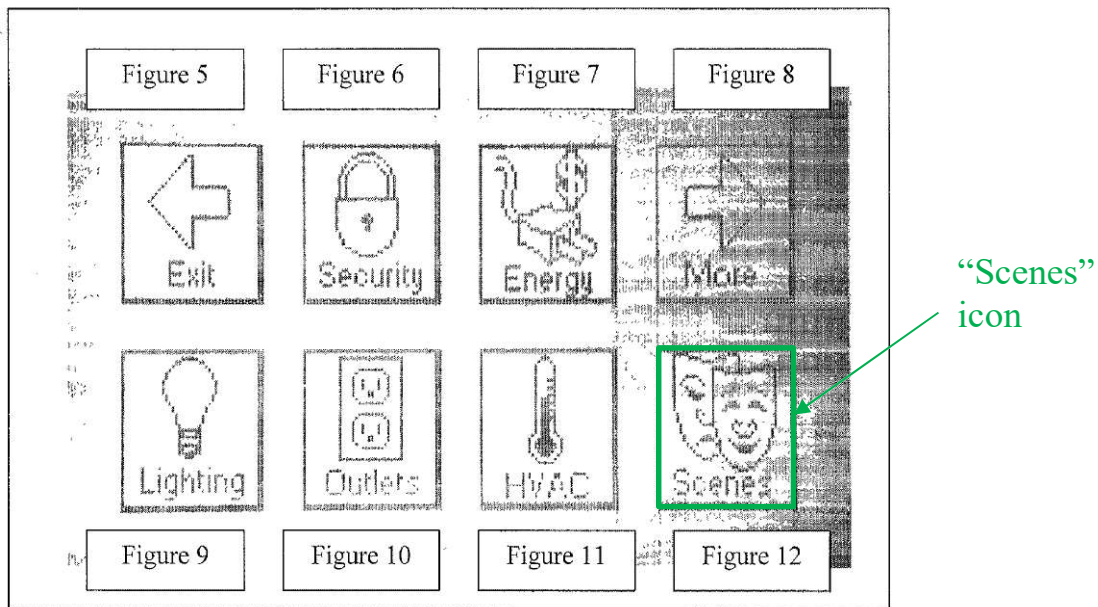
81. Control system 10 includes expansion ports such that it is “easily expandable” to control additional operations and devices “as needed.” EX1005, 3:15-24, 4:6-14, 4:26-29, 9:25-30, 12:3-21, 18:29-19:4, Figs. 1, 5. For example, an audio expansion module can be inserted into an expansion port to allow control system 10 to “interface and control of audio systems and distributed audio throughout the building.” EX1005, 9:25-30, 10:9-18, 12:3-12, 17, 4-23, Figs. 29-33. For example, an audio expansion module allows for the control of six separate

audio/video sources multiplexed to 24 or more audio zones, rooms, or sets of speakers. EX1005, 17:4-20; EX1006, 6, 172.

82. Control system 10 includes a **touchscreen user interface** displaying navigation screens and icons that enable a user to control the system in an efficient and user-friendly manner. EX1005, Abstract, 1:14-19, 9:11-21, 14:6-10, 19:5-20:20, Figs. 1, 14; EX1006, 18, Fig. 2; *see also* EX1006, 19-21, Figs. 3, 4, 13. For example, the user can control audio sources and devices by interacting with the touchscreen user interface. EX1005, 17:14-16, 20:15-17, 26:26-26:8; EX1006, 21, 62-67, 172.

83. Control system 10 includes a programmable **microprocessor** for controlling devices and updating the touchscreen user interface. EX1005, 4:6-10, 8:28-9:21, 10:19-27, 15:28-16:2, Fig. 1; EX1006, 1. For example, a user can select the **“Scenes” icon** on the touchscreen user interface to group audio zones within a “scene” and further control features of the scene, including choosing the audio source for the Scene, adding or deleting audio zones in the scene, and adjusting volumes of audio zones. EX1005, 20:13-14, 25:15-26:8, 36:13-15; EX1006, 13, 20-21, 56-67, Figs. 4, 86-89, 96-107.

Figure 4



EX1006, 20, Fig. 4 (annotated).

B. Aiso (EX1007)

84. Aiso discloses a level adjustment apparatus, such as a digital mixer, designed to individually and collectively control audio signals across multiple channels. EX1007, Abstract, 1:5-9, 3:9-32, 4:1-36, 10:13-27. As shown below, the apparatus includes a mixing console equipped with a plurality of control operators, such as faders, for setting control values, such as volume levels, of audio signals of a plurality of channels. EX1007, 1:5-18, 2:43-3:32, 10:13-27, Figs. 1-2. The control operators include fader controls for individually setting control levels of corresponding channels. EX1007, 3:33-39, 3:1-10, 6:11-21, Figs. 2, 4. The control operators also include group controls that collectively change control levels of

channels belonging to the same group. EX1007, 1:27-30, 1:64-2:12, 3:9-32, 4:1-36, 6:11-21, Figs. 1-2, 5.

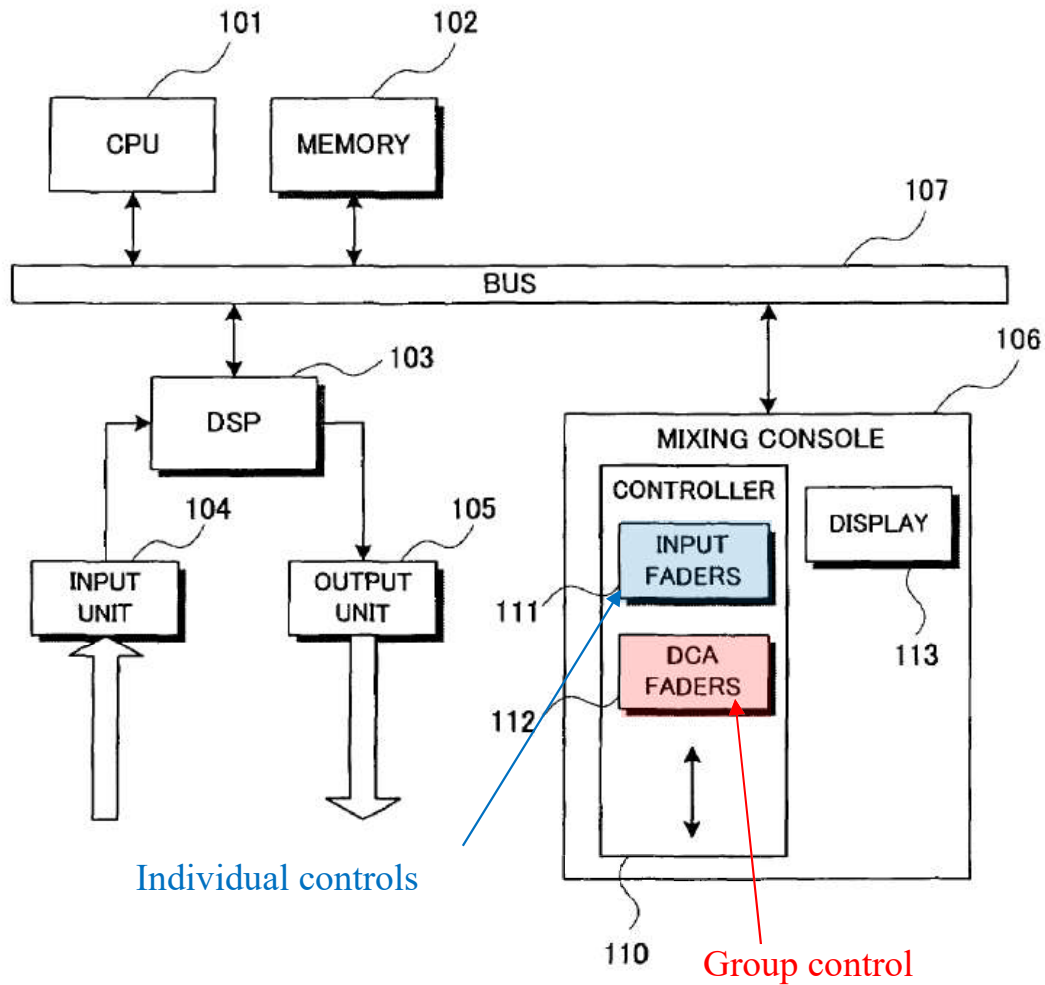


FIG. 1

EX1007, Fig. 1 (annotated).

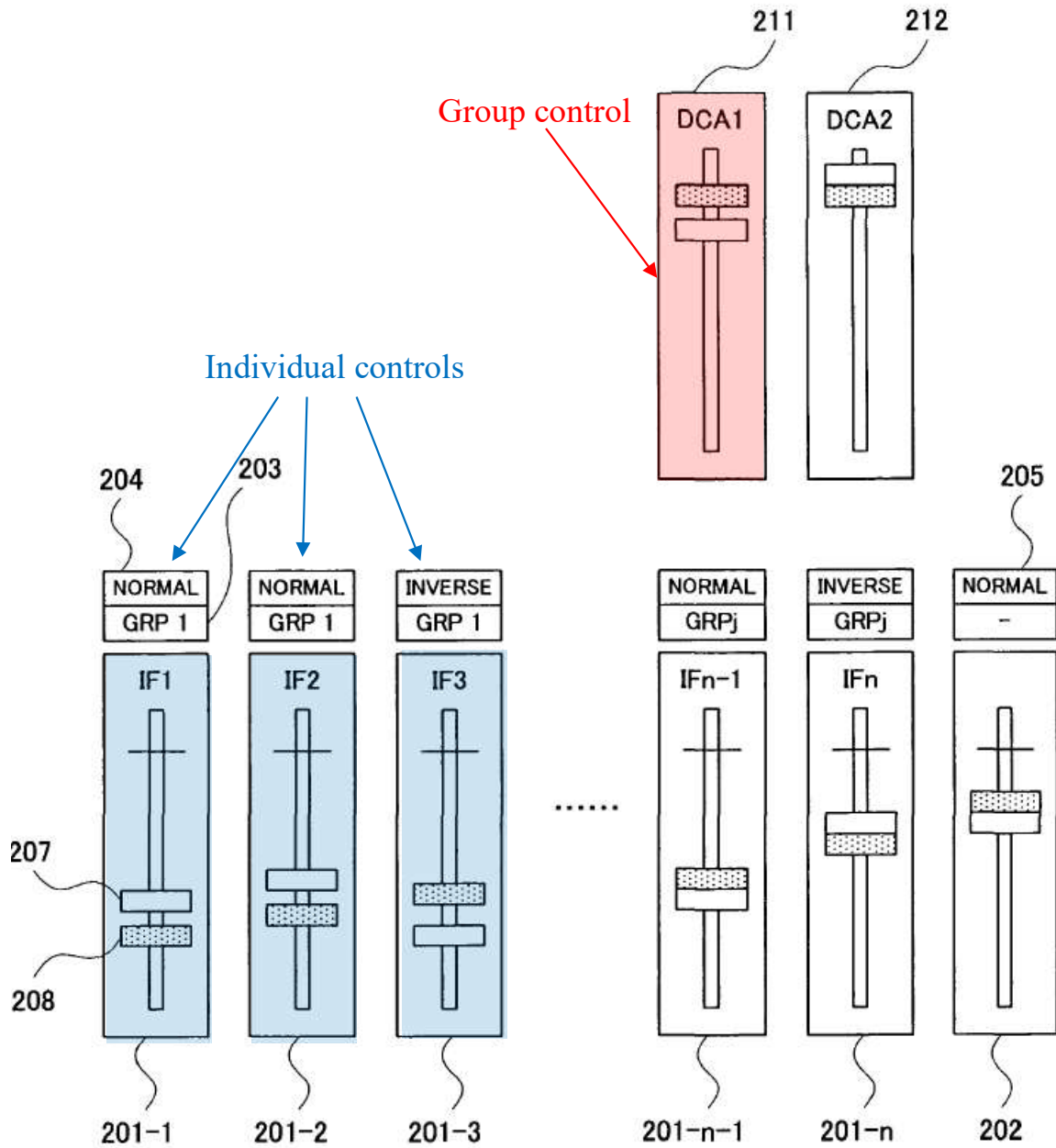


FIG. 2

EX1007, Fig. 2 (annotated).

C. Allen (EX1008)

85. Allen discloses an audio system that includes **sound reproduction devices (sound reproducers)** located in different **rooms**, **audio signal sources**, and **controllers**. EX1008, Abstract, 1:1-24, 3:11-4:17, Fig. 1. The controllers include a system controller in wireless communication with remote controllers. EX1008, Abstract, 1:1-24, 3:11-4:17, Fig. 1. The system controller receives command signals from the remote controllers, configures the audio signal sources and sound reproduction devices, and transmits parameter values of audio signal sources and of sound reproduction devices to the remote controllers. EX1008, Abstract, 1:1-24, 3:11-4:17, Fig. 1. The remote controllers transmit command signals to the system controller, receive parameter values from the system controller, and display parameter values. EX1008, Abstract, 1:1-24, 3:11-4:17, Fig. 1.

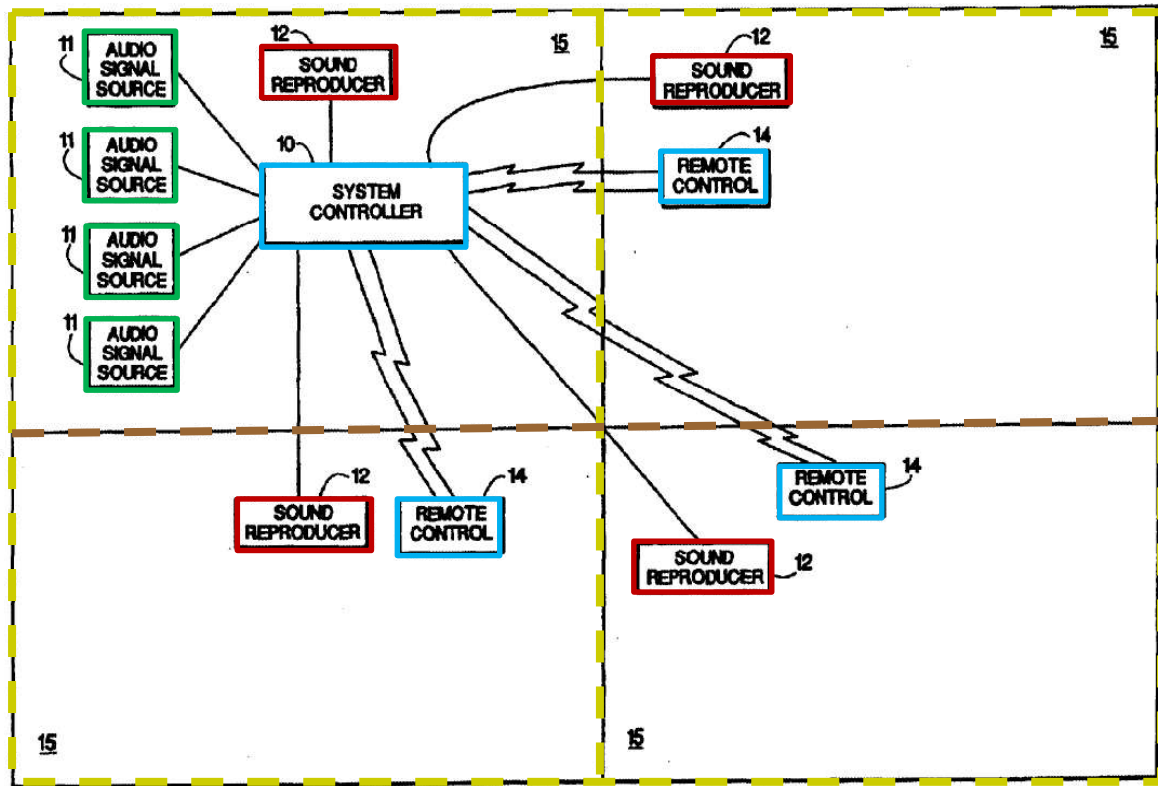
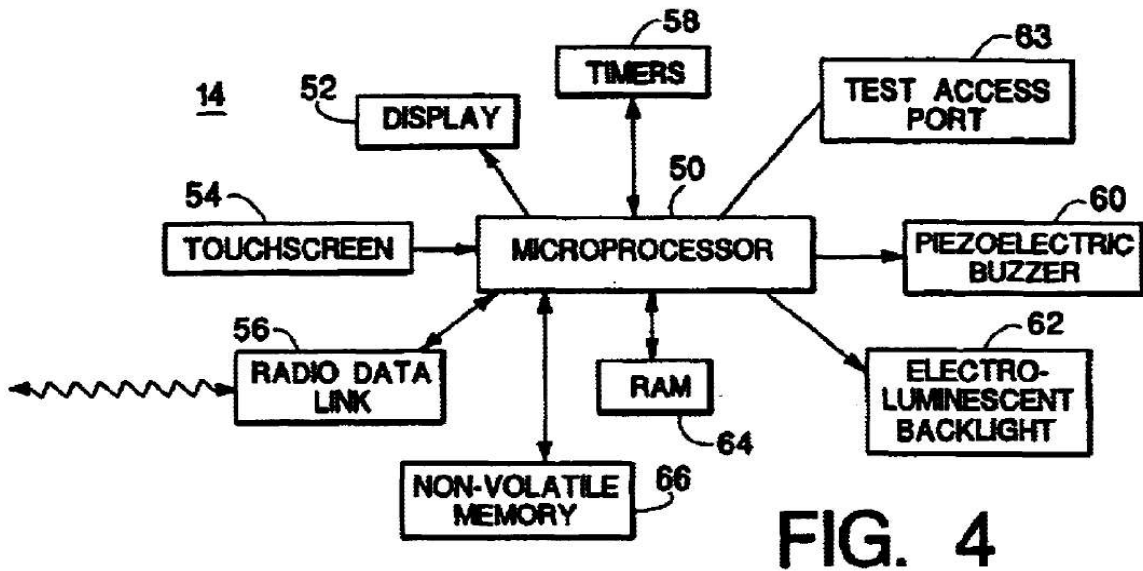


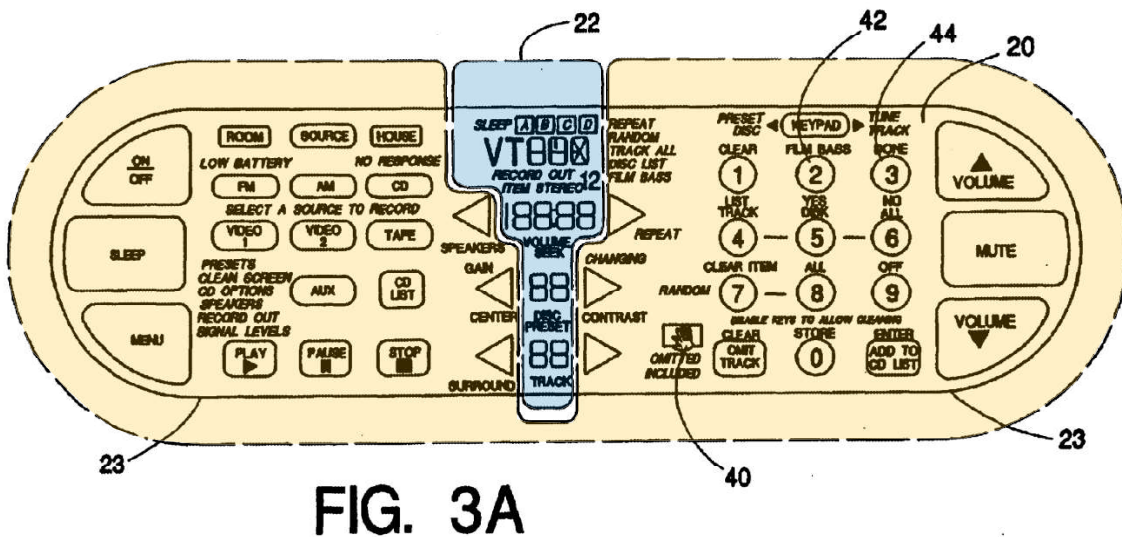
FIG. 1

EX1008, Fig. 1 (annotated).

86. As shown below, the remote controller includes, among other things, a microprocessor 50, a display 52, a touchscreen 54, a radio data link (RDL) 56, RAM 64, and non-volatile memory 66. EX1008, 6:46-7:35, Figs. 4-5.



EX1008, Fig. 4. And as shown below, the remote controller includes a user interface screen 20 having an **indicator area 22** and an **input area 23**. EX1008, 4:59-5:20, Figs. 3A-3C.



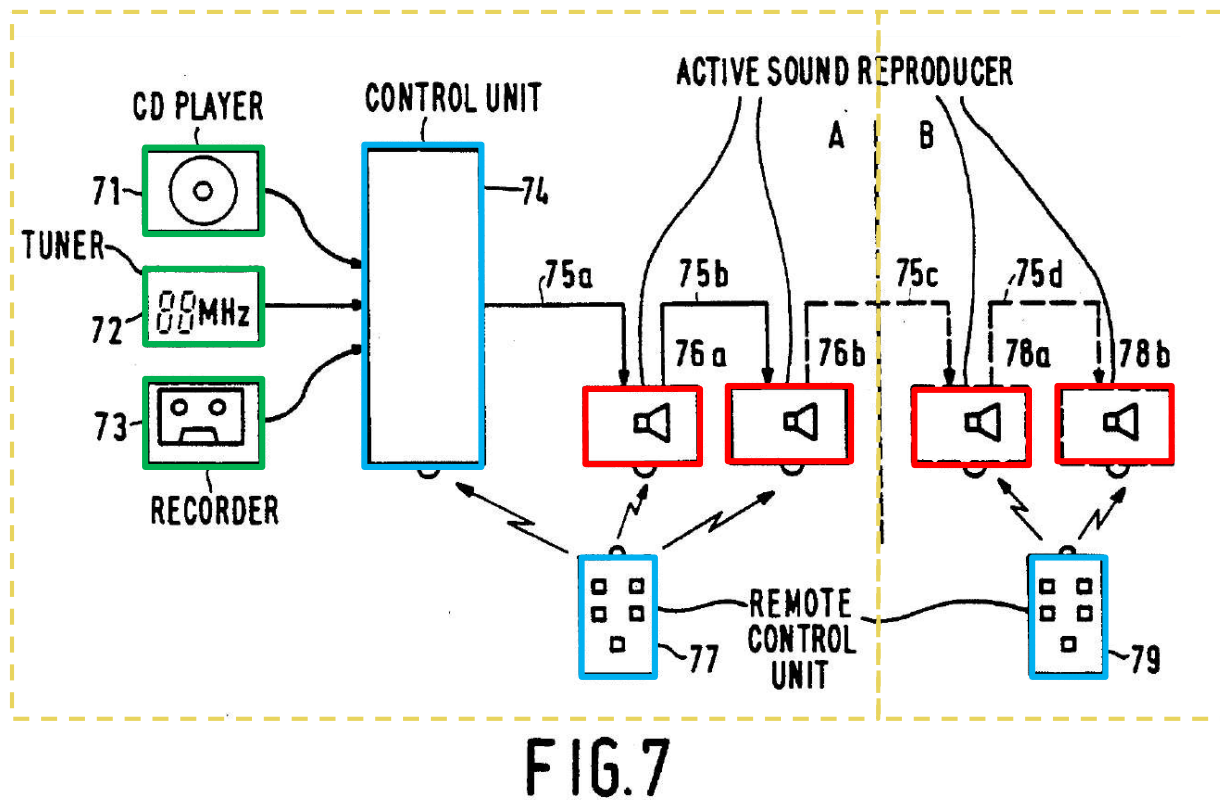
EX1008, Fig. 3A (annotated).

87. The remote controller, by interfacing with system controller, enables various forms of control over the audio sources and sound reproduction devices. EX1008, 3:44-4:17, 5:28-6:13, 7:44-8:42. For example, an audio signal source can be synchronized and shared by multiple sound reproduction devices placed in different rooms. EX1008, 3:21-43, 3:66-4:17, 5:28-49. For another example, the volumes of the sound reproduction devices “can be set individually, or adjusted collectively.” EX1008, 5:54-58. When the volume is adjusted collectively, “all rooms are adjusted accordingly from their starting position, and any offset between the rooms is remembered.” EX1008, 5:55-6:13.

D. Van Hulle (EX1009)

88. Van Hulle discloses an audio system that includes multiple **active sound reproducers**, **sound sources**, and **control units**. EX1009, Abstract, 8:24-9:50, Fig. 7. The active sound reproducers can be in different **rooms**, such as a bedroom and living room. EX1009, Abstract, 2:6-20, 8:24-9:50, Fig. 7. Each active sound reproducer includes a signal processing unit that processes received audio signal based on control signals (e.g., volume tone and balance control) received from a control unit. EX1009, Abstract, 1:8-34. The control units include one control unit 74 connected to the sound sources and multiple remote control units 77, 79 located in separate rooms. EX1009, 8:24-46. Control unit 74 operates in master mode, and the active sound reproducers operate in slave mode and receive audio signals and control

signals from the control unit. EX1009, 8:48-9:50. Alternatively, one of the active sound reproducers is switched to operate in master mode and transmits audio and control signals to other active sound reproducers that are switched to operate in slave mode. EX1009, 2:49-61, 3:1-5, 9:53-10:22. In both instances, the active sound reproducers are interconnected and play the audio signal in the form of an interconnected chain where each active sound reproducer passes on the audio signal to the next connected active sound reproducer. EX1009, 3:33-55, 9:21-37.



EX1009, Fig. 7 (annotated).

XI. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Geiwitz (Geiwitz-PCT Incorporating Geiwitz-Provisional) and Van Hulle Render Obvious Claims 25, 32, and 35

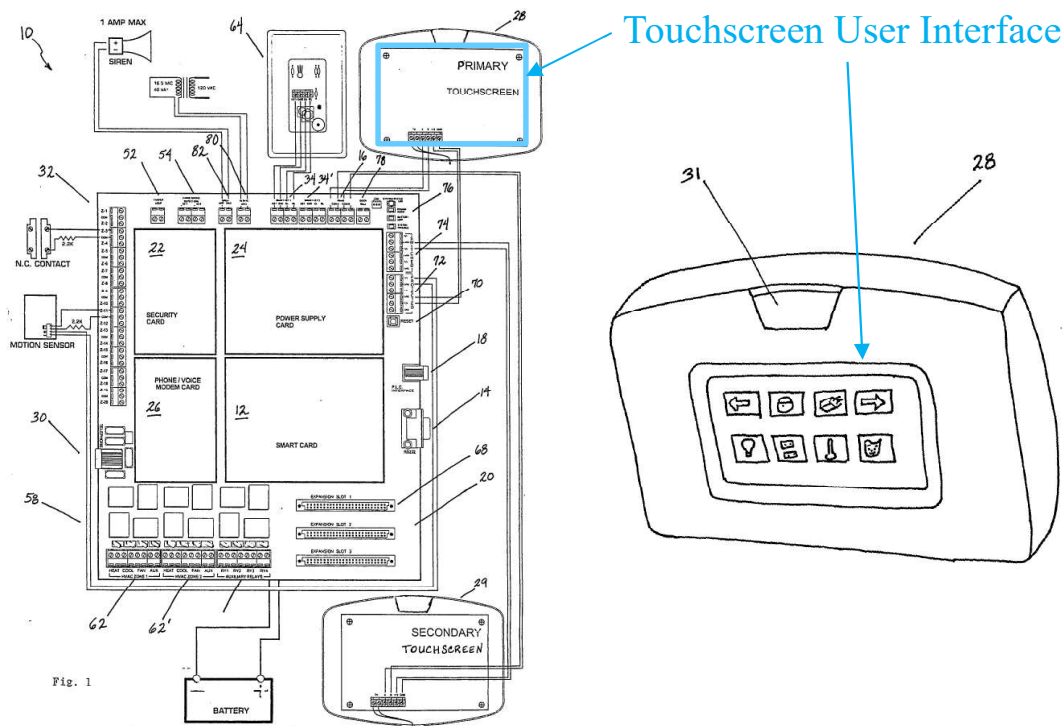
89. In my opinion, Geiwitz and Van Hulle render obvious claims 25, 32, and 35.

1. Independent Claim 25

a. [25pre]: An apparatus for controlling a plurality of players, the apparatus comprising:

90. In my opinion, Geiwitz discloses limitation [25pre].

91. Geiwitz's control system 10 ("*apparatus*") includes a touchscreen user interface for configuring and controlling various devices and operations of a building, including audio devices ("*a plurality of players*"). EX1005, 1:14-18, 2:4-13, 3:15-5:9, 17:4-23, 19:5-20:20, 25:26-26:8, 28:11-17, Figs. 1, 14; EX1006, 2, 5, 11-17, 172-173, 581; *supra* Section X.A.



EX1005, Figs. 1, 14 (annotated).

92. For example, Geiwitz discloses the user interface can control audio devices distributed throughout a building. EX1005, 17:4-20, 25:26-26:8, 41:25-29, Fig. 31; EX1006, 172. Geiwitz provides that “[m]ultiple audio zones, preferably up to 24 or more, can be controlled. Fig. 29 is a schematic of the audio expansion module input/output 8-channel digital to analog converter circuit. This circuitry provides control output to original equipment manufacturer (OEM) audio devices.... Fig. 31 is a schematic of the audio expansion module interface control circuitry which allows the user of system 10 to interface with the OEM audio device....” EX1005, 17:8-15. And while this description of Figure 31 (reproduced below) describes a single OEM audio device being controller, Figure 31 points out multiple

zones. EX1005, 17:8-15, Fig. 31. In my opinion, a POSITA would have understood that Geiwitz's audio device corresponds to an audio zone, room, or a set of speakers because Geiwitz suggests that there is at least an audio device in each zone. EX1005, 17:4-20, Fig. 31; EX1006, 172, 122, Fig. 227.

Audio Devices/Audio Zones are “players”

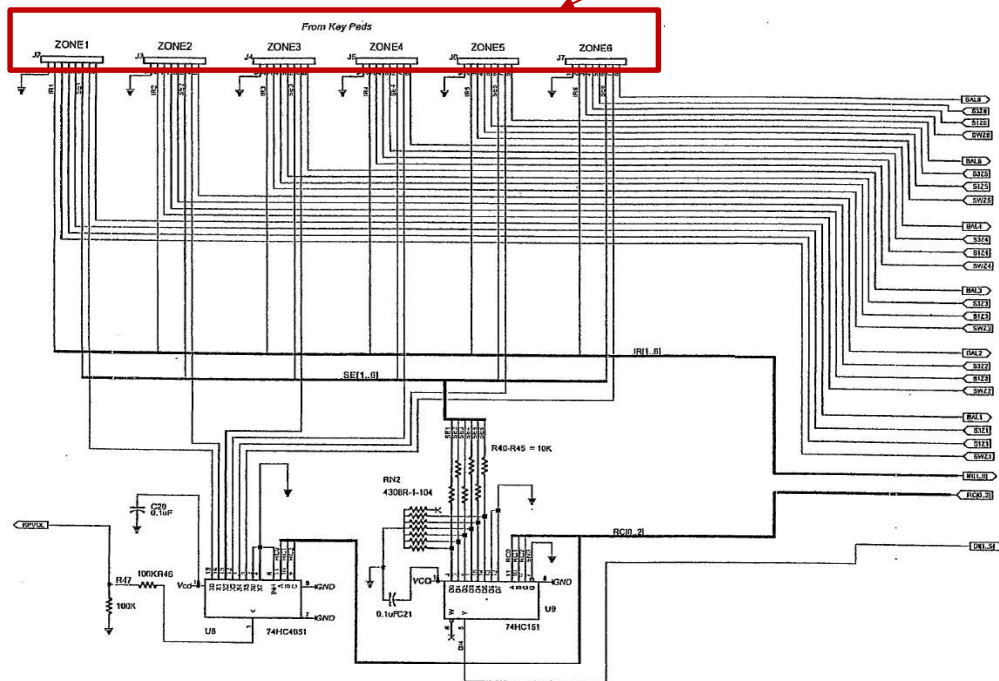
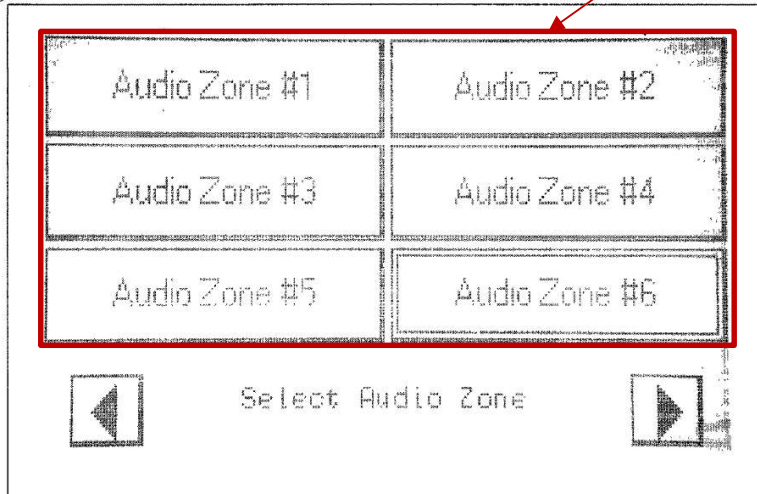


Fig. 31

EX1005, Fig. 31 (annotated).

Audio Devices/Audio Zones are “players”

Figure 227



EX1006, 122, Fig. 227 (annotated). Moreover, a POSITA have found Geiwitz's disclosures to be consistent with the '014 patent's description of players, which suggest each zone has at least one player in it. *See* EX1001, 4:65-67 (referring to each audio device installed in one area or zone as a zone player), 5:3-8 (describing two zone players located in two rooms), 1:36-38 (describing an audio device that includes amplifiers and a set of speakers, typically installed in one room).

93. It is my opinion that a POSITA would have understood that Geiwitz's audio devices receive control signals from the control system via a wired network (e.g., RS 485 interface and system bus) or wirelessly (e.g., Internet, infrared, radio frequency transmission). EX1005, Abstract, 1:14-19, 4:15-21, 9:5-13, 13:10-13, 17:4-20, 18:1-15; EX1006, 1-2, 4, 9, 164-167; EX1001, 5:14-15 (describing that a data network may be a wired network, a wireless network, or a combination of both),

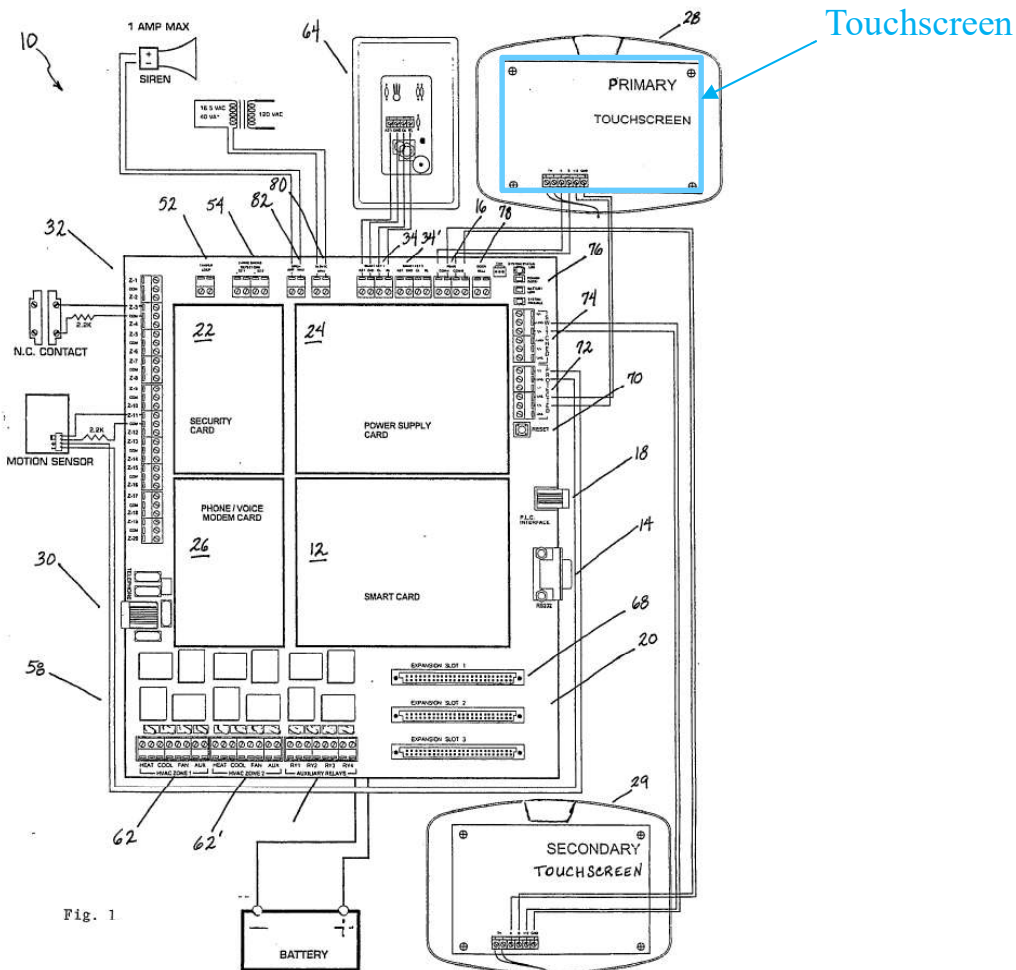
8:38-61. Geiwitz teaches the control system can “be easily modified to adapt to future protocols as they gain acceptance,” such as Bluetooth. EX1005, 3:15-18, 18:29-19:4; EX1006, 1.

94. It is also my opinion that a POSITA also would have understood Geiwitz’s audio devices would receive audio signals from audio sources connected to the system (e.g., a CD player, tuner, radio station) and perform signal processing, e.g., amplification and digital to analog conversion, before outputting audio signals. EX1005, 26:5-7, 28:11-17, 38:5-6, 17:4-20; EX1006, 13, 85, 88, 213-214. Geiwitz discloses that the audio devices could be OEM devices with their own remote controls. EX1005, 17:9-20. A POSITA would understand that a remote control would allow a user to modify the output in some way. This could only be done by employing some signal processing, such as changing the gain of an amplifier or employing some type of filtering, such as might be used to change the bass or treble balance. Thus, Geiwitz’s audio devices (audio zones) are “*a plurality of players*” under the parties’ agreed construction of “player” as “data network device configured to process and output audio.” *Supra* Section VIII.

- b. [25a]: a screen;
[25b]: a screen driver commanding the screen;
[25c]: an input interface;

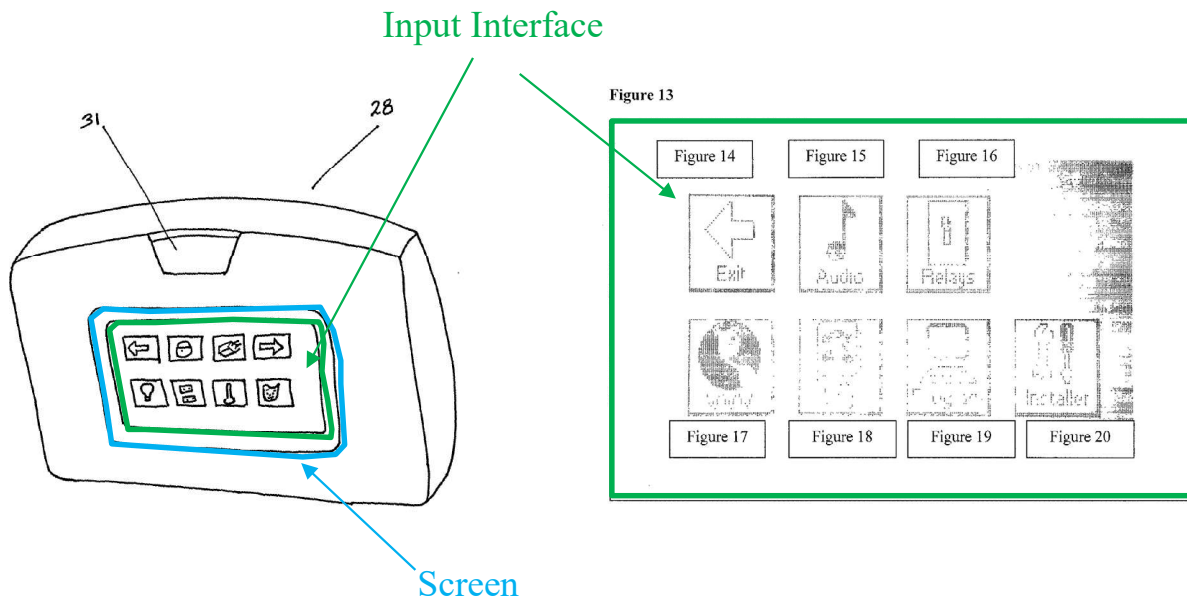
95. In my opinion, Geiwitz discloses limitations [25a]-25[c].

96. Geiwitz's user interface includes a touchscreen ("*screen*") driven by an embedded controller circuit ("*screen driver*") in communication with the system smart bus and microprocessor. EX1005, 9:11-13, 14:4-10, Figs. 1, 15; EX1006, 2, 5. A POSITA would have understood that the embedded controller circuit of Geiwitz's touchscreen would convert control signals from the microprocessor into electric control signals and constitute "*a screen driver commanding the screen.*" See EX1011, 5:43-61, Fig. 4 (showing a similar system having an audio signal processor interface that includes a display panel and a display driver connected to a microprocessor, the microprocessor instructs the display driver to update displayed content).



EX1005, Fig. 1 (annotated).

97. Geiwitz's touchscreen user interface accepts user input to effect control and programming, such as allowing the user to navigate through menus, select icons, configure features of devices, program scenes, and enter names, codes, and passwords. EX1005, Abstract, 1:14-18, 9:11-21, 17:14-20, 19:5-20:20, 25:15-37:13, Figs. 1, 14; EX1006, 20-21, Fig. 4. Geiwitz's touchscreen user interface thus constitutes "*an input interface.*" EX1005, 35:13.



EX1005, Fig. 14 (left); EX1006, 21, Fig. 13 (right) (annotated).

c. [25d]: a network interface;

98. In my opinion, Geiwitz discloses limitation [25d].

99. The '014 patent describes that zone players are coupled to a data network that can be a wired network, a wireless network, or a combination of both. EX1001, 6:6-17. The '014 patent also describes a controller 270 of the zone players includes “a network interface 280 referred to as a RF interface 280 that facilitates wireless communication with a zone player via a corresponding RF interface thereof.” EX1001, 8:38-49, Fig. 2C.

100. Like the '014 patent, Geiwitz discloses that the control system interfaces with components and devices of the building (“a data network”) via a variety of communication interfaces for building automation and control, such as RS

232 interface, RS 485 interface, power line carrier (PLC) interface, or by a wireless interface, such as Infrared, RF, or Bluetooth transmitters/receivers. EX1005, Abstract, 9:5-13, 14:4-21, 17:14-20, 18:4-15, 19:5-10; EX1006, 1-2, 176-177, 581, 805. Based on these disclosures, in my opinion, a POSITA would have understood such communication interface is a “*physical component*” of the control system (“*a device*”) that provides communication with the various components and devices of the building (“*provides an interconnection with a data network*”).

101. Geiwitz also discloses the control system can be a mobile wireless communication device, such as a personal digital assistant (PDA) device, a personal computer, or a cellular phone, that allows remote control via mobile wireless communication. EX1005, 2:10-13, 9:2-4, 12:6-8, 18:1-10. Indeed, based on this disclosure, a POSITA would have understood that a mobile wireless communication device would include a wireless data interface (“*network interface*”) to communicate with the various components and devices of the building that forms “*a data network*.” See EX1005, 18:1-10; EX1006, 1-2, 176-177, 581, 805; EX1010, [0031]-[0034], [0038], [0040]-[0041].

d. [25e]: a memory for storing code for an application module;

102. In my opinion, Geiwitz discloses limitation [25e].

103. Geiwitz discloses that control system 10 includes a smart card (i.e., a microprocessor) that is programmable and driven by software and firmware. EX1005, 8:28-9:2, Fig. 1; EX1006, 1, 167-168. The microprocessor, provided with suitable processing power, memory capabilities, and inputs/outputs, updates the icons and menus of touchscreen and configures and controls various devices and operations, including audio devices. EX1005, 1:13-18, 2:4-13, 3:15-5:9, 10:19-27, 15:28-16:5, 17:4-23, 19:5-20:20, 25:26-26:8, 28:11-17, Figs. 1, 14; EX1006, 2, 5, 11-17, 172-173, 581. Control system 10 can include an expanded processor module providing additional processing power, system memory, input/output signal and data routing, and firmware. EX1005, 12:13-16. Control system 10 can further include an “external flash memory for smart card 12.” EX1005, 16:12-15; EX1006, 167-168. Geiwitz discloses a memory because its microprocessor is provided with memory capabilities and/or a flash memory.

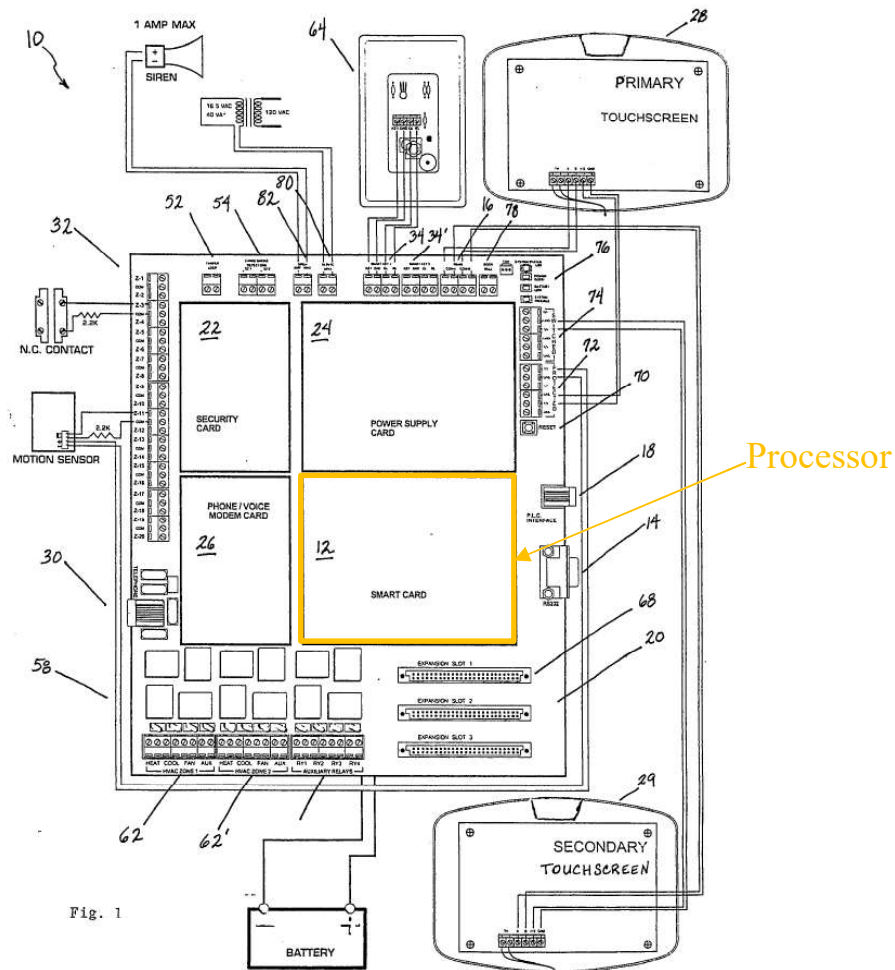
104. A POSITA would have understood that Geiwitz’s microprocessor would execute programmable software or firmware to update the touchscreen user interface and configure and control audio devices interfaced with the control system. EX1005, 9:1-2, 34:19-37:13; EX1006, 581. For example, as I discuss in greater detail below, Geiwitz’s controller provides a user with the ability to customize how zones are grouped and how loud the audio devices are playing. And, in order for Geiwitz’s controller to have this ability, the software or firmware code for these

features must be stored. Based on these features, a POSITA would have understood such software or firmware would constitute “*an application module*,” and that Geiwitz’s microprocessor memory and/or flash memory would *store software or firmware code* for the microprocessor to execute to update the touchscreen user interface and configure and control devices. Indeed, Geiwitz’s controller’s ability is consistent with the ’014 patent’s disclosure that details what an “application module” is. EX1001, 8:24-37 (“In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source....”).

- e. **[25f]: a processor coupled to the memory, the input interface, the screen driver and the network interface, the processor executing the code in the memory to cause the application module and the screen driver to perform operations of:**

105. In my opinion, Geiwitz discloses limitation [25f].

106. As discussed, Geiwitz’s control system 10 includes a programmable microprocessor that updates the touchscreen user interface and configures and controls devices, including audio devices. EX1005, 1:13-19, 2:4-13, 3:15-5:9, 10:19-27, 17:4-23, 19:5-20:20, 25:26-26:8, 28:11-17, Figs. 1, 14; EX1006, 1-2, 5, 11-17, 167-168, 172-172, 581.



EX1005, Fig. 1 (annotated). And as discussed above, a POSITA would have understood that Geiwitz's microprocessor would execute software or firmware code stored in the memory to update the touchscreen user interface and configure and control audio devices. A POSITA would have understood that Geiwitz's microprocessor would be "*coupled to the memory*" to access and execute the software code stored in the memory because "memory capabilities" are part of the "requirements of smart card 12." EX1005, 10:21-24; EX1006, 167-168; *see also*

EX1005, 15:28-16:5, Figs. 21, 22a-22b (describing that the microprocessor (smartcard), such as an Intel 386 ex processor, is coupled to 4 MB flash memory).

107. Further, as described above for limitations [25b]-[25c], Geiwitz's touchscreen is driven by an embedded controller ("screen driver"). *See supra* Section XI.A.1.b. A POSITA would have understood that Geiwitz's processor would be coupled to the embedded controller ("*the screen driver*") because the control signals are communicated to and converted to electric control signals of the touchscreen. EX1005, 9:11-13, 14:4-10, Figs. 1, 15. A POSITA also would have also understood that Geiwitz's processor would be coupled to the touchscreen user interface ("*the input interface*") because this is how the processor would receive input from the user and convert the user input into control signals to configure or control devices. EX1005, Abstract, 1:14-19, 9:11-21, 17:14-20, 19:5-20:20, 25:15-37:13, Figs. 1, 14; EX1006, 20, Fig. 4.

108. A POSITA would have understood that Geiwitz's processor would be coupled to the network interface, such as a wired RS 485 interface or a wireless interface, to communicate the signals between the processor and the devices being controlled or configured. EX1005, Abstract, 9:5-13, 14:4-21, 17:14-20, 18:4-15, 19:5-10; EX1006, 1-2, 176-177, 581, 805.

109. Based on Geiwitz's disclosures described above, a POSITA would have understood that the processor executing the software or firmware code in the

memory would cause the software or firmware (“*application module*”) and the screen driver to perform operations to update the touchscreen user interface and configure and control devices. EX1005, 1:13-19, 2:4-13, 3:15-5:9, 10:19-27, 17:4-23, 19:5-20:20, 25:26-26:8, 28:11-17, Figs. 1, 14; EX1006, 2, 5, 11-17, 172-172, 581.

f. [25g]: displaying on a screen a first list showing at least available players;

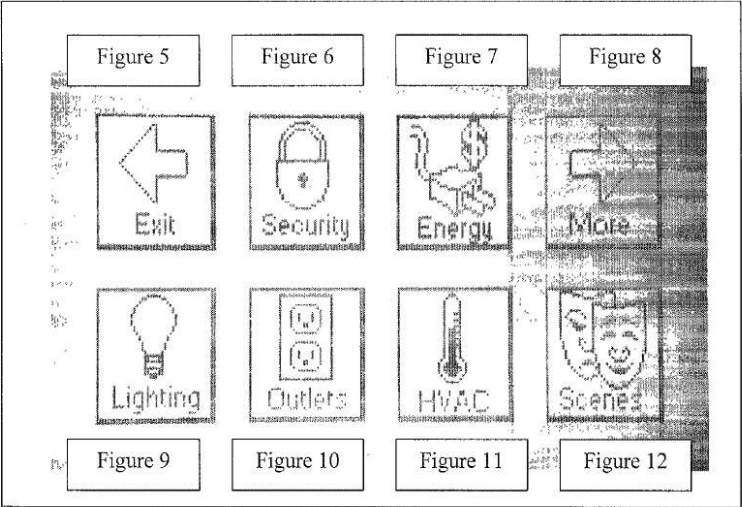
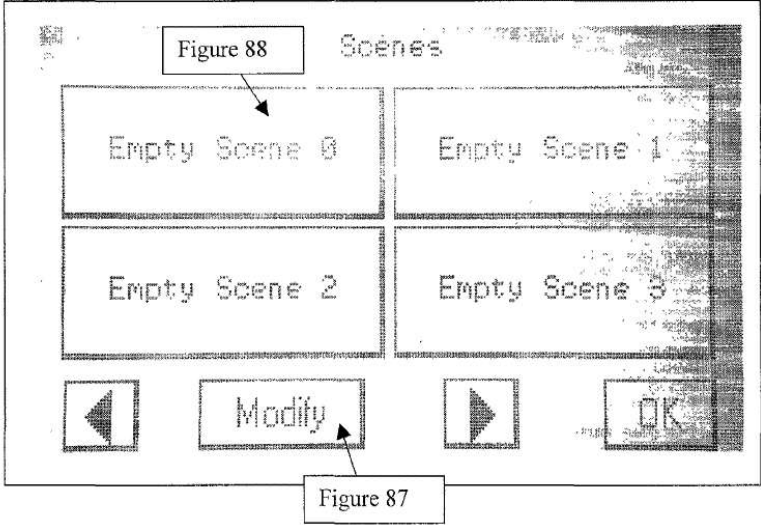
110. In my opinion, Geiwitz discloses limitation [25g].

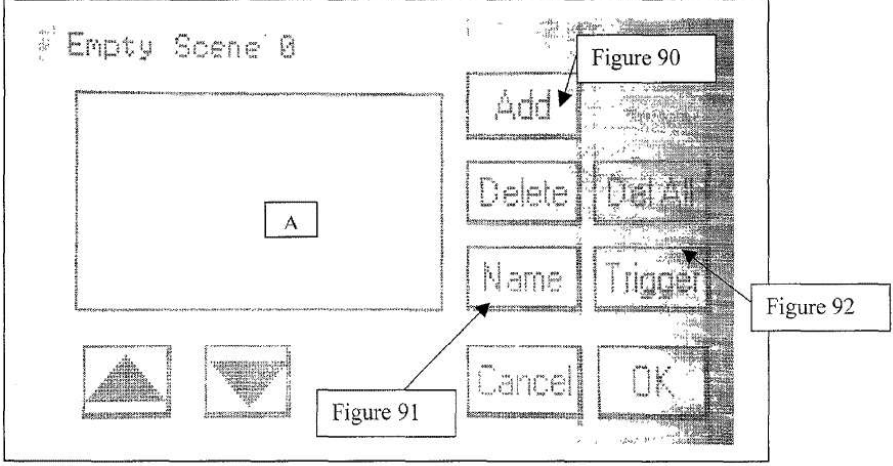
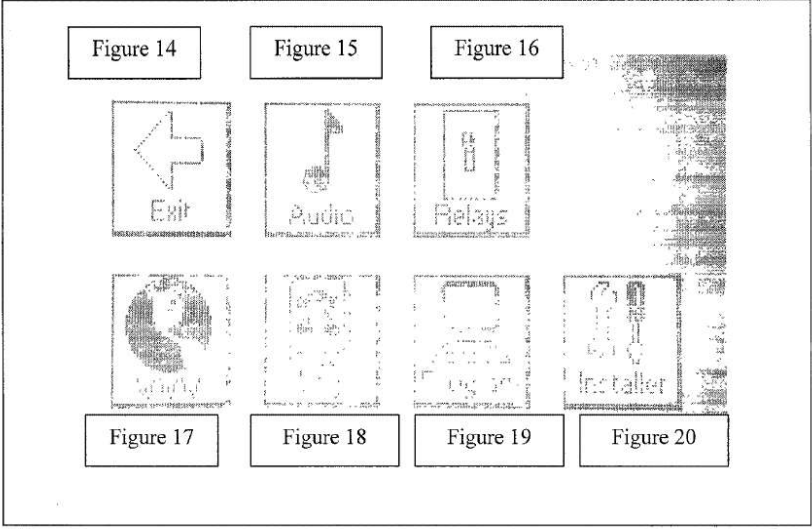
111. Geiwitz discloses the control system allows the user to program an audio scene using the touchscreen user interface. EX1005, 36:13-15; EX1006, 56-58, 172. For example, from the main navigation menu, the user can navigate to the “Scenes” icon to create or modify a “scene.” EX1005, 25:15-25; EX1006, 20, 56, Figs. 4, 86. The user can add features to a scene, including naming the scene, adding commands, or selecting specific methods for triggering a scene. EX1006, 57-61, Figs. 90-92, 94, 96 (showing a sample screen with “a custom scene name – ‘Party’”).

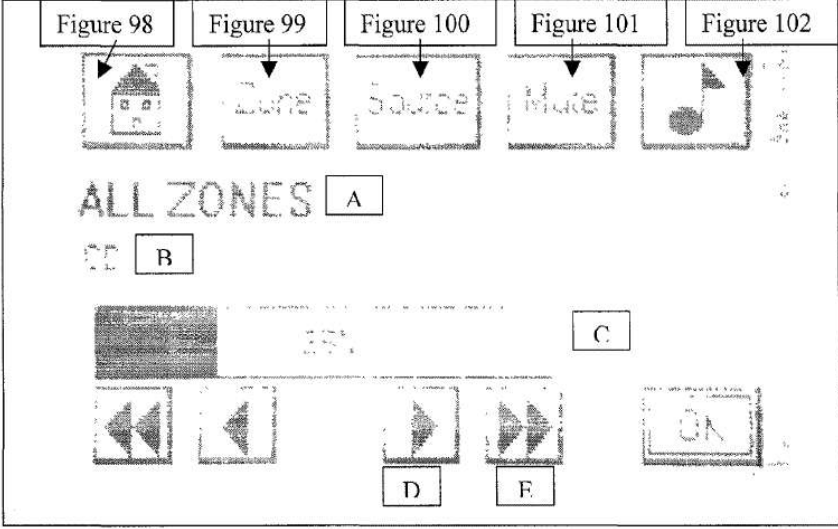
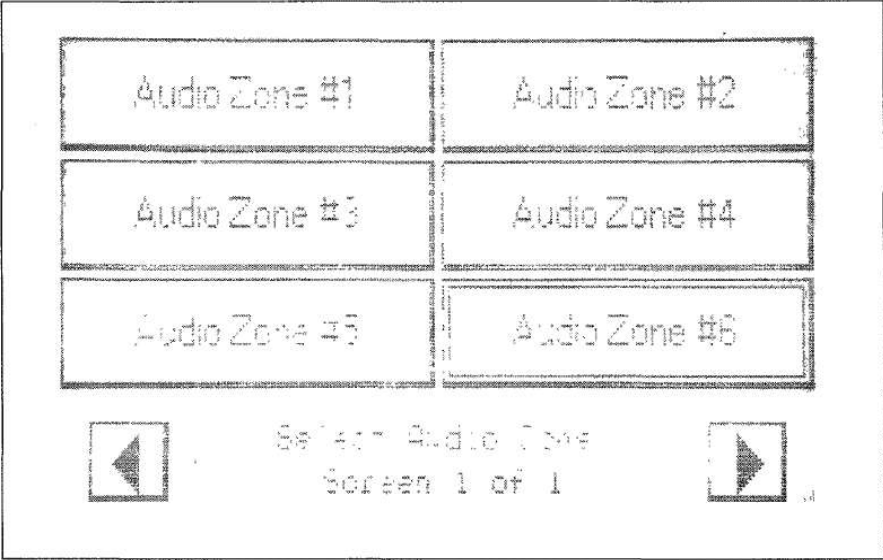
112. To program an audio scene, the user can navigate to and choose the “Audio” icon, and navigate to the audio control screen, where the user chooses the “Zone” icon to navigate to a screen displaying a list of audio zones (“players”) for selection to include in the “scene,” such as a “Wake Up” scene, a “Dinner Party”

scene,” or a “Goodnight” scene. EX1005, 25:15-25; EX1006, 20-21, 56-59, 62-64, 172, 581-590, Figs. 4, 13, 15, 86, 89, 97, 99, 104.

113. The table below summarizes this process through a sequence of screens:

Screen	User Action
Figure 4 	Choose “Scenes” icon from a navigation menu. EX1006, 20, Fig. 4.
Figure 86 	Choose a “Scene” (e.g., Scene 0) and “Modify,” to create or modify a scene. EX1006, 56-57, Fig. 86.

Screen	User Action
Figure 89 	Choose “Add” to add devices to the scene. EX1006, 57, Fig. 89.
Figure 13 	To add audio devices, navigate to navigation menu, choose “Audio” icon to navigate to audio control. EX1006, 21, Fig. 13.

Screen	User Action
Figure 97 	Choose “Zone” icon to select audio zones to add to the scene EX1006, 62, Fig. 97.
Figure 104 “displaying on a screen a first list showing at least available players” 	Select audio zones from a displayed list of audio zones to add to the scene EX1006, 64, Fig. 104.

114. As discussed in limitation [25pre], Geiwitz's audio zones are the claimed "*players.*" *Supra* Section XI.A.1.a. Thus, Geiwitz discloses displaying on the touchscreen user interface a list of available players for adding to the scene ("*a first list showing at least available players*"). EX1006, 21, 56-59, 64, Fig. 104 (showing a list of Audio Zones #1-#6).

115. Geiwitz further discloses that "[w]hen more zones are present the system will represent the number of additional screens and allow the user to cycle between them with the navigation arrows at the bottom of Figure 104." EX1006, 64. To the extent that there is a dispute over whether the "first list" needs to display all the available players, a POSITA would have understood that Geiwitz's "*first list*" would continue to additional screens to allow the user to scroll through to see and select from all available audio zones ("*players*"). And a POSITA would have understood that in the instance where just six audio zones are available, all six would be shown in the list on the screen. EX1006, 64, Fig. 104.

- g. [25h]: displaying a zone group including players from the available players when at least two of the available players are selected to form the zone group, wherein any one of the players in the group serves as a zone group head;**

116. In my opinion, Geiwitz and Van Hulle render obvious limitation [25h].

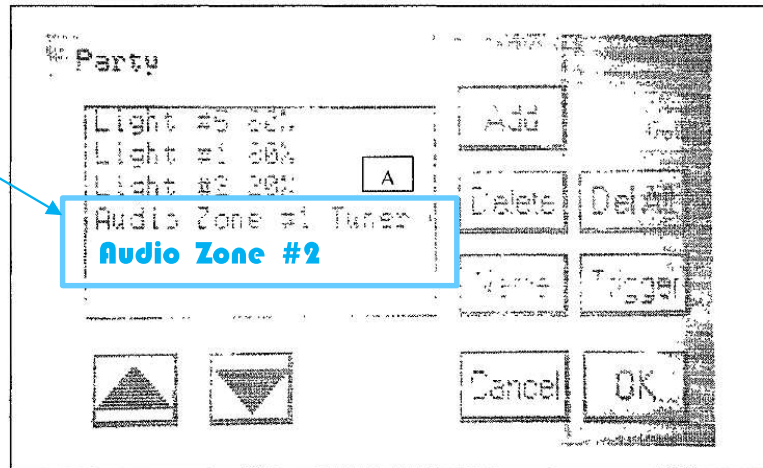
- i. **Geiwitz discloses, or at least renders obvious, “displaying a zone group including players from the available players when at least two of the available players are selected to form the zone group,”**

117. As discussed above in limitation [25g], Geiwitz’s control system 10 allows the user to program an audio scene using the touchscreen user interface. *See supra* Section XI.A.1.f. Geiwitz’s scene including user selected audio zones constitutes “*a zone group including players from the available players.*” EX1006, 57-61. A POSITA would have understood that Geiwitz’s user would select at least two audio zones to form the scene (“*zone group*”).

118. For example, as shown below, to configure a “Party” scene, a POSITA would have understood that a user would select at least two audio zones to include in the scene (“*at least two of the available players are selected to form the zone group*”) using the process summarized above. EX1006, 583 (when “Dinner Party” scene is activated, music plays in “select rooms”). And a POSITA would have understood that when more than one audio zones are selected to add to the scene, the screen would display the scene (“*zone group*”) as including at least two audio zones selected by the user for inclusion in the scene.

“displaying a zone group including players from the available players when at least two of the available players are selected to form the zone group”

Figure 96



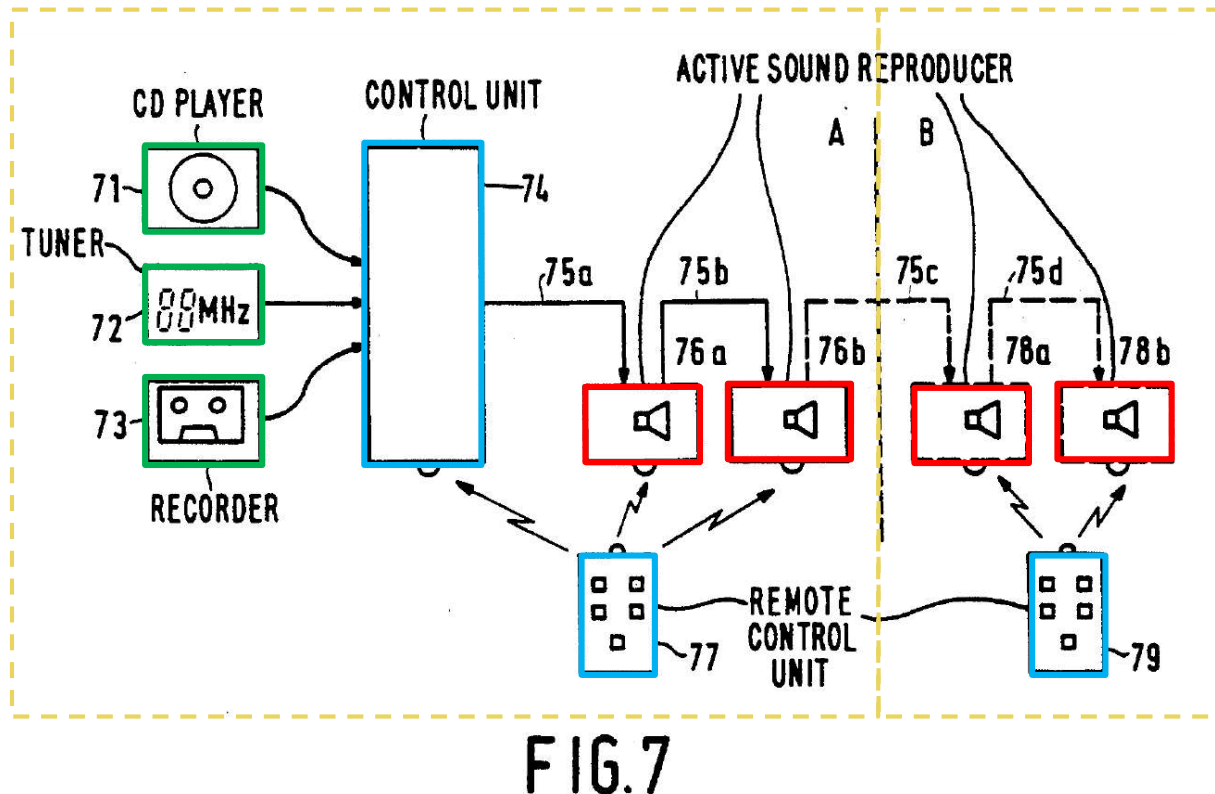
EX1006, 61, Fig. 96 (modified, annotated).

119. A POSITA further would have understood that once a scene is set up, such as a “Party” scene, a user would be able to select additional audio zones to include in the scene through the process summarized in limitation [25g]. *Supra* Section XI.A.1.f. A POSITA would have understood that, when the scene as modified is triggered, the newly added audio zone would play the same music as the other audio zone or zones in the scene. For example, when more audio zones are added to the “Party” scene, the same audio source (e.g., light jazz and classical from the CD) would be played by all audio zones in the scene. EX1005, 38:7-9; EX1006, 581-583.

**ii. Geiwitz and Van Hulle render obvious
“wherein any one of the players in the group
serves as a zone group head;”**

120. As discussed above, Geiwitz teaches “*at least two of the available players are selected to form the zone group,*” such as when a user configures a “Party” scene, and the same audio source would be played by all audio zones in the scene. Section XI.A.1.g.i; EX1005, 38:7-9; EX1006, 581-583. A POSITA would have understood that any one of the audio zones selected by the user to include in the scene, before the scene is modified to include additional zones, serves as the zone group head (“*any one of the players in the group serves as a zone group head*”). EX1001, 5:33-51, 9:23-26. Furthermore, Geiwitz and Van Hulle render obvious any one of the players in the group serves as a zone group head and synchronizing all players in the zone group in accordance with the zone group head (*infra* limitation [25i], Section XI.A.1.h.ii).

121. Like Geiwitz and the '014 patent, Van Hulle discloses an audio system including **sound sources**, **active sound reproducers** (“*players*”) in different **rooms**, and **control units** for controlling the sound reproducers and sources. EX1009, Abstract, 2:6-20, 8:24-9:50, Fig. 7. Both Geiwitz and Van Hulle are analogous to the '014 patent. *Supra* Sections X.A (Overview of Geiwitz), X.D (Overview of Van Hulle).



EX1009, Fig.7 (annotated).

122. Van Hulle discloses a method of synchronizing its active sound reproducers of an audio system to play the same audio signal at the same time. EX1009, 3:33-55, 9:22-37. A first sound reproducer operates in master mode (“*zone group head*”) and passes on the audio signal it plays to the remaining sound reproducers in the form of an interconnected chain. EX1009, 2:49-61, 3:1-5, 3:33-55, 9:21-10:22. Van Hulle teaches any one of the active sound reproducers can be the master (“*zone group head*”). EX1009, 2:49-52.

123. A POSITA would have understood that Geiwitz teaches audio zones in a scene play the same audio source. EX1005, 25:15-25; EX1006, 20, 56, Figs. 4, 86.

To the extent Geiwitz does not disclose implemental details for such synchronized play, a POSITA would have been motivated to find teaching on the implementation details, and would have recognized that Van Hulle provides a suitable solution. For example, Geiwitz shows a circuit that can produce six audio outputs in Fig. 29. A POSITA would have recognized that the chained signal routing disclosed by Van Hulle provides a suitable alternative solution for sending the audio outputs to the six audio zones. And a POSITA would have understood that Van Hulle's audio synchronization based on chained signal routing allows for expanding and sending audio output to additional audio zones players. Furthermore, Van Hulle's chained signal routing could be combined with Geiwitz's audio output circuit by having the audio outputs each connected to one or more of Van Hulle's signal routing chains, thus increasing the number of possible players, reducing the need for multiple driver circuits in Geiwitz's control system, and simplifying signal routing and system expansion.

124. In Geiwitz combined with Van Hulle, a user can select any one of Geiwitz's audio zones ("*players*") to operate in the master mode and serve as the "*zone group head*," which passes the audio signal to the remaining audio zones such that all audio zones in the scene would play the same audio at the same time, as taught by Van Hulle. *Supra* Section XI.A.1.f (limitation [25g]). And the displayed scene ("*zone group*") would include the "*zone group head*."

125. And a POSITA would have been motivated to use Van Hulle's method of routing audio signals for synchronous playback in Geiwitz to improve and expand the availability of Geiwitz's audio system. A POSITA would have understood and appreciated that when using wirelessly connected components, that the Van Hulle's chain-based signal routing topology can extend the range, making it possible to cover larger spaces (such as a whole home) without worrying that the furthest players will be out of range of the wireless transmitter. When using wired network connections for connecting players, Van Hulle's chain signal routing topology can reduce the number installation costs and difficulty by reducing the amount of cabling required. When implementing Geiwitz's system control for audio players in multiple locations, using Van Hulle's method of synchronizing would allow a first player to become the master and pass on the audio signal being played to the remaining players in the form of an interconnected chain. EX1009, 3:33-55, 9:21-37. A POSITA would have understood that such control configuration would improve the availability of Geiwitz's audio system.

126. A POSITA would have expected reasonable success in using Van Hulle's method of synchronizing in Geiwitz because Geiwitz's audio system is modular and well equipped for such modifications, and such modifications would have involved only ordinary skill. Like Van Hulle's sound reproducers, Geiwitz's audio devices include wired or wireless communication interfaces for receiving and

transmitting audio and control signals. EX1005, Abstract, 1:14-18, 4:15-21, 5:3-5, 9:5-13, 13:10-13, 17:4-20, 18:1-15; EX1006, 1-2, 4, 9, 164-167; EX1009, 1:30-37, 4:14-61, 5:8-33, 9:6-50, 10:15-22. A POSITA would have known to update the audio devices to include a control circuit for switching between master and slave modes and outputting audio signal based on received control signals, as disclosed by Van Hulle. EX1009, 4:14-46, 5:8-53. A POSITA would have understood that implementing Van Hulle's method of synchronizing in Geiwitz would have been using a known technique to improve a similar device in the same way and yield predictable results of an audio system with improved availability.

h. [25i]: synchronizing all players in the zone group in accordance with the zone group head; and

127. In my opinion, Geiwitz and Van Hulle render obvious limitation [25i].

i. Geiwitz discloses “synchronizing all players in the zone group”

128. I understand that the parties' agreed to construe “*synchronizing all players*” to mean “*causing all players to playback the same multimedia at the same time.*” *Supra* Section VIII. As discussed above in limitation [25h], Geiwitz teaches upon a “Party” scene being triggered, audio zones in the scene would play the same audio source (e.g., light jazz and classical from the CD), teaching “*causing all players to playback the same multimedia at the same time.*” EX1005, 38:7-9; EX1006, 581-583.

**ii. Geiwitz and Van Hulle render obvious
“synchronizing ... in accordance with the zone
group head”**

129. As discussed for limitation [25h], in Geiwitz combined with Van Hulle, Geiwitz’s audio zones (“*players*”) would play the same audio at the same time as the master audio zone (“*zone group head*”), teaching “*synchronizing ... in accordance with the zone group head*”). *Supra* Section XI.A.1.g.ii.

**i. [25j]: adjusting a volume meter represented by an
averaged value of audio volumes of the players in the
group, wherein said adjusting of the volume meter
includes changing a volume of each of the group of
players synchronously in accordance with an
adjustment made by a user.**

130. In my opinion, Geiwitz discloses, or at least renders obvious, limitation [25j].

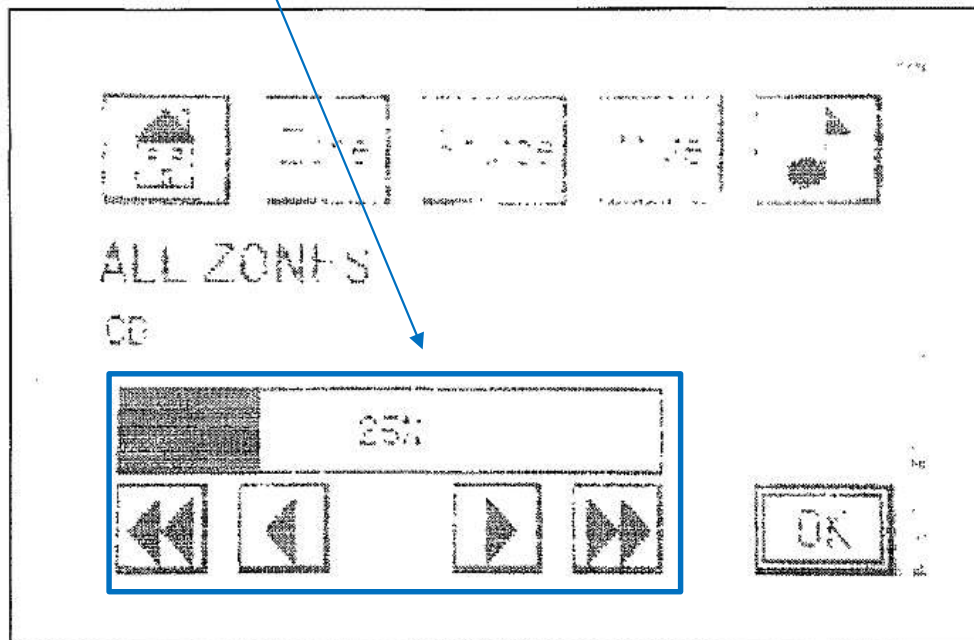
**i. Geiwitz discloses, or at least renders obvious,
“adjusting a volume meter ... includes changing
a volume of each of the group of players
synchronously in accordance with an
adjustment made by a user.”**

131. Geiwitz discloses the touchscreen user interface displays a volume bar (“*volume meter*”) and volume adjusters to control the volume of the audio zones (“*players*”). EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103. Geiwitz discloses the user can select a “House” icon, which “allows the user to select ALL Zones for immediate control.” EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103. As shown below, with the “ALL ZONES” indication, “the touchscreen is controlling all the

audio zones in the same fashion and that any command performed will change all zones simultaneously.” EX1005, 25:26-26:6; EX1006, 62-63, Fig. 103. As such, under the “ALL ZONES” indication, adjusting the volume meter, such as by using the volume adjusters, would change the volume of each of the audio zones synchronously in accordance with an adjustment made by a user.

Adjusting the volume meter changes a volume of each of the group of players synchronously in accordance with an adjustment made by a user

Figure 103



EX1006, 63, Fig. 103 (annotated).

132. A POSITA would have understood that Geiwitz’s volume meter for “ALL ZONES” would be used for controlling the volume of all audio zones in a scene (“group of players”). *Supra* Section XI.A.1.g.ii (limitation 25[h]). As

discussed above, Geiwitz discloses that a user defines a scene to include a group of audio zones. Thus, controlling the volume on the volume meter when “ALL ZONES” is selected would simultaneously change a volume of each of the audio zones in the scene (*“each of the group of players”*). EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103. And a POSITA would have used such group volume control function for controlling all audio zones in the scene in the same fashion. EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103.

133. A POSITA also would have understood that using this “ALL ZONES” volume meter for group volume control for a scene in Geiwitz would prevent unnecessary volume adjustment of audio zones not included in the scene, such as avoiding increasing volume in an office or bedroom while only increasing the volume of party music in the living room or avoiding increasing volume in all rooms of a hotel building while only increasing the volume in the ballroom. A POSITA also would have understood that such group volume control would be an alternative to individually adjusting the volume of each audio zone in the scene.

134. A POSITA would have known how to implement Geiwitz’s group volume control for a scene and would have had a reasonable expectation of success in doing so because such use of Geiwitz’s group volume control under “ALL ZONES” requires only ordinary skill. Geiwitz’s control system is well equipped for such modification; its microprocessor is coupled to the audio zones being controlled

and is programmable to control the audio devices in a scene in the same fashion. EX1005, 8:28-9:24, 10:19-27, 14:4-21, 17:14-20, 18:4-15, 19:5-10, Figs. 1, 14; EX1006, 1-2, 62-63, 176-177, 581, 805, Fig. 103. A POSITA would have understood that such group volume control for audio zones in a scene would be easily implemented by updating the software for programming a scene and by Geiwitz's microprocessor executing the software to generate controls signals to the audio zones in the scene. Indeed, Geiwitz's system already controls audio zones in a scene in the same fashion, such as controlling the audio zones in a scene to play the same audio source. EX1006, 581-583.

ii. Geiwitz discloses, or at least renders obvious, “a volume meter represented by an averaged value of audio volumes of the players in the group”

135. Geiwitz discloses, or at least renders obvious, this limitation in three ways.

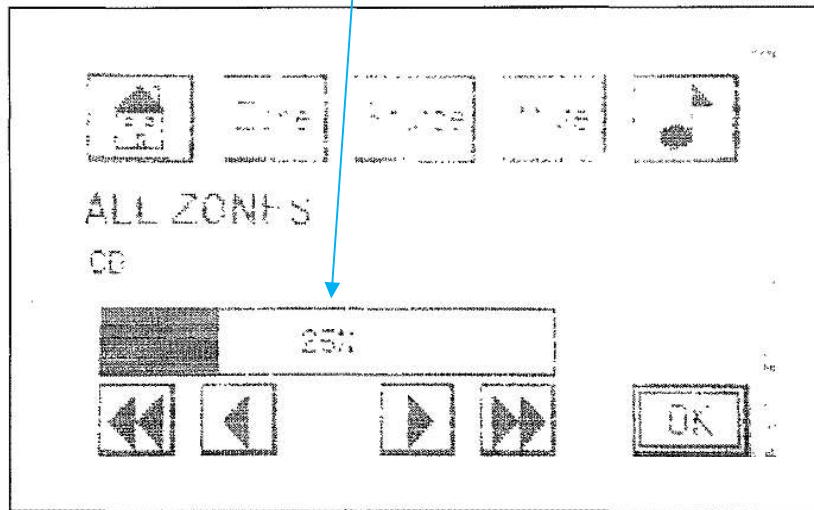
136. Geiwitz discloses the group volume meter is represented by a value of 25% when the current volume for all zones is 25%. EX1006, 62-63, Fig. 103. Adjusting the volume meter allows synchronous adjustment of the volume of all audio zones in the same fashion, such as adjusting the volume of each audio zone in increments of 1% or 5%. EX1006, 62-63, Fig. 103; EX1005, 26:7-8.

137. A POSITA would have understood that Geiwitz's group volume meter is represented by an averaged volume of all zone players being controlled. For

example, as shown in Figure 103 below, in a scene (“group”) having two audio zones (“players”), the group volume meter is represented by a value of 25%, which is “an averaged value of audio volumes” of volumes of all audio zones having respective volumes at 25%, 25%. EX1006, 62-63.

Group volume meter represented by an averaged
value of volumes of all zone players

Figure 103



EX1006, 63, Fig. 103 (annotated). And where the group volume meter is represented by a value of 100%, such value would be the averaged value of the volumes of audio zones each having a volume of 100%. Indeed, in the instance where all audio zones have the same volume, the group volume meter would be represented by the averaged value throughout the adjustment from 0% to 100%.

138. Geiwitz teaches that the volumes of selected audio zones in a scene can be controlled individually and adjusted based on the ambient noise level. EX1006,

62-67, 582-583, Figs. 103, 106; *see also* EX1024 (Stanko), 1:22-25, 2:47-3:9 (automatic controlling output volume of speakers in accordance with the ambient noise level so that the output of the speakers is maintained sufficiently audible above the noise level). Based on Geiwitz's teaching, a POSITA would have understood that, for certain scene configurations, the volumes of the audio zones in a scene would vary depending on the ambient noise level. Indeed, it was well known in the prior art to set audio devices in different rooms that are controlled as a group to different volumes based on "the type of room and the purpose of the audio content in each room." *See* EX1015, [0053] (teaching maintaining different volumes in the living room and bathroom, and in a party, maintaining the volume at the deck to be lower than the rest of the house); EX1008, 5:54-58 (teaching volumes of its audio devices "can be set individually, or adjusted collectively. If the volume is changed collectively, all rooms are adjusted accordingly from their starting position, and any offset between the rooms is remembered."). A POSITA would have understood that when controlling a scene having audio zones at different volumes, Geiwitz's group volume meter would be represented by a value (e.g., 25% as shown in EX1006 Figure 103), and that a numerical average of the volumes of the audio zones in a scene would have been one of the finite, suitable options for representing Geiwitz's group volume meter.

139. For example, a POSITA would have understood that to provide feedback on collective group volume to the user, the group volume meter would be represented by some composite value of the individual volumes. When using a single value to be representative of a group of values, the most common mathematical functions for doing so are maximum, minimum, and average. These functions are well-known in all STEM fields and would be familiar to a POSITA. Since an average volume reflects the contribution of all individual volumes, using an average when collectively displaying and controlling the volumes of a group would be an intuitive way of presenting group volume to users in a way that reflects the volume of the group.

140. A POSITA would have further understood that using the average volume to represent the group volume would allow for adjusting the volumes of the individual audio zones in the group while maintaining the volume offset between them. As discussed above, Geiwitz teaches the volumes of the audio zones in a scene, such as a “Party” scene, would vary depending on the ambient noise level. EX1006, 62-67, 582-583, Figs. 103, 106. And a POSITA would have understood that it would be desirable to maintain the volume offset between rooms in some situations. *See* EX1015, [0053]; EX1008, 5:54-58. A POSITA would have used the average volume, instead of the median volume, to represent the group volume meter because using the average volume would allow for maintaining the volume offset between

different audio zones (e.g., rooms) after the adjustment. For example, where a scene includes two audio zones having respective volumes at 10%, 40% with a volume offset of 30%, increasing the group volume represented by the average volume of 25% by 5% to 30% would result in the volumes of the two audio zones going up to 15% and 45% respectively while maintaining the volume offset of 30%.

2. Claim 32

141. In my opinion, Geiwitz and Van Hulle render obvious claim 32.

a. [32pre]: The apparatus of claim 25, wherein said synchronizing all players in the zone group comprises:

142. In my opinion, Geiwitz and Van Hulle render obvious limitation [32pre] because Geiwitz combined with Van Hulle teaches synchronizing all players in the zone group as explained for limitation [25i]. *Supra* Section XI.A.1.h.ii.

b. [32a]: causing all players in the zone group to play an identical audio source; and

143. In my opinion, Geiwitz and Van Hulle render obvious limitation [32a].

144. As discussed above in limitations [25h] and [25i], Geiwitz teaches upon a “Party” scene (“*zone group*”) being triggered, audio zones in the scene (“*all players in the zone group*”) would play the same audio source (e.g., light jazz and classical from the CD), teaching “causing all players in the zone group to play an identical audio source.” EX1005, 38:7-9; EX1006, 581-583; *supra* Sections XI.A.1.g, XI.A.1.h. And a POSITA would have understood that, when the

scene is modified to add additional audio zones, upon such modified scene being triggered, the newly added audio zone would play the same music as the other audio zone or zones in the scene. EX1005, 38:7-9; EX1006, 581-583.

c. [32b]: presenting the zone group in a manner that indicates a grouping.

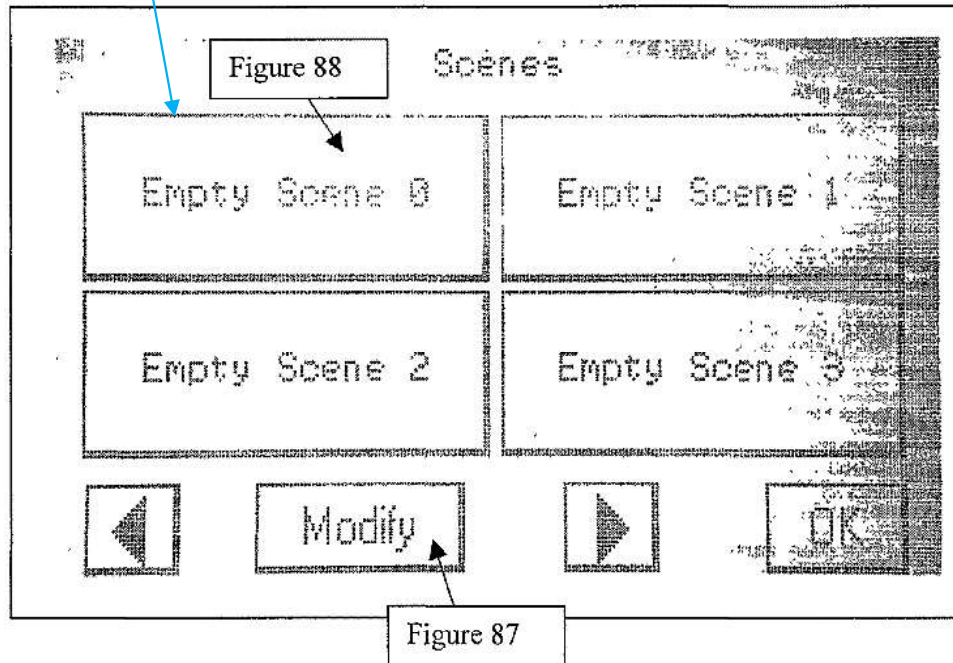
145. In my opinion, Geiwitz and Van Hulle render obvious limitation [32b].

146. Geiwitz teaches presenting a scene (“*zone group*”) on the screen in a manner that indicates a grouping in two ways.

147. First, as discussed in limitation [25h] (Section XI.A.1.g), Geiwitz discloses the user can navigate to the “Scenes” icon to a screen displaying a list of scenes to create or modify a scene (“*zone group*”). EX1005, 25:15-25; EX1006, 20, 56, Figs. 4, 86. The user can also name the scene, add commands, or select specific methods for triggering a scene. EX1006, 57-61, Figs. 90-92, 94, 96. A POSITA would have understood that once a scene is named (e.g., “Party”), the scene name would appear instead of the default scene name as shown in Figure 86 below. A POSITA would have understood that presenting the scene with a user-specified name would indicate a grouping of the devices in the scene.

A named scene indicates a grouping

Figure 86

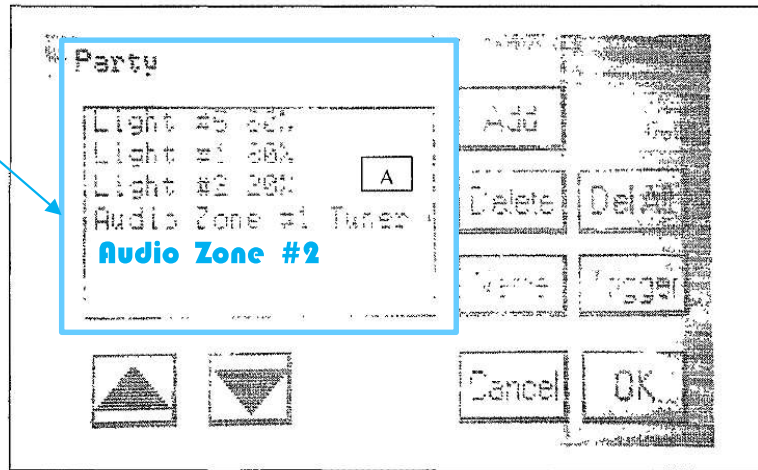


EX1006, 56, Fig. 86 (annotated).

148. Second, Geiwitz discloses a screen presenting the zone group in a manner that indicates a grouping when a scene is being configured. As shown below, Geiwitz discloses a screen ("zone group"), showing the devices in the scene (*"in a manner that indicates a grouping"*). A POSITA would have understood that when more than one audio zone is selected to be included in the scene, the screen would present the scene ("zone group") as including all audio zones selected by the user for inclusion in the scene (*"in a manner that indicates a grouping"*).

Figure 96

“presenting the zone group in a manner that indicates a grouping”



EX1006, 61, Fig. 96 (modified, annotated).

3. Claim 35

149. In my opinion, Geiwitz and Van Hulle render obvious claim 35.

- a. [35pre]: The apparatus of claim 25, wherein the processor executing the code in the memory to cause the application module and the screen driver to perform operations of:

150. In my opinion, Geiwitz discloses this limitation as explained for limitation [25f]. *Supra* Section XI.A.1.e.

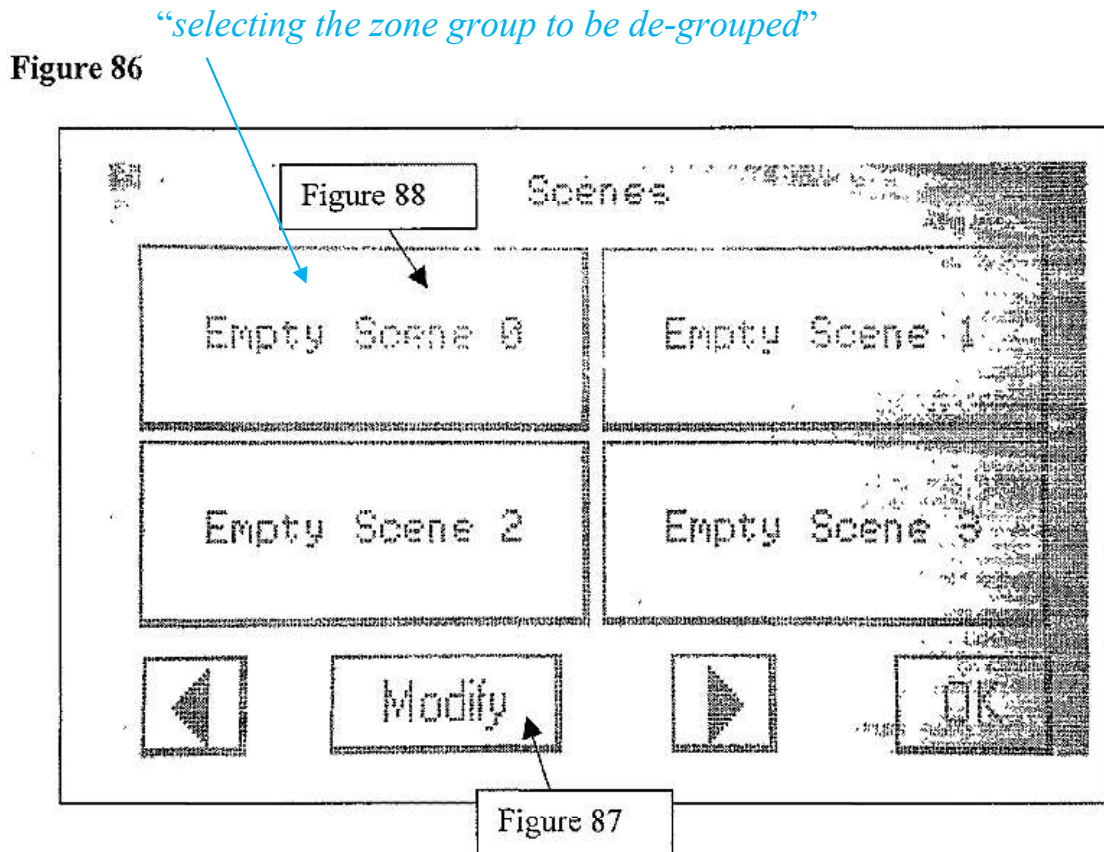
- b. [35a]: selecting the zone group to be de-grouped from the first list;

151. In my opinion, Geiwitz discloses limitation [35a].

152. Geiwitz discloses selecting a scene (“zone group”) to be de-grouped.

Geiwitz discloses that to modify a scene, a user navigates to the scenes menu and

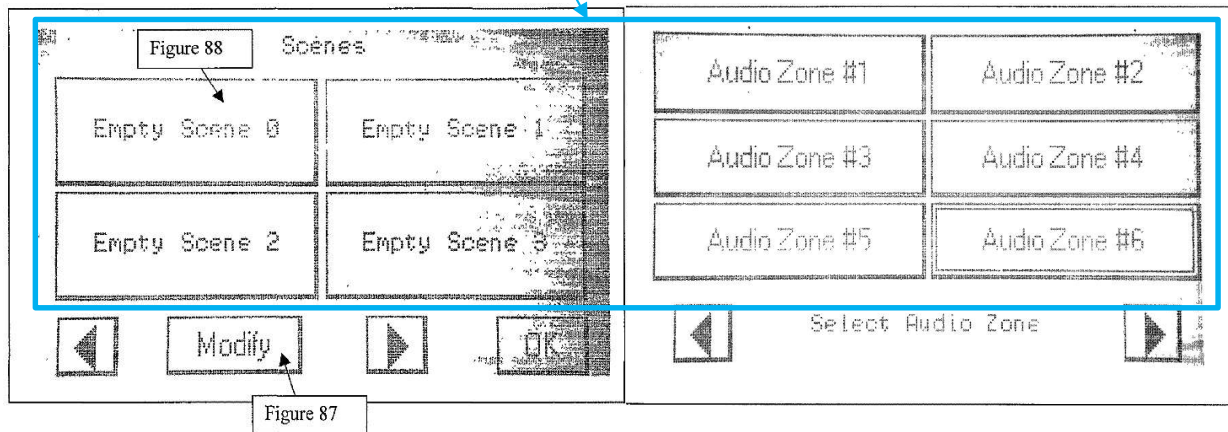
selects the scene to be modified (“*selecting the zone group to be de-grouped*”) and selects “Modify”. EX1006, 56, Fig. 86.



EX1006, 56, Fig. 86 (annotated).

153. As explained for limitation [25g] (Section XI.A.1.f), Geiwitz discloses displaying “*a first list showing at least available players,*” Geiwitz does not expressly disclose selecting the scene “*from the first list.*” A POSITA would have found it obvious to configure Geiwitz’s touchscreen user interface to show the scenes and audio zones in the same list, as illustrated below.

A first list showing zone groups and players



EX1006, 56, Fig. 86 (left), 64, Fig. 104 (right) (annotated).

154. As discussed in [25g] (Section XI.A.1.f), when configuring a scene, the user first navigates to the “Scenes” menu (shown above on the left), chooses a “scene,” and selects the “Modify” icon to create or modify the “scene.” EX1005, 25:15-25; EX1006, 20, 56, Figs. 4, 86. To select audio zones to include in the scene, the user needs to navigate through multiple screens, including:

- navigating to and choosing the “Audio” icon;
- navigating to the audio control screen and choosing the “Zone” icon; and
- navigating to a screen displaying a list of audio zones for selection (shown above on the left).

EX1005, 25:15-25; EX1006, 21, 56-59, 62-64, 172, 581-590, Figs. 15, 99, 104. A POSITA would have found it obvious to configure the touchscreen user interface

to show the scenes and audio zones in the same list on the screen, as shown above, because it is a suitable option for displaying scenes and audio zones on a screen. For example, a POSITA would have understood that listing the various items separately, on different interfaces, would be one suitable option, and displaying the various items together on a single interface would be another alternative that would potentially yield at least incremental benefit in providing a streamlined interface and user experience.

155. A POSITA also would have had a reasonable expectation of success in such modification because it merely requires only ordinary skill to update the software to be executed by the microprocessor for updating the touchscreen user interface. EX1005, 4:6-10, 8:28-9:21, 10:19-27, 15:28-16:2, Fig. 1; EX1006, 1. A POSITA would have known how to show more devices or icons in a list, such as by programming the user interface control software to adjust the size and location of the icons representing the audio zones and scenes, and to present additional icons in additional screens for the user to cycle between them using navigation arrows. EX1006, 64. A POSITA would have found such modification to the user interface a routine design choice and merely requires ordinary skill. EX1006, 64.

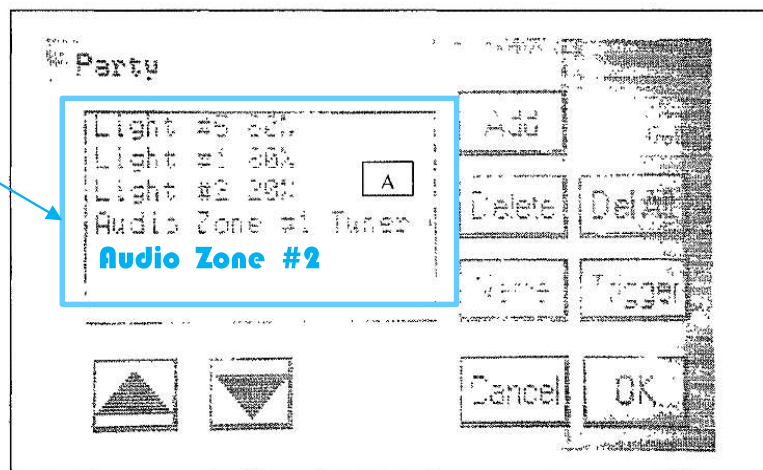
- c. **[35b]: displaying on the screen an another list showing all the players within the zone group to be de-grouped;**

156. In my opinion, Geiwitz discloses limitation [35b].

157. As described above for limitation [35a], once a scene (“*zone group to be de-grouped*”) is selected, a user can choose the “Modify” icon to modify the “scene.” EX1005, 25:15-25; EX1006, 20, 56, Figs. 4, 86. The touchscreen user interface then displays another list showing the audio zones (“*players*”) within the scene, as shown below. EX1006, 61. And a POSITA would have understood that when the scene includes more than one audio zone, the screen would show all audio zones within the scene (“*displaying on the screen an another list showing all the players within the zone group to be de-grouped*”).

“displaying on the screen an another list showing all the players within the zone group to be de-grouped”

Figure 96



EX1006, 61, Fig. 96 (modified, annotated).

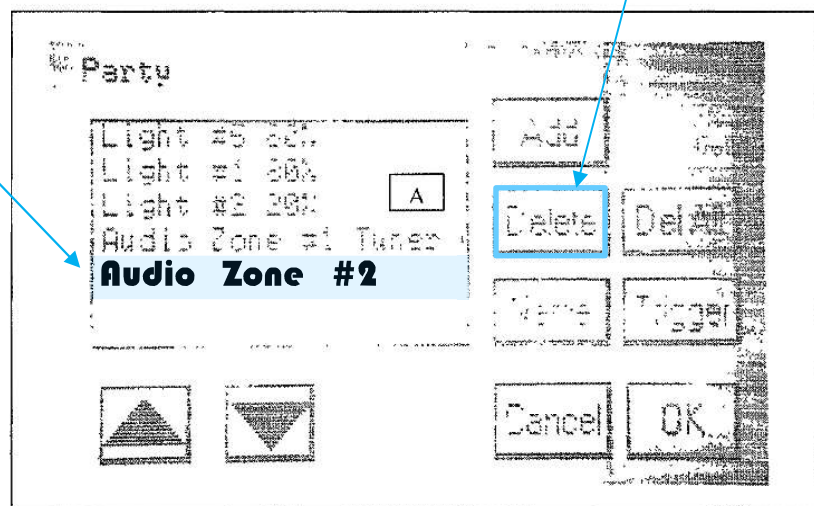
- d. [35c]: selecting one or more players from the another list; and

158. In my opinion, Geiwitz discloses limitation [35c].

159. As shown below, Geiwitz provides the option for a user to delete audio zones from a scene. EX1006, 57, Fig. 89. In some applications, Geiwitz teaches a user can delete options from a displayed list by scrolling the highlight to the option and pressing the Delete icon. EX1006, 83, 91, 96, 100, 104, 110, 115, 119, 127. A POSITA would have understood that when a scene includes more than one audio zones, a user would delete an audio zone in the scene by, for example, scrolling the highlight to an audio zone within the scene (*“selecting one or more players from the another list”*), and chose the “Delete” icon to delete those audio zones from the scene. EX1006, 91.

“selecting one or more players from the another list”

Figure 96



“disassociating the selected players from the zone group”

EX1006, 61, Fig. 96 (modified, annotated).

e. [35d]: disassociating the selected players from the zone group.

160. In my opinion, Geiwitz discloses limitation [35d].

161. As described above for [35c] (Section XI.A.3.d), Geiwitz's touchscreen user interface gives the user an option to select and "Delete" one or more audio cones (*"players"*) from the scene (*"zone group"*). A POSITA would have understood that deleting an audio zone (*"one or more players"*) at the scene configuration screen would remove the audio zone from the scene (*"disassociating the selected players from the zone group"*). EX1006, 91.

B. Ground 2: Geiwitz and Aiso Render Obvious Claim 38 and 42-43

1. Rationale to Combine Geiwitz and Aiso

162. Geiwitz and Aiso are analogous art to the '014 patent because they are in the same field of endeavor as each other and as the '014 patent—audio output control and user interface. *See* EX1005, Abstract, 19:5-20:20, 25:26-26:9, 28:11-17; EX1006, 2, 6, 172-173; EX1007, 1:42-48, 2:46-64; EX1001, Abstract, 1:18-22.

163. Geiwitz and Aiso both describe controlling an individual zone/channel and collective control of a group of zones/channels. *See* Sections X.A (Overview of Geiwitz), X.B (Overview of Aiso). And both Geiwitz and Aiso disclose a user interface that enables control of the input/output levels of individual zones/channels and control of grouped of zones/channels. EX1005, 25:26-26:8; EX1006, 62-63, 66, 214, Figs. 103, 106, 372-373; EX1007, 3:9-16, 4:1-10, 4:30-35, Fig. 2.

164. A POSITA would have found it obvious to modify Geiwitz's touchscreen user interface to display the individual volume meters of audio zones belonging to a scene ("*group*") and the group volume meter for changing the volumes of all audio zones in the scene on the same screen, in view of Aiso's teachings of a known, conventional layout for presenting the user with both options collected in a single interface. EX1026, [0039], [0042]-[0057], Fig. 1; EX1027, 11:12-16, Figs. 6, 7.

165. Aiso teaches a mixing console for setting control values, such as volume levels, of audio signals of multiple channels. EX1007, Abstract, 3:9-32, 4:1-10, 10:13-27. Aiso's mixing console provides individual fader controls for setting the levels of corresponding channels. EX1007, 3:33-39, 3:1-10, 6:11-21, Figs. 2, 5. Aiso's mixing console, in the same interface, also provides group controls that collectively change levels of channels belonging to the same group. EX1007, 1:27-30, 3:9-32, 4:1-10, Figs. 1-2.

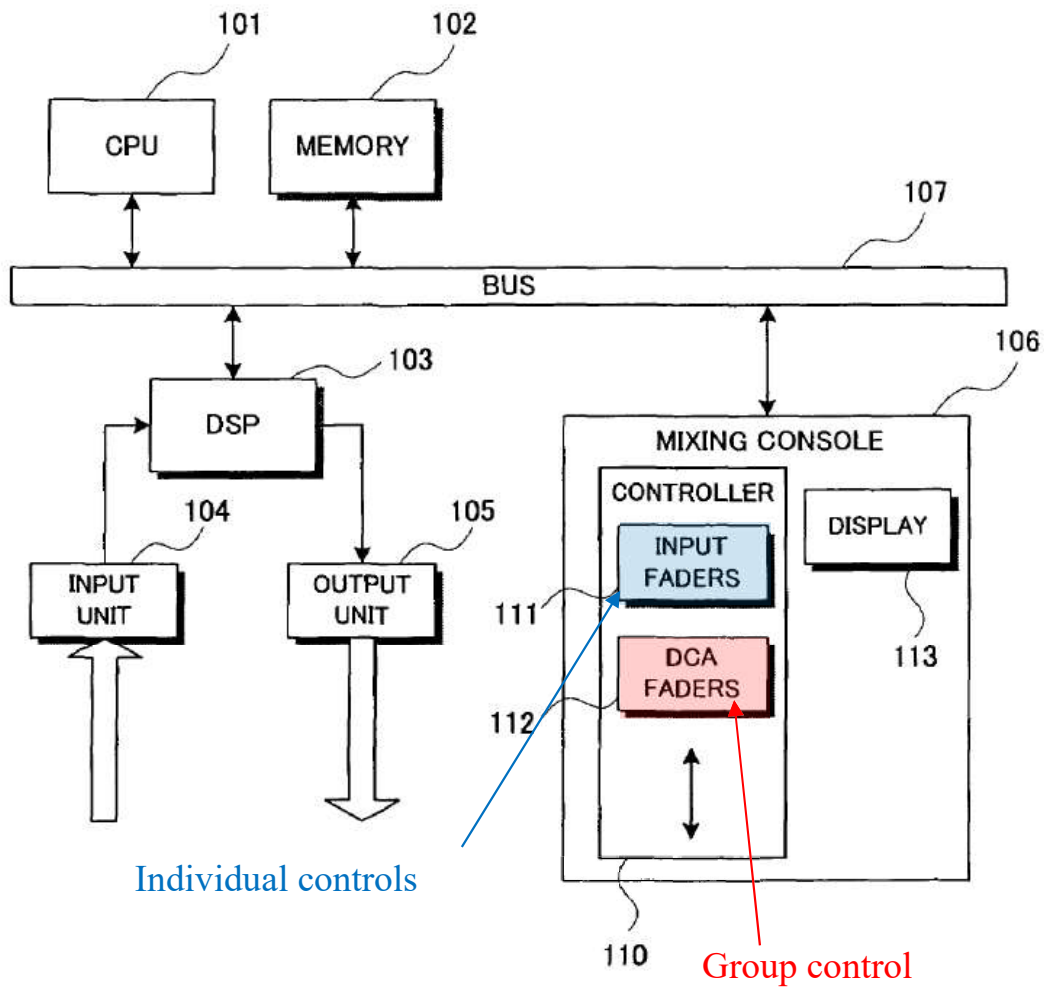


FIG. 1

EX1007, Fig. 1 (annotated).

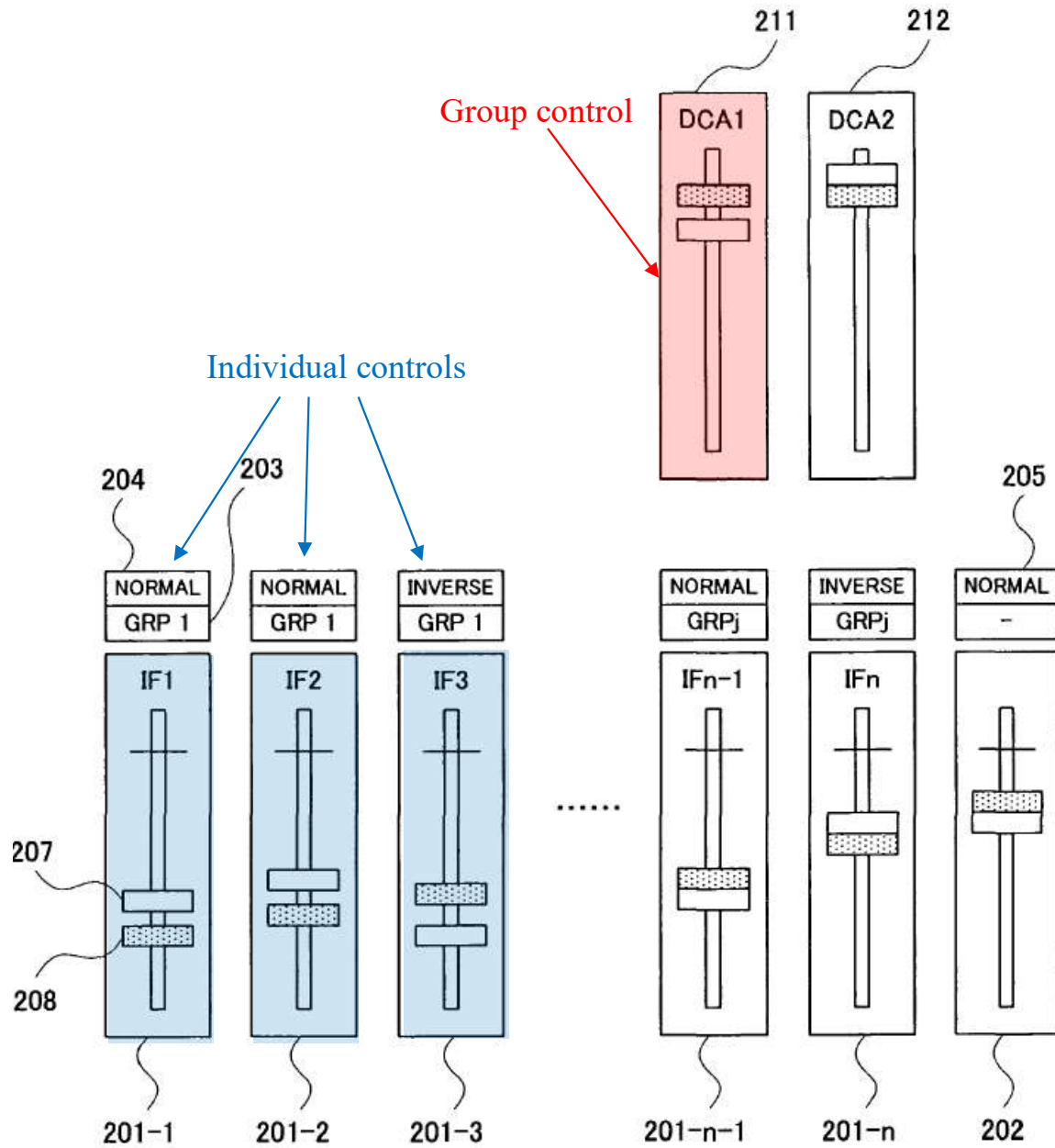


FIG. 2

EX1007, Fig. 2 (annotated).

166. Like Aiso, Geiwitz discloses individual volume meters of audio zones and a group volume meter for changing volumes of all audio zones in a scene by the same amount. EX1005, 25:26-26:8; EX1006, 62-63, 66, Figs. 103, 106. In combination, Geiwitz's user interface would have been adapted to display Geiwitz's individual audio zone volume controls and group control volume control on a single interface display, as Aiso teaches and was well known in the art in the audio and volume control space. A POSITA would have found Aiso's teaching of providing both individual and group controls on one interface a suitable design alternative for the layout and configuration of Geiwitz's touchscreen user interface for presenting Geiwitz's individual and group volume meters of audio zones in a scene. EX1012, Figs. 8A-9 (a user interface displaying both group and individual volume controls of audio applications).

167. And a POSITA would have understood that such modification to Geiwitz's touchscreen user interface would offer a streamlined user experience in various ways. For example, a POSITA would have understood that such combined display would allow the user to have immediate visual feedback of the effect of the group control on individual audio zones. Although Aiso's mixing console uses knobs or sliders for control input while Geiwitz relies on a graphical user interface for input, a POSITA would have found Aiso's unified display of single and group controls applicable to Geiwitz's graphical displays because the art was moving

towards graphical displays, and a POSITA would have easily understood that adopting the conventional and well known interface layouts in graphical form would have provided a display that was intuitive and comfortable for the user. EX1012, Figs. 8:34-36, 8A-9; EX1026, [0039], [0042]-[0057], Fig. 1; EX1027, 2:22-25, Figs. 6, 7. A POSITA would have understood that such combined display would reduce navigation needed to fine tune the volume controls of individual audio zones in a scene. And a POSITA would have understood that the combined display would allow the user to see instantly if the audio zones are behaving normally according to the group control and perform troubleshooting or calibration if needed.

168. A POSITA would have known how to present individual volume meters of and group volume meter of audio zones in a scene on Geiwitz's touchscreen user interface because such modification would require nothing more than ordinary software programming skills. For example, a POSITA would have programmed the user interface control software executed by Geiwitz's microprocessor to adjust the size and location of the icons to present the individual volume meters and the group volume meter on the same screen. When there are many audio zones in a scene under group control, a POSITA would have understood to display additional volume meters in additional screens for the user to cycle between them using navigation arrows. EX1006, 64, Fig. 104.

2. Independent Claim 38

169. In my opinion, Geiwitz and Aiso render obvious claim 38.

- a. **[38pre]: An apparatus for manipulating a plurality of players, the apparatus comprising:**

170. In my opinion, Geiwitz discloses limitation [38pre] as explained for limitation [25pre]. *Supra* Section XI.A.1.a.

- b. **[38a]: a screen;
[38b]: a screen driver commanding the screen;
[38c]: an input interface;**

171. In my opinion, Geiwitz discloses limitations [38a]-[38c] as explained for limitations [25a]-[25c]. *Supra* Sections XI.A.1.b (limitations [25a]-[25c]).

- c. **[38d]: a network interface;**

172. In my opinion, Geiwitz discloses limitation [38d] as explained for limitation [25d]. *Supra* Section XI.A.1.c (limitation [25d]).

- d. **[38e]: a memory for storing code for an application module;**

173. In my opinion, Geiwitz discloses limitation [38e] as explained for limitation [25e]. *Supra* Section XI.A.1.d (limitation [25e]).

- e. **[38f]: a processor coupled to the memory, the input interface, the screen driver and the network interface, the processor executing the code in the memory to cause the application module and the screen driver to perform operations of:**

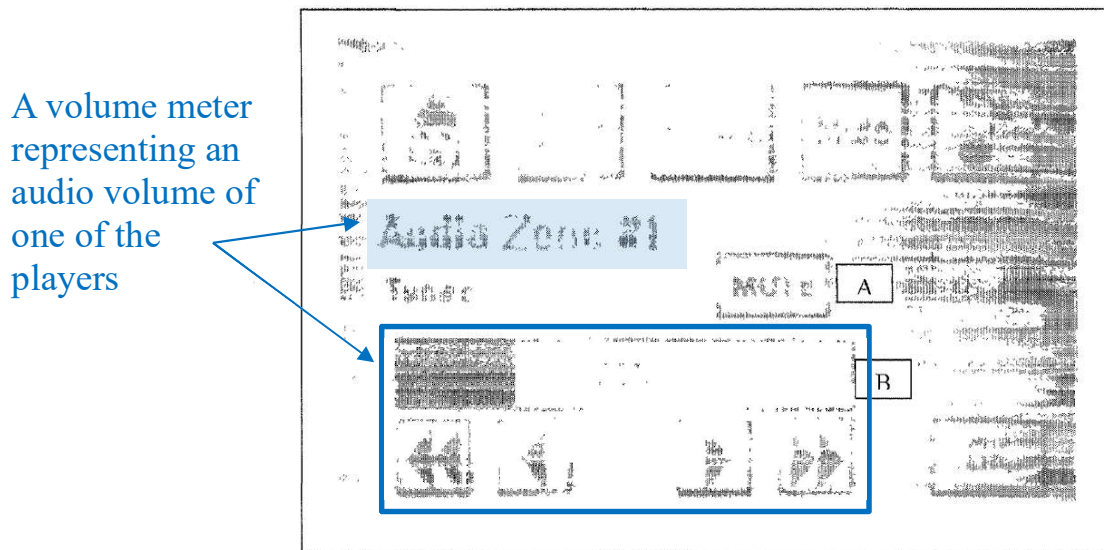
174. In my opinion, Geiwitz discloses limitation [38f] as explained for limitation [25f]. *Supra* Section XI.A.1.e (limitation [25f]).

- f. [38g]: displaying on a screen a list showing a plurality of volume meters, at least one of the volume meters representing an audio volume of one of the players, and another one of the volume meters representing an audio volume of a group of players, if there is such a group; and

175. In my opinion, Geiwitz and Aiso render obvious limitation [38g].

176. Geiwitz discloses adjusting the volume levels of individual audio zones and displaying a volume meter for adjusting the volume of an individual audio zone (“player”), as shown below. EX1006, 13, 66, Fig. 106.

Figure 106



EX1006, 66, Fig. 106 (annotated).

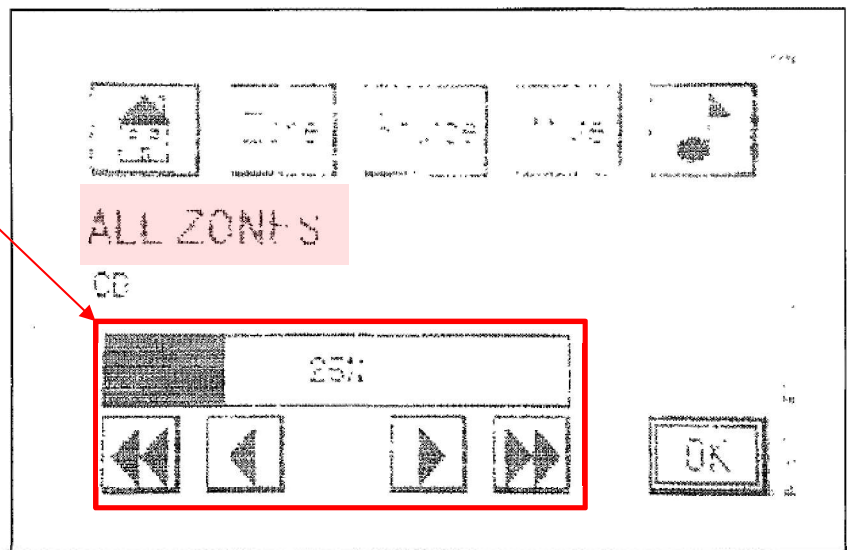
177. And as discussed in limitation [25j] (Section XI.A.1.i), a POSITA would have understood that Geiwitz discloses a group volume meter and volume adjusters to control the volumes of all audio zones (“players”) in a scene (“group”), as shown below. A POSITA would have understood that this group volume meter

would “represent[] an audio volume of a group of players, if there is such a group.”

And a POSITA would have understood this group volume meter as “another one of the volume meters representing an audio volume of a group of players” because it reflects the volume of the whole group. *Supra* Section XI.A.1.i.

“another one of the
volume meters
representing an
audio volume of a
group of players”

Figure 103

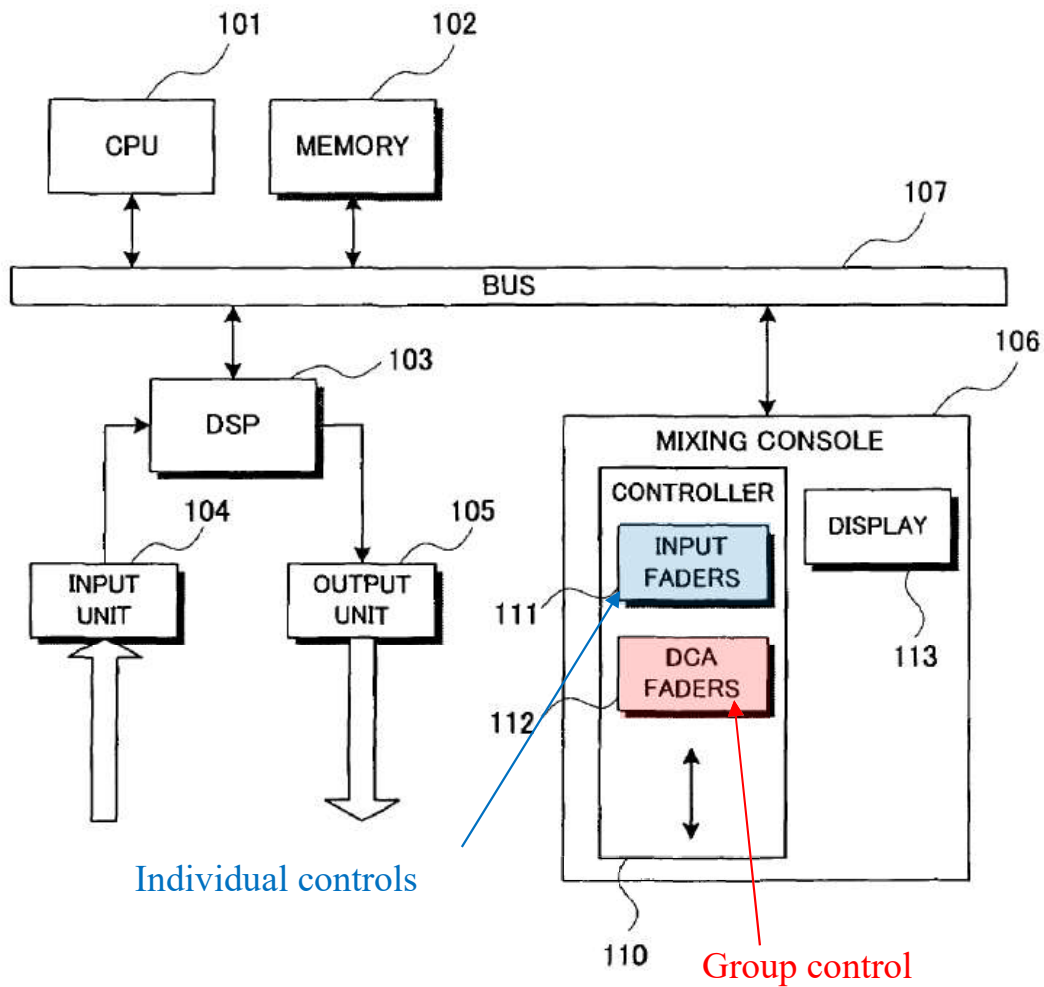


EX1006, 63, Fig. 103 (annotated).

178. Geiwitz does not expressly disclose “displaying on a screen a list showing a plurality of volume meters” that includes a volume meter for representing an audio volume of an individual player and a group volume meter that represents an audio volume of a group of players. But it would have been obvious to a POSITA, in my opinion, to modify the format and layout of Geiwitz touchscreen display to present both Geiwitz’s individual player volume meter and group volume meter

combined on a single interface, as Aiso teaches and was known in the art. EX1007, Fig. 2; EX1026, [0039], [0042]-[0057], Fig. 1; EX1027, 2:22-29, Figs. 6, 7.

179. As shown below, Aiso discloses a console panel with an interface that provides **individual fader controls** for setting control levels of individual channels and **group controls** that collectively change the levels of all channels of the same group (e.g., “GRP1”). EX1007, 3:9-32, 4:1-10, Figs. 1-2.



F I G . 1

EX1007, Fig. 1 (annotated).

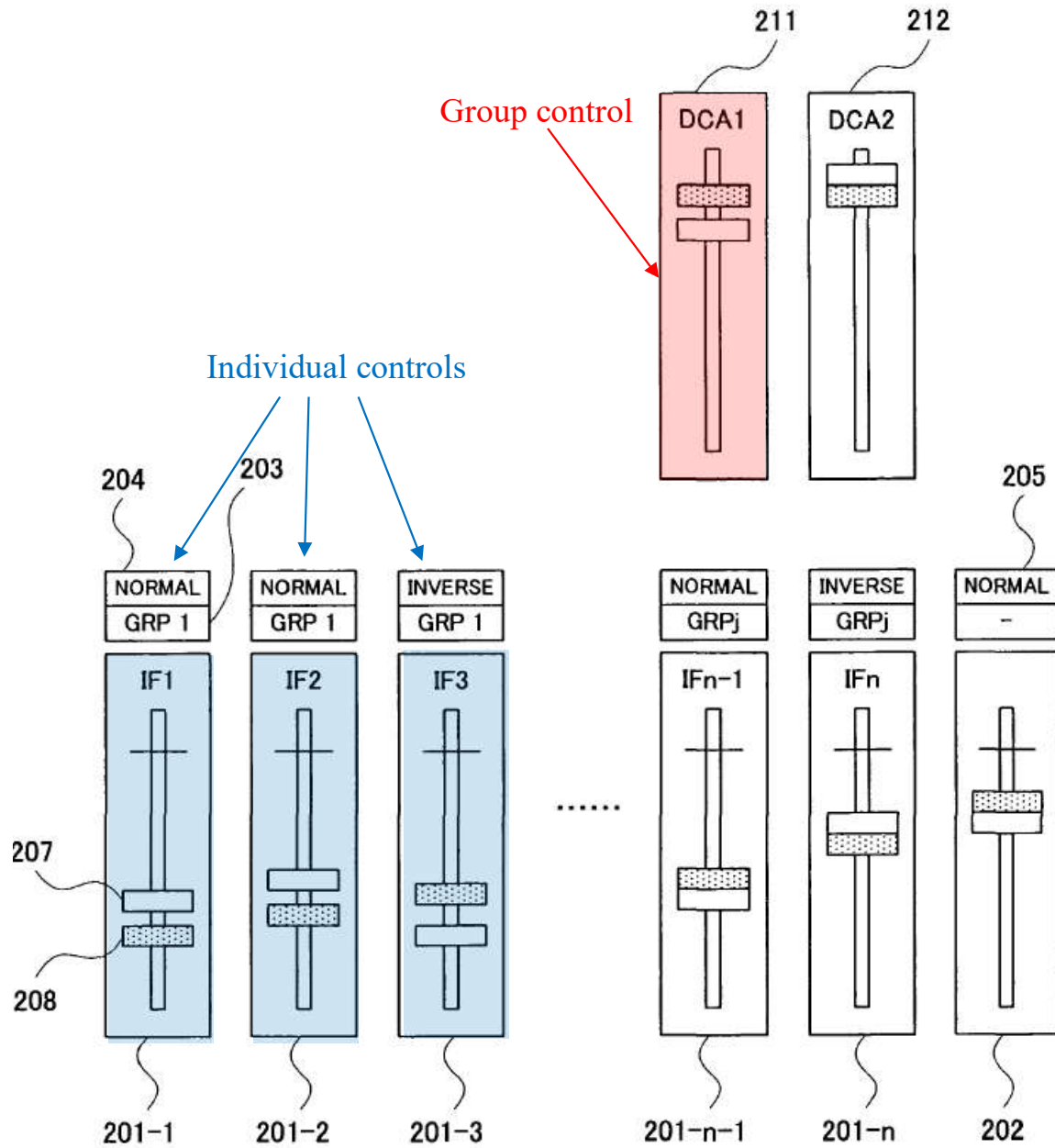


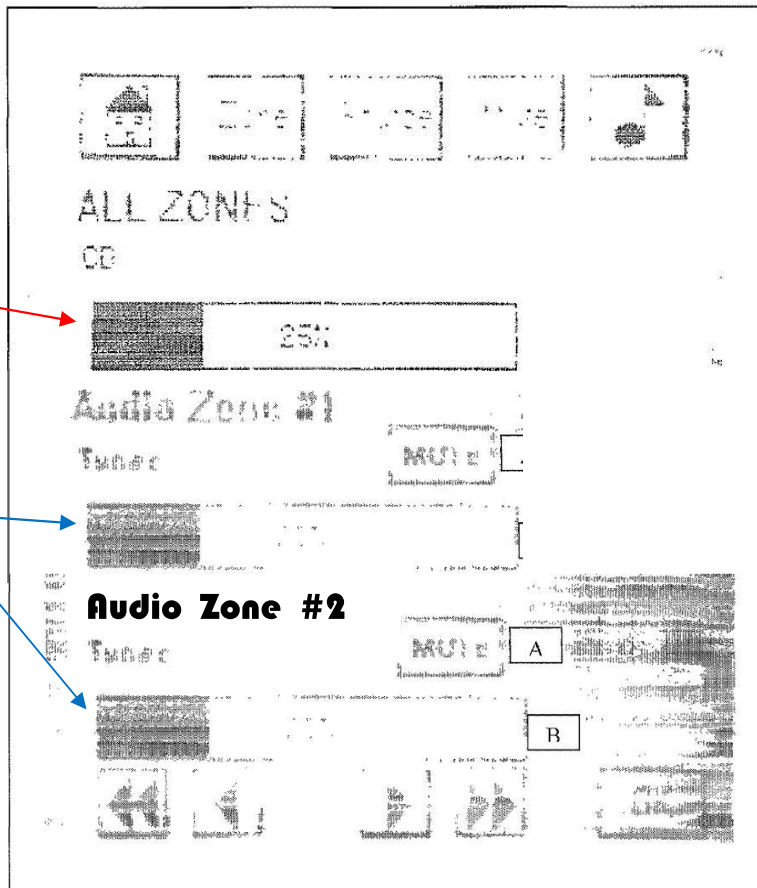
FIG. 2

EX1007, Fig. 2 (annotated).

180. As explained in the Rationale to Combine Geiwitz and Aiso (Section XI.B.1), a POSITA would have found Aiso's teaching of providing both individual and group controls on the same user interface a suitable design alternative for Geiwitz's presentation of individual and group volume meters of audio zones (*"players"*) in a scene (*"group"*). EX1012, Figs. 8A-9; EX1027, Fig. 1. As combined, a POSITA would have understood that Geiwitz's touchscreen user interface would display both its individual and group controls, a layout taught by Aiso. And a POSITA would have understood such modification to Geiwitz's touchscreen user interface would offer a streamlined interface and user experience. Section XI.B.1. A POSITA would have known how to present individual volume meters of and group volume meters of audio zones in a scene on Geiwitz's touchscreen user interface using ordinary skill. *Supra* Section XI.B.1. As such, as illustrated below, when Geiwitz's touchscreen user interface is used for controlling a scene including more than one audio zone (*"if there is such a group"*), Geiwitz's touchscreen user interface modified in view of Aiso's teaching would display *"a list showing a plurality of volume meters,"* and *"at least one of the volume meters"* would represent an audio volume of an audio zone in the scene (*"one of the players"*) and *"another one of the volume meters"* would represent an audio volume of all audio zones in the scene (*"a group of players"*).

“another one of the volume meters representing an audio volume of a group of players”

“at least one of the volume meters representing an audio volume of one of the players”



EX1006, 63, 66, Fig. 103, 66, Fig. 106 (modified, annotated).

- g. **[38h]:** adjusting one of the volume meters as desired after one of the volume meters from the list is selected, wherein the one of the volume meters is for the group of players, represented by an averaged value of audio volumes of the players in the group, and

181. In my opinion, Geiwitz and Aiso render obvious limitation [38g].

182. As discussed above in limitation [38g] (Section XI.B.2.f), Geiwitz and Aiso render obvious displaying on Geiwitz’s touchscreen “a list showing a plurality of volume meters,” one of which would represent an audio volume of all audio zones

in the scene (*“one of the volume meters is for the group of players”*). And as discussed in [25j] (Section XI.A.1.i), it would have been obvious to a POSITA that such group volume meter of Geiwitz would have been represented by the averaged value of the audio volumes of the audio zones of the scene (*“players in the group”*). A POSITA would have understood that adjusting the group volume meter, such as by using the volume adjusters, would change a volume of each of the audio zones in accordance with an adjustment made by a user. EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103; Section XI.A.1.i (limitation [25j]).

183. And a POSITA would have further understood that in Geiwitz’s touchscreen user interface modified in view of Aiso’s teaching, there are at least two suitable, alternative ways to change the volumes of all zones in the scene by adjusting the group volume meter.

184. First, a POSITA would have understood that the touchscreen user interface would include a set of volume adjusters under each listed volume meter as taught in Geiwitz (e.g., EX1006, 63, 66, Figs. 103, 106), and adjusting the volume adjusters changes the value of the volume meter displayed above the volume adjusters. A POSITA would have understood that adjusting the volume adjusters under the group volume meter would have selected the group volume meter from the list of displayed volume meters and would have adjusted the volume adjusters

based on the desired listening experience of the whole group (*“adjusting one of the volume meters as desired after one of the volume meters from the list is selected”*).

185. Second, a POSITA would have understood that another suitable design would have the touchscreen user interface present one set of volume adjusters for adjusting any of the volume meters in the list, and a user would adjust the group volume meter after selecting the group volume meter from the list (*“adjusting one of the volume meters as desired after one of the volume meters from the list is selected”*), such as by scrolling a highlight across the list of volume meters, and adjusting the volume adjuster selected by the highlight. EX1006, 62-63, 91, Figs. 103, 106.

186. A POSITA would have understood that both designs would be suitable for adjusting the group volume meter in Geiwitz combined with Aiso. And a POSITA would have had a reasonable expectation of success in implementing either design because it would have only required ordinary skill to program Geiwitz’s software driving the microprocessor to update the touchscreen user interface to display the volume meters and volume adjusters at suitable locations and sizes while maintaining their existing functions. EX1005, 1:13-19, 2:4-13, 3:15-5:9, 10:19-27, 17:4-23, 19:5-20:20, 25:26-26:8, 28:11-17, Figs. 1, 14; EX1006, 2, 5, 11-17, 62-63, 91, 172-172, 581, Figs. 103, 106.

- h. [38i]: said adjusting of the one of the volume meters includes changing a volume of each of the group of players synchronously in accordance with an adjustment made by a user.**

187. In my opinion, Geiwitz and Aiso render obvious limitation [38g].

188. As discussed in [25j] and [38h] (Sections XI.A.1.i, XI.B.2.g), a POSITA would have understood that adjusting the group volume meter displayed in the list, such as by using the volume adjusters, would change a volume of each of the audio zones in a scene (“*changing a volume of each of the group of players*”) in the same fashion (“*synchronously*”) in accordance with an adjustment made by a user, such as an increase or decrease by 1% or 5%. EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103.

3. Claim 42

189. In my opinion, Geiwitz and Aiso render obvious claim 42.

- a. The apparatus of claim 38, wherein the processor executing the code in the memory causes the application module and the screen driver to perform operations of maintaining relative volume loudness difference among each of the players in the group.**

190. As discussed above in limitation [25f] (Section XI.A.1.e), Geiwitz discloses the processor executing the code in the memory causes the application module and the screen driver to perform operations. And as discussed above in limitation [25j] (Section XI.A.1.i), Geiwitz discloses a volume meter that controls the volumes of all the audio zones, and adjusting the volume meter allows

synchronous adjustment of the volumes of all the audio zones in the same fashion, such as adjusting the volume in increments of 1% or 5%. EX1005, 25:26-26:8; EX1006, 62-63, Figs. 97, 103. And as discussed in limitations [25j] and [38h] (Sections XI.A.1.i, XI.B.2.g), a POSITA would have found it obvious that Geiwitz's group volume meter is represented by "*an averaged value of audio volumes of the players in the group.*" As such, a POSITA would have understood that adjusting Geiwitz's group volume meter would cause the relative volume loudness difference among each of the audio zones of a scene ("players in the group") to remain the same.

191. For example, when all audio zones ("players") in a scene ("*group*") have the same volume, such as 25% or 100%, the relative volume loudness difference between the audio zones is zero. Adjusting the group volume meter represented by an average value of 25% or 100% would change the volume of each audio zone by the same amount, maintaining the relative volume loudness difference, i.e., zero. In fact, in the instance where all audio zones have the same volume, the relative volume loudness difference between the audio zones would remain zero throughout the adjustment of the group volume meter from 0% to 100%.

192. And for another example, in a scene ("*group*") having two audio zones ("players") with respective volumes at 10% and 40% and a relative volume loudness difference of 30%, increasing the group volume meter represented by the averaged

value of 25% by 5%, would result in the first audio zone having a volume of 15%, and the second audio zone having a volume of 45%, maintaining the offset of 30%. Alternatively, it would have been obvious, if the user increased group volume from 25% to 50%, to change the two audio zones to 20% and 80%, thus maintaining the 4x volume difference between the two players. *See* EX1005, 25:26-26:8; EX1006, 62-63, Figs. 97, 103 (teaching changing volumes of all the audio zones in the same fashion). This same effect can be achieved, for example, when a fixed offset between volumes is maintained and the volumes are represented in decibels (a common method of representing volume).

4. Claim 43

193. In my opinion, Geiwitz and Aiso render obvious claim 43.

- a. **The apparatus of claim 38, wherein the one of the volume meters from the list selected is for the group of players, and wherein said adjusting the one of the volume meters includes causing an equal change to a volume of each of the players in the group.**

194. As discussed in [38i] (Section XI.B.2.h), a POSITA would have understood that adjusting the group volume meter displayed in the list (“*adjusting the one of the volume meters*”), such as by using the volume adjusters, would change a volume of each of the audio zones in a scene synchronously in accordance with an adjustment made by a user in the same fashion, such as an increase or decrease by

1% or 5% (*“causing an equal change to a volume of each of the players in the group”*). EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103.

195. A POSITA would have understood that such adjustment of Geiwitz’s group volume meter would allow it to remain represented by the averaged value of the volumes of the players of the group. For example, when all audio zones (*“players”*) in a scene (*“group”*) have the same volume, such as (i) 25%, increasing the group volume meter by 5% would result in the volumes of both audio zones increasing to 30%, while the group volume meter is represented by the averaged value of the volumes of the two audio zones; or (ii) 100%, decreasing the group volume meter by 5% would result in the volumes of both audio zones to decrease to 95%, which the group volume meter is represented by the averaged value 95% of the volumes of the two audio zones. In fact, in the instance where all audio zones have the same volume, the group volume meter would be represented by the average value of the volumes of all audio zones in the scene throughout its adjustment from 0% to 100%.

196. And for another example, in a scene (*“group”*) having two audio zones (*“players”*) with respective volumes at 10% and 40 and an averaged value of 30%, increasing the group volume meter from 25% by 5% would increase the first audio zone to a volume of 15% and the second audio zone to a volume of 45%, while the group volume meter is represented by the averaged value of 30%.

197. The '014 patent similarly describes that “when the volume adjustment is made to the zone group, the entire group will respond to the volume adjustment in an identical scale. In one embodiment, the identical scale is based on percentage of the audio volume. In another embodiment, the identical scale is based on graphic representation of the volume meter.” EX1001, 13:47-51. “Depending on implementation, the relative difference of the audio volume among zone players in the group remains unchanged either in percentage or graphic strength.” EX1001, 11:37-40. In one embodiment, “an end user increases the audio volume for the zone group by 5%. The volume for each of the zone players in the zone group will be increased by 5%, and the relative volume loudness difference among each of the zone players remains unchanged.” EX1001, 13:53-57.

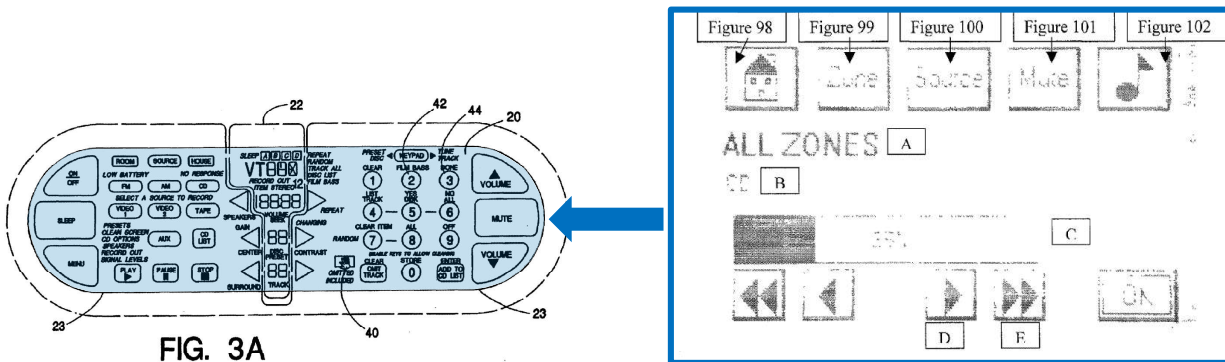
C. Ground 3: Allen, Geiwitz, and Van Hulle Render Obvious Claims 25, 32, and 35

1. Rationale to Combine Allen, Geiwitz, and Van Hulle

198. In my opinion, Allen and Geiwitz are analogous art to the '014 patent because they are in the same field of endeavor as each other and as the '014 patent. *See* Sections (Overview of the '014 patent), X.A (Overview of Geiwitz), X.C (Overview of Allen).

199. A POSITA would have been motivated to modify the user interface screen of Allen's remote controller to use Geiwitz's icon-based user interface

designs to effect control over the audio sources and sound reproduction devices, as illustrated below:



EX1008, Fig. 3A; EX1006, 62, Fig. 97; *see also* EX1008, 3:44-4:17, 5:28-6:13, 7:44-8:42; EX1005, 9:25-30, 10:9-18, 12:3-12, 17:4-23, Figs. 28-33; EX1006, 6, 172. For example, both Allen and Geiwitz disclose collective control of a group of audio devices throughout a house, such as playing the same audio source and performing collective volume adjustment of a group of audio devices. EX1008, 3:21-43, 3:66-4:17, 5:28-6:13; EX1005, 25:26-26:8, 38:7-9; EX1006, 62-63, 581-583, Fig. 103. A POSITA would have understood that modifying Allen's user interface screen to use Geiwitz's icon-based user interface designs would have provided users a familiar, simplified, and flexible icon-based interface.

200. For example, a POSITA would have understood that the indicator area of Allen's user interface screen allows for displaying a predetermined number of graphic figures, and selecting multiple rooms, such as by toggling through the graphic figures. EX1008, 5:28-49; *compare* EX1008, 3:33-36 (15 different rooms in

a house) *with* Figs. 3A (showing a list of four rooms A, B, C, D). A POSITA would have understood that using Geiwitz's icon-based user interface designs allows for more flexible and expandable options for what to display on the interface in an intuitive navigation. EX1006, 21, 56-59, 64, Fig. 104; EX1006, 172 (controlling 144 zones).

201. A POSITA would have understood that Geiwitz's icon-based user interface designs also allow for customizing the icons representing the audio devices or groups of devices, allowing for easy reconfiguration of groups, rather than using predefined graphic figures as in Allen. EX1006, 64, 214, Fig. 373; EX1008, 5:28-49.

202. Accordingly, a POSITA would have understood that modifying Allen's user interface screen to use Geiwitz's icon-based user interface designs would further Allen's objective "to provide an improved remotely controllable audio system and ... improved remote controlling." EX1008, 1:6-8.

203. And a POSITA would have found that Geiwitz's icon-based user interface designs would have been a suitable alternative for implementing the various user interface functions of Allen's remote controller. Allen discloses displaying graphical figures representing commands appropriate to the selected audio device or group of devices, suggesting that the user interface screen can be dynamic. EX1008, 5:43-49. A POSITA would have understood that Geiwitz's icon-

based user interface designs would have been suitable for such dynamic display and provide additional display and navigation functionalities.

204. A POSITA would have known how to use Geiwitz's icon-based user interface designs in Allen's user interface screen and would have had a reasonable expectation of success in doing so because such modification requires only ordinary skill. For example, a POSITA would have understood to replace Allen's fixed segment LCD screen with a graphic LCD and update the operating system and its software modules to generate instructions for addressing pixels as needed for generating the icon-based graphical user interface on the screen. A POSITA would have known to choose a microprocessor and RAM if more processing power and memory were needed for implementing Geiwitz's icon-based user interface designs in Allen's remote controller. As such, a POSITA would have understood that incorporating Geiwitz's icon-based user interface designs in Allen's user interface screen would have been applying a known technique to improve a similar device in the same way to yield the predictable result of a user interface screen with improved flexibility and expandability.

205. A POSITA also would have been motivated to modify Allen in view of Van Hulle. As explained in [25h] (Ground 1, Section XI.A.1.g), Van Hulle discloses any one of the active sound reproducers can operate in master mode (*"serves as a zone group head"*) and synchronize all players in accordance with the master, which

passes on the audio signal it plays to the remaining sound reproducers. EX1009, 2:49-61, 3:1-5, 3:33-55, 9:22-10:22.

206. A POSITA would have understood that Allen teaches a combination of sound reproducers playing the same audio source. EX1008, 3:21-43, 3:66-4:17, 5:28-49. To the extent Allen does not describe the implementation details of such synchronized play, a POSITA would have been motivated to find teachings on the implementation details, and would have recognized that Van Hulle provides a suitable solution. For example, a POSITA would have recognized that Van Hulle's chained signal routing provides a suitable alternative solution for sending the audio signals to Allen's four sound reproducers in Rooms A, B, C, D. EX1008, 5:28-49, Fig. 3. And a POSITA would have understood that Van Hulle's audio synchronization based on chained signal routing allows for expanding and sending audio output to additional sound reproducers in Allen.

207. A POSITA would have understood that using Van Hulle's synchronization method in Allen would improve the availability of Allen's audio system. For example, a POSITA would have recognized that Van Hulle's method of routing audio signals for synchronous playback would improve the range and/or installation of Allen's networked audio system. A POSITA would have understood and appreciated that when using wirelessly connected components, that Van Hulle's chain-based signal routing topology can extend the range, making it possible to

cover larger spaces (such as a whole home) without worry that the furthest sound reproducers will be out of range of the wireless transmitter. When using wired network connections for connecting players, Van Hulle's chain-based signal routing topology can reduce the number installation costs and difficulty by reducing the amount of cabling required. When implementing Allen's system control for audio players in multiple locations, using Van Hulle's method of synchronizing would allow a first player to become the master and pass on the audio signal being played to the remaining players in the form of an interconnected chain. EX1009, 3:33-55, 9:22-37. A POSITA would have understood that such control configuration would improve the availability of Allen's audio system.

208. A POSITA would have expected reasonable success in using Van Hulle's method in Allen because Allen's audio system is well equipped for such modification and such modification would have involved only ordinary skill. Like Van Hulle's sound reproducers, Allen's sound reproducers include wired or wireless communication interfaces for receiving and transmitting audio and control signals; EX1010, [0031]-[0034], [0038], [0040]-[0041]; EX1009, 1:30-37, 4:14-61, 5:8-33, 9:6-50, 10:15-22. A POSITA would have known to update Allen's sound reproducers to include an audio detector and a control circuit for implementing synchronized play, as disclosed by Van Hulle. EX1009, 4:14-46, 5:8-53. A POSITA would have understood that implementing Van Hulle's synchronization method in

Allen-Geiwitz would have been using a known technique to improve a similar device in the same way and yield predictable results of an audio system with improved availability.

2. Independent Claim 25

209. In my opinion, Allen, Geiwitz, and Van Hulle render obvious claim 25.

a. [25pre]: An apparatus for controlling a plurality of players, the apparatus comprising:

210. In my opinion, Allen discloses an audio system that includes a **remote controller** (“*apparatus*”) for controlling **sound reproduction devices (or sound producers)** (“*a plurality of players*”) located in different **rooms** of a house. EX1008, Abstract, 1:1-24, 3:11-4:17, 5:28-6:13, 7:44-8:42, Fig. 1.

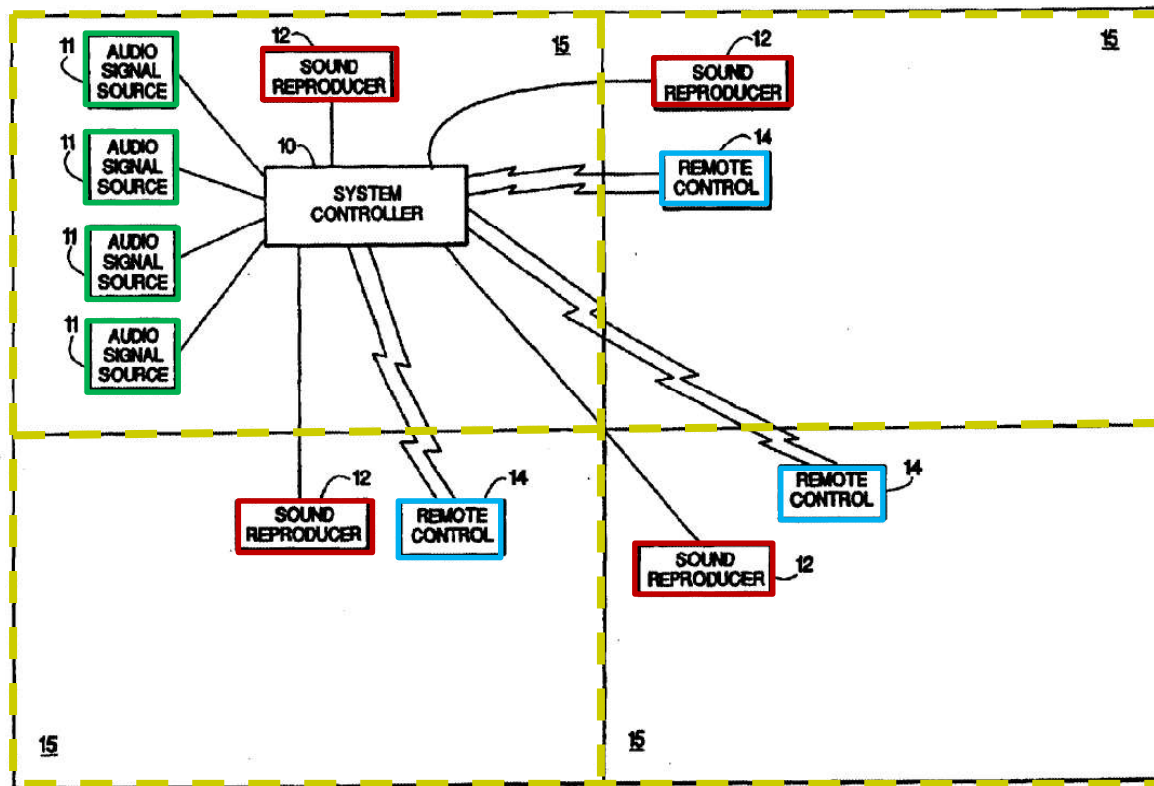


FIG. 1

EX1008, Fig. 1 (annotated). Allen's audio system also includes a system controller that is coupled to (e.g., by wireless means or electrical cable) and transmit signals to and from the sound reproduction devices and audio signal sources (e.g., tuners, CD or DVD players, tape decks, or record players). EX1008, 3:11-43, 4:18-58. The remote controller, via wireless communication with the system controller, controls the sound reproduction devices. EX1008, Abstract, 1:1-24, 3:11-4:17, Fig. 1.

211. A POSITA would have understood that Allen's sound reproduction devices constitute "*a plurality of players*" because the sound reproduction devices

are part of a connected system (“a data network”) that would receive audio signals from audio sources connected to the system and perform signal processing, e.g., amplification and digital-to-analog conversion, before outputting audio signals. EX1008, Abstract, 1:1-24, 3:11-4:58, Fig. 1. Thus, Allen’s sound reproduction devices are “a plurality of players” under the parties’ agreed construction of “player” as “a data network device configured to process and output audio.” *Supra* Section VIII

- b. [25a]: a screen;
[25b]: a screen driver commanding the screen;
[25c]: an input interface;

212. In my opinion, Allen discloses, or at least renders obvious, limitations [25a]-[25c].

213. Allen’s remote controller includes a user interface screen 20 (“screen”) having an indicator area 22 and an input area 23. EX1008, 4:59-5:20, Figs. 3A-3C.

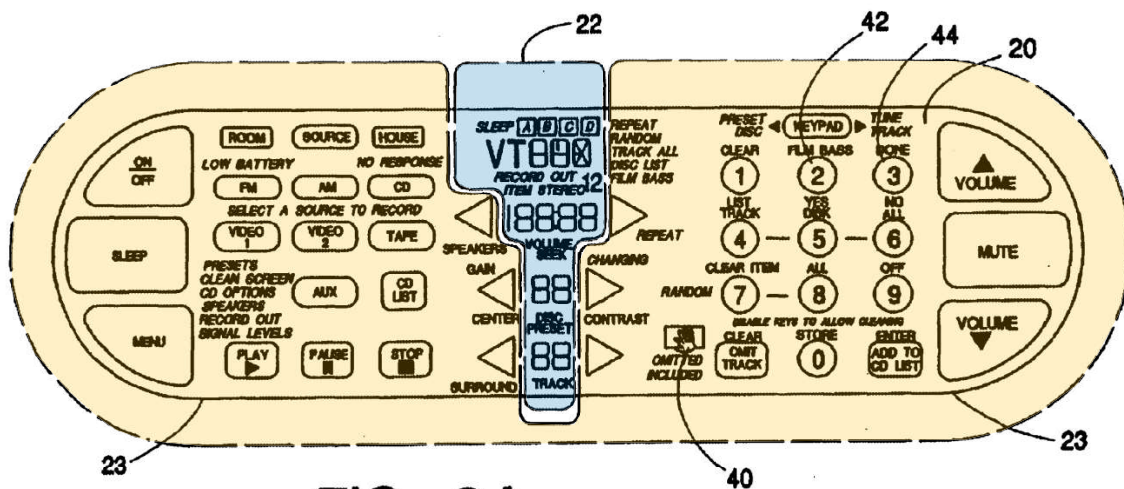


FIG. 3A

EX1008, Fig. 3A (annotated). A block diagram of Allen's remote controller is shown below. Input area 23 corresponds to a **touchscreen 54** ("*an input interface*") that receives a user command, such as selecting sound reproducers or an audio source for control. EX1008, 5:6-20, 5:28-43, 6:56-59. Indicator area 22 corresponds to a **display 52** that displays current parameter values and appropriate commands for the user selected sound reproducers or audio source. EX1008, 4:59-5:6, 5:21-27, 5:34-49, 6:14-25, 6:53-56.

214. Allen discloses, or at least renders obvious, "*a screen driver commanding the screen.*" Allen's remote controller includes a **device driver 73** that receives information from the operating system of the remote controller and transforms the information into a form usable by **display 52**. EX1008, 7:1-8. Allen discloses the device driver is "typically implemented by software." EX1008, 7:7-8. A POSITA would have understood that Allen's software device driver would send the transformed information to a control circuit that would convert such information to electric control signals to illuminate the display ("*a screen driver commanding the screen*"). A POSITA would have understood that such a control circuit is essential to allow pixels of the display to illuminate. EX1008, 4:64-5:6 (the display includes LCD segments that are illuminated). Such a screen driver was well known in the art. *See* EX1011, 5:43-61, Fig. 4.

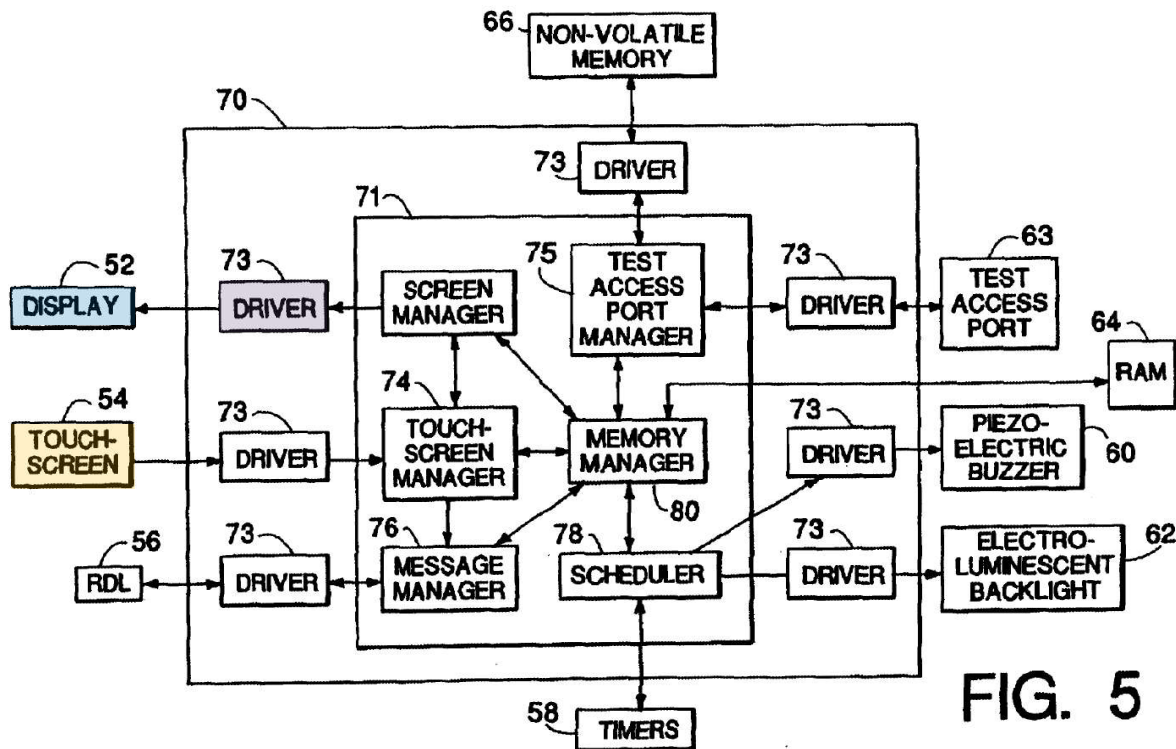


FIG. 5

EX1008, Fig. 5 (annotated).

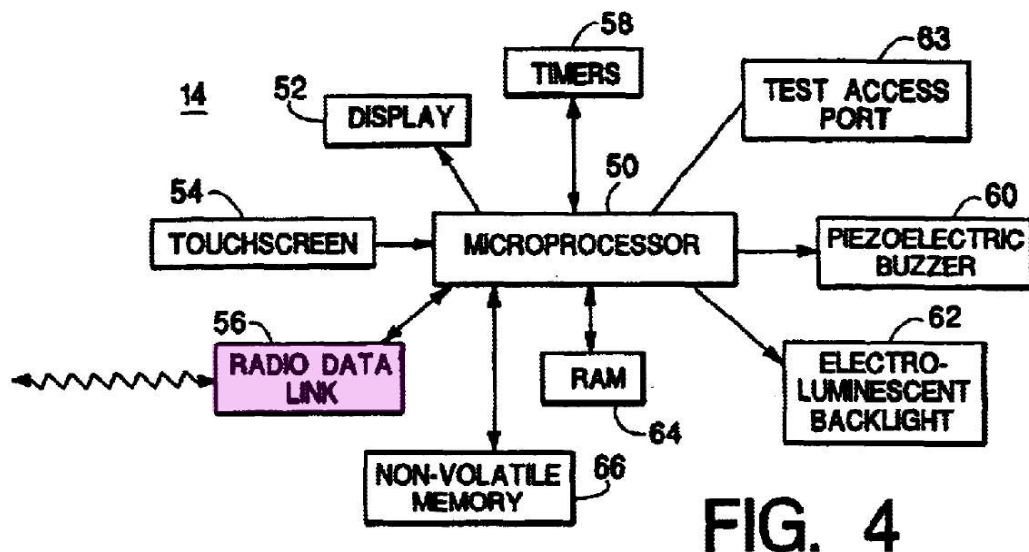
c. [25d]: a network interface;

215. In my opinion, Allen discloses limitation [25d].

216. The '014 patent describes that zone players are coupled to a data network that can be a wired network, a wireless network, or a combination of both. EX1001, 6:7-20. The '014 patent also describes a controller 270 of the zone players includes "a network interface 280 referred to as a RF interface 280 ..." EX1001, 8:38-49, Fig. 2C.

217. Like the '014 patent, Allen discloses an audio system that includes sound reproduction devices, audio signal sources, a system controller, and remote

controllers. EX1008, Abstract, 1:1-24, 3:11-4:17, Fig. 1. The sound reproduction devices and audio signal sources couple with the system controller by wireless means or through electrical cabling. EX1008, 3:21-28. The remote controller communicates with the system controller by wireless methods, such as by using radio frequencies, which allows the remote controller to be moved from room to room. EX1008, Abstract, 1:9-24, 3:50-61, Figs. 4-5. For example, as shown below, the remote controller includes a radio data link (RDL) 56 (“a network interface”) that transmits signals to, and receives signals from the system controller, which also includes an RDL. EX1008, 6:46-52, 6:56-62, 7:27-30, 7:36-48, 8:5-21, Figs. 4, 6.



EX1008, Fig. 4 (annotated).

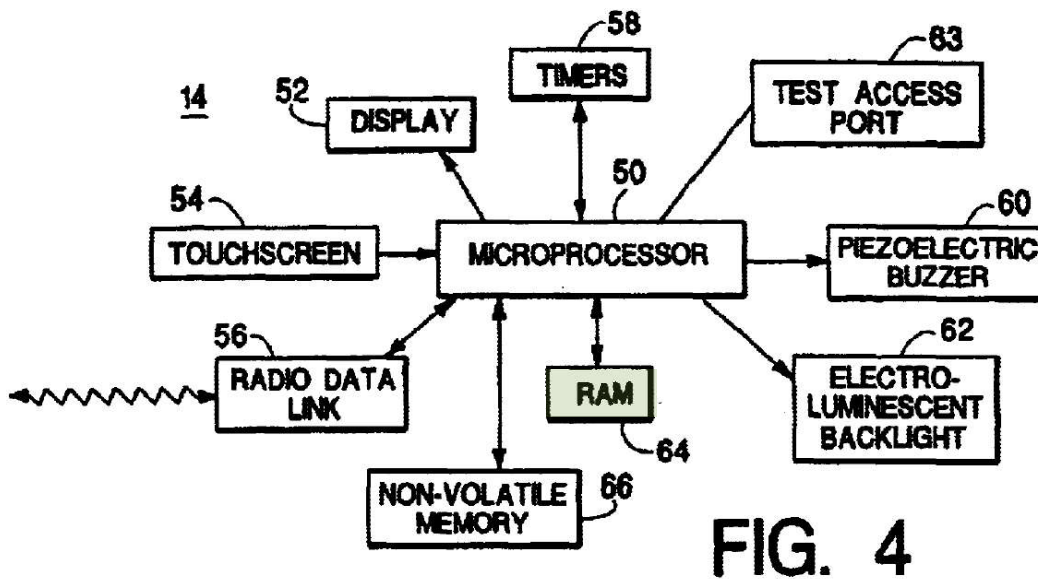
218. A POSITA would have understood that Allen’s audio system constitutes “a data network” because the system allows audio and control data to be

transmitted and received by devices in communication via wired or wireless methods. A POSITA would have further understood that Allen's **radio data link (RDL) 56** is a "*physical component*" of the remote controller ("*a device*") that, via the system controller, communicates with the sound reproduction and audio source devices of the audio system ("*provides an interconnection with a data network*") under the parties' agreed construction. See Section VIII.

d. [25e]: a memory for storing code for an application module;

219. In my opinion, Allen discloses limitation [25e].

220. As shown below, Allen's remote controller includes a **RAM 64** ("*a memory*") that stores an operating system that includes various software modules ("*storing code for an application module*"). EX1008, 6:46-52, 7:3-16. A POSITA would have understood that Allen's memory stores "*code*" for the software modules ("*an application module*") for its microprocessor to execute to implement the functions of the software modules.



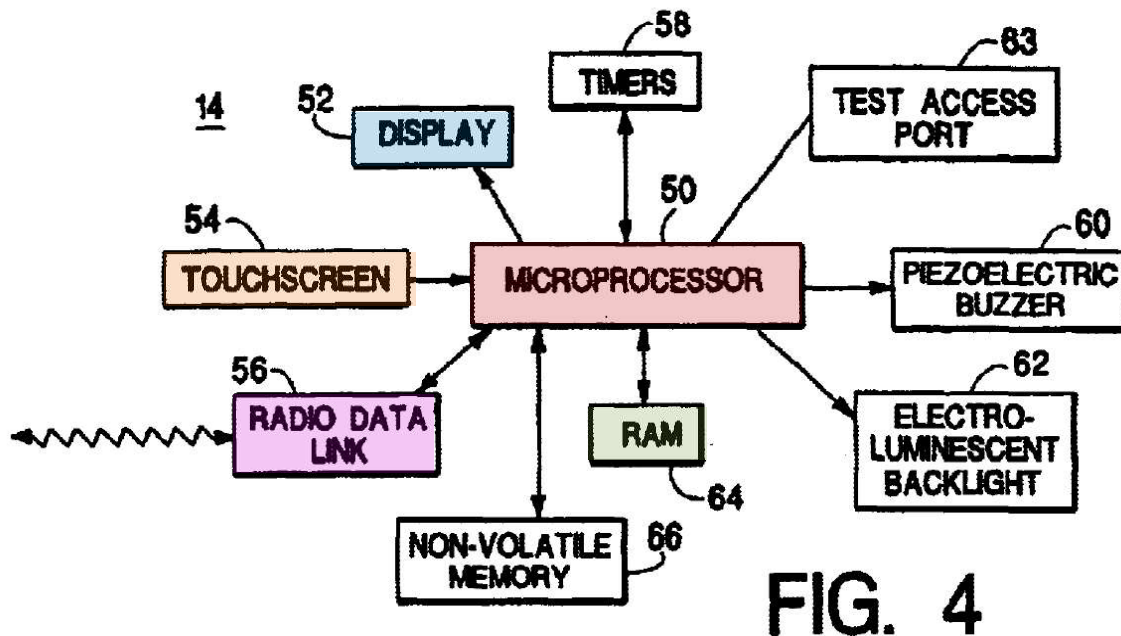
EX1008, Fig. 4 (annotated).

221. Allen also discloses the RAM 64 further stores a number of state variables, such as which sound reproduction devices receive audio signals from which audio signal sources, and the volumes of the sound reproduction devices. EX1008, 7:17-30. Such state variables may be changed when a command is issued by a user touching touchscreen, or when the remote controller receives update information from the system controller 10. EX1008, 7:17-30. Allen also discloses the remote controller includes a non-volatile memory 66 used to store information necessary to start up the operating system or that may be desirable to preserve if the remote controller loses power. EX1008, 6:46-52, 7:31-35.

- e. [25f]: a processor coupled to the memory, the input interface, the screen driver and the network interface, the processor executing the code in the memory to cause the application module and the screen driver to perform operations of:

222. In my opinion, Allen discloses limitation [25f].

223. As shown below, Allen's remote controller includes a **microprocessor 50** ("processor") coupled to **display 52** (including "screen driver", *supra* Section XI.C.2.b), **touchscreen 54** ("input interface"), **radio data link (RDL) 56** ("network interface"), and **RAM 64** ("memory"). EX1008, 6:46-52.



EX1008, Fig. 4, 6:46-52 (annotated).

224. A POSITA would have understood that Allen's remote controller would receive user commands via the touchscreen, update state parameters and

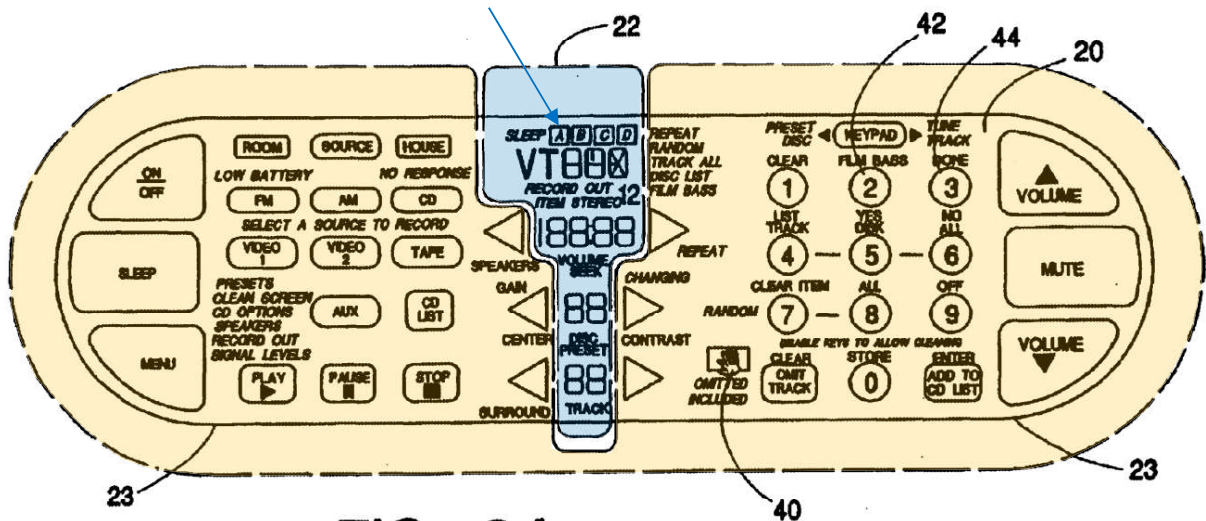
graphic figures shown on display based on the user commands, and transmit signals to the system controller to configure sound reproduction devices and audio sources based on the user's commands. EX1008, Abstract, 1:1-24, 3:11-4:17, 4:59-6:13, 7:44-8:42, Figs. 1, 3A-3C. Thus, a POSITA would have understood that the microprocessor of the remote controller would execute the code of the operating system to cause the software modules and the screen driver to perform operations based on the user commands received by the touchscreen.

f. [25g]: displaying on a screen a first list showing at least available players;

225. In my opinion, Allen and Geiwitz render obvious limitation [25g].

226. As discussed in limitation [25a] (Section XI.C.2.b), Allen's remote controller includes a user interface screen 20 ("*screen*") having an **indicator area 22** and an **input area 23**. EX1008, 4:59-5:20, Figs. 3A-3C. Allen discloses a user can select the audio device being controlled, such as a sound reproduction device, for example, by pressing the "Room" graphic figure in the input area to toggle through and select graphic figures representing sound reproduction devices shown in the indicator area, as shown below. EX1008, 5:28-49. Allen also discloses that a user can select a combination of rooms by, for example, toggling through the graphic figures of the rooms shown in the indicator area. EX1008, 5:28-49.

Displaying on a screen a first list showing at least available players



EX1008, Fig. 3A (annotated).

227. For example, Allen discloses displaying A, B, C, D graphic figures in the indicator area 22, representing sound reproduction devices located in different rooms A, B, C, and D (“displaying on a screen a first list showing at least available players”). EX1008, 2:2-6, 3:16-20, 3:33-43, 4:59-5:11, 5:37-43, 6:14-25, Figs. 1, 3a; *supra* Section XI.C.2.a (sound reproduction devices are “players”).

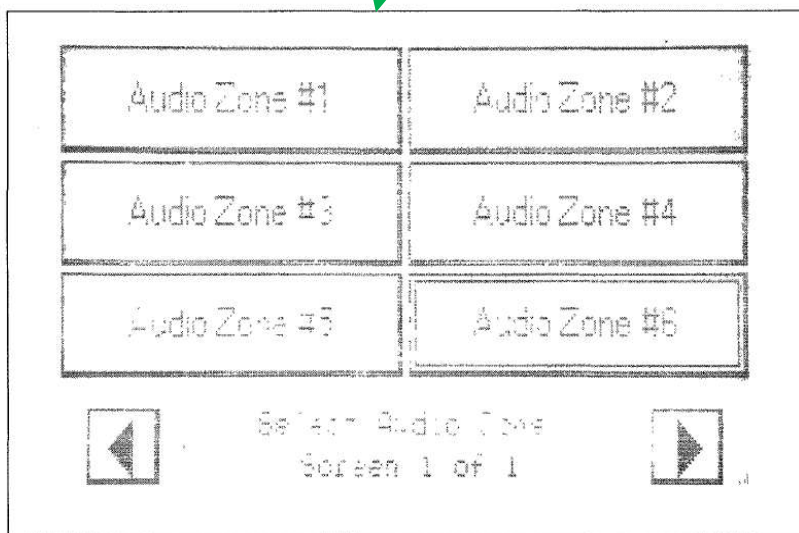
228. Allen’s list shows “at least available players.” Allen teaches not displaying the graphical figure pertaining to a room if the sound reproduction devices of that room are not connected to a terminal of the system controller. EX1008, 3:28-43, 6:18-21. As such, a POSITA would have understood that Allen

discloses displaying available players that are connected to the system on its user interface screen.

229. As discussed above in Ground 1 (limitation [25g]), Geiwitz discloses a touchscreen user interface that allows a user to configure and control a scene, where the touchscreen user interface displays a list of audio zones (“*players*”) for selection to include in a scene, as shown below. EX1006, 21, 56-59, 64, Fig. 104; *see* Section XI.A.1.f.

“displaying on a screen a first list showing at least available players”

Figure 104



EX1006, 64, Fig. 104.

230. And Geiwitz discloses its touchscreen user interface “uses familiar icon-based menus that have extensive functionality,” is “logical in its layout,” “extremely simple to use,” and “efficient and user-friendly.” EX1005, Abstract, 1:14-18, 9:11-21, 14:6-10, 19:5-20:20, Figs. 1, 14; EX1006, 2, 18.

231. As discussed above in the rationale to combine Allen, Geiwitz, and Van Hulle (Section XI.C.1), a POSITA would have been motivated to modify Allen’s user interface screen to use Geiwitz’s icon-based user interface designs with a reasonable expectation of success. A POSITA would have been motivated to use Geiwitz’s icon-based user interface designs to further Allen’s objective “to provide an improved remotely controllable audio system and ... improved remote controlling.” EX1008, 1:6-8. A POSITA would have known how to incorporate Geiwitz’s icon-based user interface designs in Allen’s user interface screen using ordinary skill and would have applied a known technique to improve a similar device in the same way to yield the predictable result of an improved user interface screen.

- g. [25h]: displaying a zone group including players from the available players when at least two of the available players are selected to form the zone group, wherein any one of the players in the group serves as a zone group head;**

232. In my opinion, Allen, Geiwitz, and Van Hulle render obvious limitation [25h].

i. Allen and Geiwitz render obvious “displaying a zone group including players from the available players when at least two of the available players are selected to form the zone group”

233. Allen discloses that a user can select a combination of two or more sound reproduction devices or rooms for collective adjustment, such as sharing the same audio source (“*at least two of the available players are selected to form the zone group*”). EX1008, 4:1-17, 5:50-54. To the extent that Allen does not expressly disclose details of how to display and control the combination of selected sound reproduction devices (“*displaying a zone group*”), a POSITA would have been motivated to use Geiwitz’s icon-based user interface designs and have a reasonable expectation of success and would have understood Geiwitz’s icon-based user interface designs provide a suitable option for the display and control of Allen’s zone group. *Supra* Section XI.C.1.

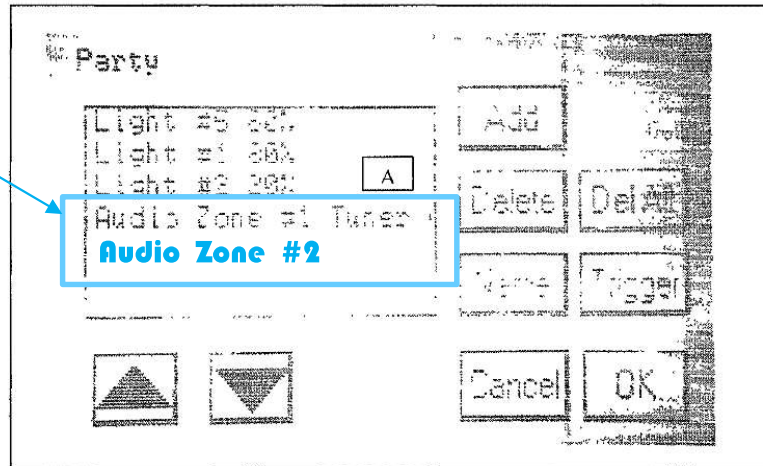
234. As discussed above in Ground 1 (limitations [25g]-[25h]), Geiwitz teaches a touchscreen user interface that allows a user to program a scene (“*zone group*”), where the touchscreen user interface displays the scene as including at least two audio zones (“*players*”) selected by the user for inclusion in the scene. EX1006, 21, 56-59, 64, Fig. 104; *see* Sections XI.A.1.f-XI.A.1.g.

235. For example, as shown below, to configure a “Party” scene, a POSITA would have understood that when more than one audio zones are selected to add to

the scene (EX1006, 583), the screen would display the scene (“*zone group*”) as including at least two audio zones selected by the user for inclusion in the scene.

“displaying a zone group including players from the available players when at least two of the available players are selected to form the zone group”

Figure 96



EX1006, 61, Fig. 96 (modified, annotated).

236. A POSITA would have understood that in Allen combined with Geiwitz, a user would select two or more sound reproduction devices (“*players*”) and perform collective control with Allen’s remote controller using Geiwitz’s icon-based user interface designs. EX1008, 5:50-54; EX1005, 38:7-9; EX1006, 581-583; Sections XI.A.1.f-XI.A.1.g. Allen’s user interface screen using Geiwitz’s icon-based user interface designs would display the user-selected combination of two or more sound reproduction devices (“*zone group*”) as taught in Allen, teaching “*displaying a zone group including players from the available players.*” EX1005, 38:7-9; EX1006, 581-583.

**ii. Allen, Geiwitz, and Van Hulle render obvious
“wherein any one of the players in the group
serves as a zone group head;”**

237. As discussed above, Allen discloses “*at least two of the available players are selected to form the zone group*” when a user selects a combination (“*zone group*”) of two or more sound reproduction devices (“*players*”) for sharing the same audio source. EX1008, 4:1-17, 5:50-54. A POSITA would have understood that, in Allen combined with Geiwitz, more players can be added to an existing group using Allen’s user interface screen modified with Geiwitz’s icon-based user interface designs. A POSITA would further have understood that, in Allen as modified by Geiwitz, any one of the players selected by the user, before the scene is modified to include players, serves as the zone group head (“*any one of the players in the group serves as a zone group head*”). EX1001, 5:33-51, 9:23-26.

238. Furthermore, Allen, Geiwitz, and Van Hulle render obvious any one of the players in the group serves as a zone group head and synchronizing all players in the zone group in accordance with the zone group head (*infra* limitation [25i], Section XI.C.2.h).

239. As explained in limitation [25h] (Ground 1, Section XI.A.1.g), Van Hulle discloses any one of the active sound reproducers can be the master (“*zone group head*”), and synchronizing all players in accordance with the master, which

passes on the audio signal it plays to the remaining sound reproducers in the form of an interconnected chain. EX1009, 2:49-61, 3:1-5, 3:33-55, 9:21-10:22.

240. As discussed above in the rationale to combine Allen, Geiwitz, and Van Hulle (Section XI.C.1), a POSITA would have understood that Van Hulle provides a suitable solution for implementing Allen's synchronized audio play, that modifying Allen and Geiwitz with Van Hulle's synchronization method would improve the availability of Allen's audio system, and that such modification would have involved only ordinary skill.

241. In Allen combined with Geiwitz and Van Hulle, a user can select any one of Allen's sound reproducers ("*players*") to operate in the master mode and serve as the "*zone group head*," which passes the audio signal to the remaining sound reproducers such that all sound reproducers would play the same audio at the same time, as taught by Van Hulle. And the displayed combination of devices ("*zone group*") would include the "*zone group head*."

h. [25i]: synchronizing all players in the zone group in accordance with the zone group head; and

242. In my opinion, Allen, Geiwitz, and Van Hulle render obvious limitation [25i].

**i. Allen and Geiwitz render obvious
“synchronizing all players in the zone group”**

243. Allen teaches that “[a] source being shared by multiple rooms may be ‘synchronized’ in some aspects.” EX1008, 4:10-13; *see also* EX1008, 4:8-9, 4:13-17, Figs. 7-8.

244. Allen discloses “*synchronizing all players in the zone group*.” Allen discloses an audio signal source can be synchronized and shared by multiple sound reproduction devices placed in different rooms (“*synchronizing all players in the zone group*”). EX1008, 3:21-43, 3:66-4:17, 5:28-49. And a user can select a combination of sound reproduction devices and adjust them collectively. EX1008, 5:50-58. Allen provides that “[o]nce the sound reproduction device (or combination of rooms) has been selected, only graphic figures representing commands appropriate to the sound reproduction device or devices in that room or combination of rooms are displayed....” EX1008, 5:43-49. A POSITA would have understood that Allen discloses that all sound reproduction devices under the collective control (“*all players in the zone group*”) playback the same multimedia at the same time under the parties’ constructions.

245. Furthermore, as discussed above in the rationale to combine Allen, Geiwitz, and Van Hulle (*supra* Section XI.C.1), a POSITA would have found it obvious to modify Allen’s user interface screen to use Geiwitz’s icon-based user

interface designs for selecting and collectively controlling a combination of two or more sound reproduction devices (“*zone group*”). *Supra* Section XI.C.2.g (limitation [25g], Ground 3). In Allen combined with Geiwitz and Van Hulle, Geiwitz’s user interface would be used for selecting and controlling Allen’s players in the zone group to share the same audio source for synchronized play, teaching “*causing all players to playback the same multimedia at the same time.*” EX1008, 4:1-17; EX1005, 38:7-9; EX1006, 581-583.

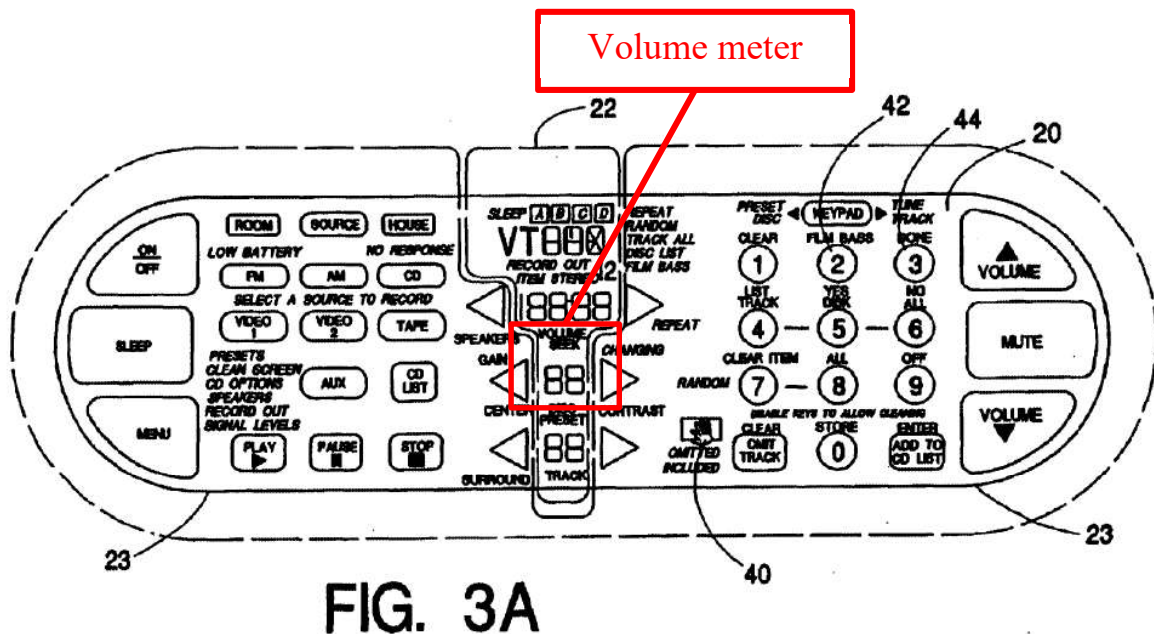
**ii. Allen, Geiwitz, and Van Hulle render obvious
“synchronizing ... in accordance with the zone
group head”**

246. As discussed for [25h] (Ground 3, Section XI.C.2.g), in Allen combined with Geiwitz and Van Hulle, Allen’s sound reproducers (“*players*”) would play the same audio at the same time as the master (“*zone group head*”), teaching “*synchronizing ... in accordance with the zone group head*”). *See* Section XI.C.1 (Rationale to Combine Allen, Geiwitz, and Van Hulle).

**i. [25j]: adjusting a volume meter represented by an
averaged value of audio volumes of the players in the
group, wherein said adjusting of the volume meter
includes changing a volume of each of the group of
players synchronously in accordance with an
adjustment made by a user.**

247. In my opinion, Allen, Geiwitz, and Van Hulle render obvious limitation [25j].

248. Allen discloses performing collective volume control of a combination of two or more sound reproduction devices (“*players in the group*”). EX1008, 5:50-6:13. As shown below, Allen also discloses displaying “*a volume meter*” in the indicator area of its user interface screen and volume control buttons in the input area. EX1008, Fig. 3A, 5:21-27, 5:34-49 (describing the display of information in indicator area 22).



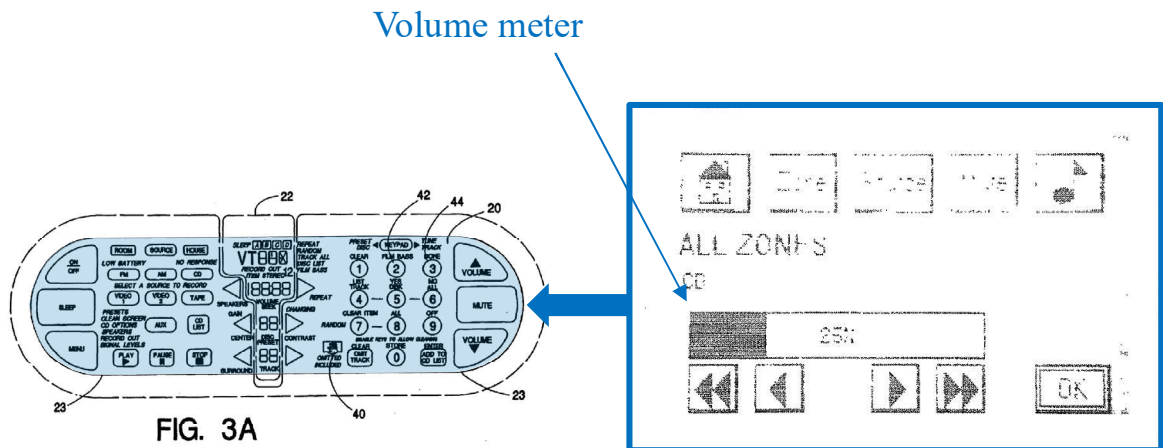
EX1008, Fig. 3A (annotated).

249. Allen discloses that when a user selects a combination of two or more sound reproduction devices for playing the same audio source (“*group of players*”), the user interface screen displays information on the selected devices, which allows the user to perform collective volume adjustment by changing the volumes of all

players from their start position while maintaining the offset between the players (*“changing a volume of each of the group of players synchronously in accordance with an adjustment made by a user”*). EX1008, 4:8-17, 5:37-6:13.

250. To the extent that Allen does not expressly disclose *“a volume meter represented by an averaged value of audio volumes of the players in the group,”* Allen combined with Geiwitz renders it obvious.

251. As discussed above in the Rationale to Combine Allen, Geiwitz, and Van Hulle (*supra* Section XI.C.1), a POSITA would have found it obvious to modify Allen’s user interface screen to use Geiwitz’s icon-based user interface designs, and would have found Geiwitz’s icon-based user interface designs a suitable option for selecting and collectively controlling a combination of two or more sound reproduction devices (*“group of players”*). *See also supra* Section XI.C.2.g (limitation [25h], Ground 3). For example, a POSITA would have found it obvious to use Geiwitz’s icon-based user interface design showing a group volume meter for Allen’s collective volume control, as shown below:



EX1008, Fig. 3A (annotated); EX1006, 63, Fig. 103 (annotated).

252. Allen discloses maintaining collective volume adjustment by changing the volumes of all sound reproduction devices from their start position while maintaining the offset between the devices in a group. EX1008, 5:37-6:13. A POSITA would have understood that the group volume meter in Allen combined with Geiwitz would be represented by a value (e.g., 25% as shown in Figure 103), and that a numerical average of the volumes of the players in the group would have been one of the finite, suitable options for representing the group volume meter in Allen combined with Geiwitz.

253. For example, a POSITA would have understood that to provide feedback on collective group volume to the user, the group volume meter would be represented by some composite value of the individual volumes. When using a single value to be representative of a group of values, the most common mathematical functions for doing so are maximum, minimum, and average. These

functions are well-known in all STEM fields and would be familiar to a POSITA. Since an average volume reflects the contribution of all individual volumes, using an average when collectively displaying and controlling the volumes of a group would be an intuitive way of presenting group volume to users in a way that reflects the volume of the group. A POSITA would have understood that using the average volume to represent the group volume would allow for adjusting the volumes of the individual players in the group while maintaining the volume offset between them as desired by Allen. And a POSITA would have understood that using the average volume would allow for adjusting the volumes of all audio zones without surprising jumps to some zones, and that the average volume would better represent the group volume in some instances. *See* Section XI.A.1.i.

254. Also, a POSITA would have understood that the group volume meter in Allen as modified by Geiwitz is represented by an averaged volume of players being controlled at least some of the times. For example, when all players have the same volumes at 25% or 100%, the volume meter would be represented by the averaged value of all audio zones at 25% or 100%, respectively. *See* Section XI.A.1.i.

3. Claim 32

255. In my opinion, Allen, Geiwitz, and Van Hulle render obvious claim 32.

a. [32pre]: The apparatus of claims 25, wherein said synchronizing all players in the zone group comprises:

256. In my opinion, Allen, Geiwitz, and Van Hulle render obvious synchronizing all players in the zone group as explained for limitation [25i]. *Supra* Section XI.C.2.h.

b. [32a]: causing all players in the zone group to play an identical audio source; and

257. As discussed above in [25h] and [25i] (Ground 3, Sections XI.C.2.g, XI.C.2.h), in Allen combined with Geiwitz and Van Hulle, Geiwitz's user interface would be used for selecting and controlling Allen's all players in the zone group to share the same audio source for synchronized play using, Van Hulle's method of synchronization, for example, teaching "*causing all players in the zone group to play an identical audio source.*" EX1008, 4:1-17; EX1005, 38:7-9; EX1006, 581-583.

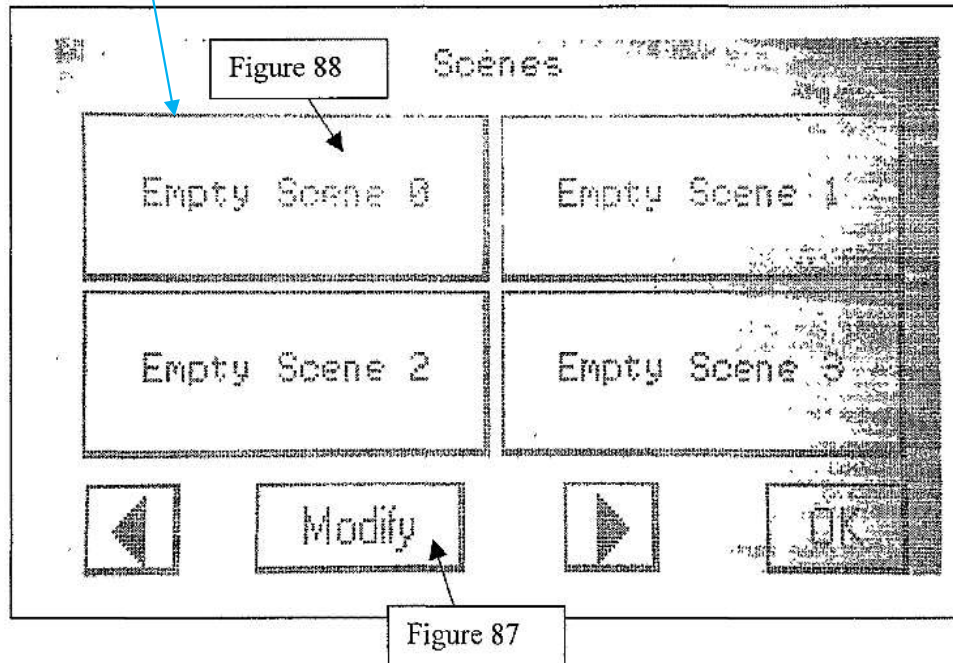
c. [32b]: presenting the zone group in a manner that indicates a grouping.

258. In my opinion, Allen, Geiwitz, and Van Hulle render obvious limitation [32b].

259. As discussed above in Section XI.A.2.c (Ground 1, limitation [32b]) and shown below, Geiwitz discloses presenting a scene with a customized name that indicates a grouping of the devices in the scene. EX1005, 25:15-25; EX1006, 20, 56-61, Figs. 4, 86, 90-92, 94, 96.

A named scene indicates a grouping

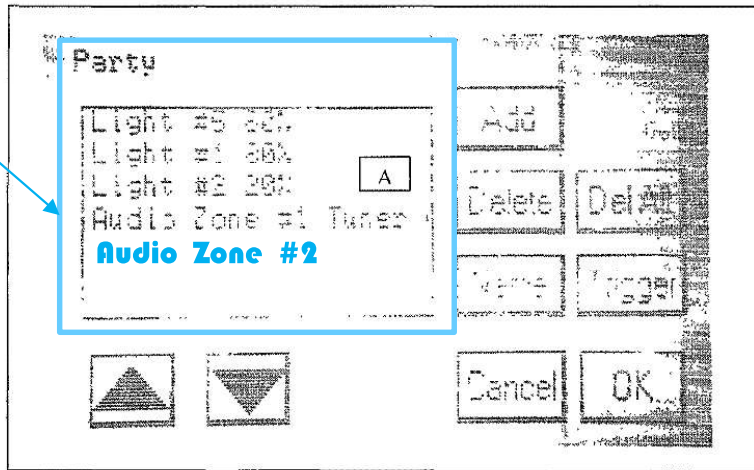
Figure 86



EX1006, 56, Fig. 86 (annotated). Geiwitz also discloses a screen presenting the zone group in a manner that indicates a grouping when a scene is being configured. Section XI.A.2.c (Ground 1, limitation [32b]).

Figure 96

“presenting the zone group in a manner that indicates a grouping”



EX1006, 61, Fig. 96 (modified, annotated).

260. As discussed above in the Rationale to Combine Allen, Geiwitz, and Van Hulle (*supra* Section XI.C.1), a POSITA would have found it obvious to modify Allen’s user interface screen to use Geiwitz’s icon-based user interface designs, and would have found Geiwitz’s icon-based user interface designs a suitable option for selecting and collectively controlling a combination of two or more sound reproduction devices (“*zone group*”) in Allen. *Supra* Section XI.C.2.g (limitation [25h], Ground 3). In Allen combined with Geiwitz and Van Hulle, a “*zone group*” would include two or more sound reproduction devices (“*players*”) (EX1008, 4:1-17, 5:50-54), and the screen would present the zone group as including all players in the group (“*in a manner that indicates a grouping*”).

4. Claim 35

261. In my opinion, Allen, Geiwitz, and Van Hulle render obvious claim 35.

- a. **[35pre]: The apparatus of claim 25, wherein the processor executing the code in the memory to cause the application module and the screen driver to perform operations of:**

262. In my opinion, Allen discloses limitation [35pre] as discussed in limitation [25f]. *Supra* Section XI.A.3.a.

- b. **[35a]-[35d]**

263. In my opinion, Allen in view of Geiwitz renders obvious limitations [35a]-[35d].

264. As discussed above in Sections XI.A.3.b-XI.A.3.e(Ground 1, [35a]-[35d]), Geiwitz discloses these limitations. And as discussed above in the Rationale to Combine Allen, Geiwitz, and Van Hulle (*supra* Section XI.C.1), a POSITA would have found it obvious to modify Allen's user interface screen to use Geiwitz's icon-based user interface designs, and would have found Geiwitz's icon-based user interface designs a suitable option for selecting and collectively controlling a combination of two or more sound reproduction devices ("*zone group*"). *Supra* Section XI.C.2.g (limitation [25h], Ground 3). As such, in Allen combined with Geiwitz and Van Hulle, a user would use Geiwitz's icon-based user interface designs to select players and disassociate the selected players from the zone group by navigating and interacting with the screens shown in Ground 1, [35a]-[35d] (Sections XI.A.3.b-XI.A.3.e).

D. Ground 4: Allen, Geiwitz, and Aiso Render Obvious Claims 38 and 42-43

1. Rationale to Combine Allen, Geiwitz, and Aiso

265. As explained for Ground 3 (Section XI.C.1), a POSITA would have been motivated to modify Allen's user interface screen to use Geiwitz's icon-based user interface designs and would have had a reasonable expectation of success in doing so. Further, a POSITA would have been motivated to combine Allen and Geiwitz with Aiso. These references are analogous to the '014 patent. They are in the same field of endeavor as each other and the '014 Patent. *See Supra* Sections VII.A(Overview of the '014 patent), X.A(Overview of Geiwitz), X.B (Overview of Aiso), X.C (Overview of Allen).

266. And a POSITA would have been motivated to further modify Allen's user interface screen using Geiwitz's icon-based user interface designs to display the individual volume meters of players belonging to a group and the group volume meter for collectively changing the volumes of all players of the group on the same screen, in view of Aiso's teachings of a known, conventional layout for presenting the user with both options in a single interface. EX1026, [0039], [0042]-[0057], Fig. 1; EX1027, 11:12-16, Figs. 6, 7. A POSITA would have understood such modification to Geiwitz's touchscreen user interface would offer a streamlined user experience in various ways. For example, a POSITA would have understood that

such combined display would allow the user to have immediate visual feedback of the effect of the group control on individual audio zones. Although Aiso's mixing console uses knobs or sliders for control input while Allen and Geiwitz rely on a graphical user interface for input, a POSITA would have found Aiso's unified display of single and group controls applicable to Allen and Geiwitz's graphical displays because the art was moving towards graphical displays and a POSITA would have easily understood that adopting the conventional and well known interface layouts in graphical form would have provided a display that was intuitive and comfortable for the user. EX1012, Figs. 8:34-36, 8A-9; EX1026, [0039], [0042]-[0057], Fig. 1; EX1027, 2:22-25, Figs. 6, 7. A POSITA would have understood that such combined display would reduce navigation needed to fine tune the volume controls of individual audio zones in a scene. And a POSITA would have understood that the combined display would allow the user to see instantly if the audio zones are behaving normally according to the group control and perform troubleshooting or calibration if needed. A POSITA would have found that this modification furthers Allen's goal of providing "an improved remotely controllable audio system" and "improved remote controlling." EX1008, 1:6-8.

267. A POSITA would have known how to implement this additional modification to Allen's user interface screen and would have had a reasonable expectation of success in doing so because such modification requires only ordinary

skill. For example, a POSITA would have understood how to further update Allen's operating system and its software modules to generate additional individual volume meter icons for display on the graphic LCD screen in Allen combined with Geiwitz. *See* Section XI.C.1 (combining Allen and Geiwitz). And a POSITA would have programmed the operating system and its software modules to adjust the size and location of the icons to present the individual volume meters and the group volume meter on the same screen. When there are many players under group control, a POSITA would have understood to display additional volume meters in additional screens for the user to cycle between them using navigation arrows. EX1006, 64.

2. Independent Claim 38

268. In my opinion, Allen, Geiwitz, and Aiso render obvious claim 38.

a. [38pre]: An apparatus for manipulating a plurality of players, the apparatus comprising:

269. In my opinion, Allen discloses limitation [38pre] as explained for limitation [25pre] in Ground 3. *See* Section XI.B.2.a.

b. [38a]: a screen; [38b]: a screen driver commanding the screen; [38c]: an input interface;

270. In my opinion, Allen discloses, or at least renders obvious, limitations [38a]-[38c] as explained for limitations [25a]-[25c] in Ground 3. *See* Section XI.B.2.b.

c. [38d]: a network interface;

271. In my opinion, Allen discloses limitation [38d] as explained for limitation [25d] in Ground 3. *See* Section XI.C.2.c.

d. [38e]: a memory for storing code for an application module;

272. In my opinion, Allen discloses limitation [38e] as explained for limitation [25e] in Ground 3. *See* Section XI.C.2.d.

e. [38f]: a processor coupled to the memory, the input interface, the screen driver and the network interface, the processor executing the code in the memory to cause the application module and the screen driver to perform operations of:

273. In my opinion, Allen discloses limitation [38f] as explained for [25f] in Ground 3. *See* Section XI.C.2.e.

f. [38g]: displaying on a screen a list showing a plurality of volume meters, at least one of the volume meters representing an audio volume of one of the players, and another one of the volume meters representing an audio volume of a group of players, if there is such a group; and

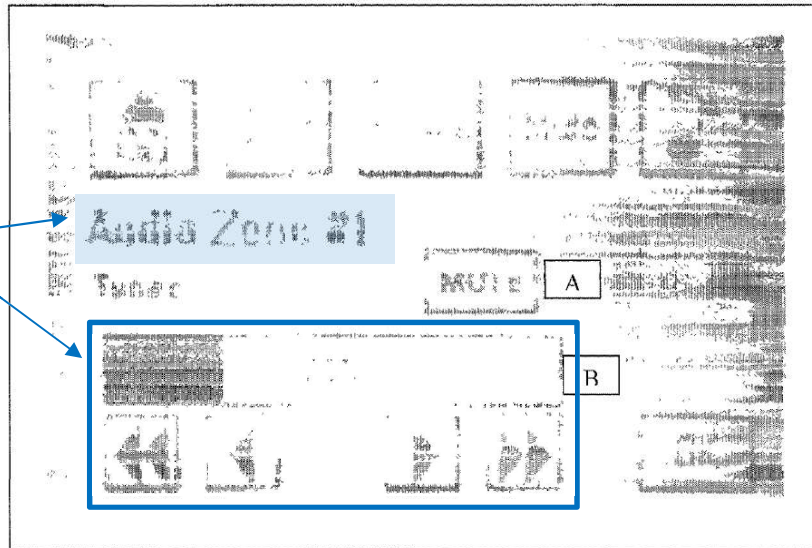
274. In my opinion, Allen, Geiwitz, and Aiso render obvious limitation [38g].

275. As explained for limitation [38g] in Ground 2 (Section XI.B.2.f), Geiwitz discloses displaying a volume meter representing an audio volume of one

of the players and a group volume meter representing the volume of a group of players, as shown below. EX1006, 13, 66, Figs. 97, 106.

Figure 106

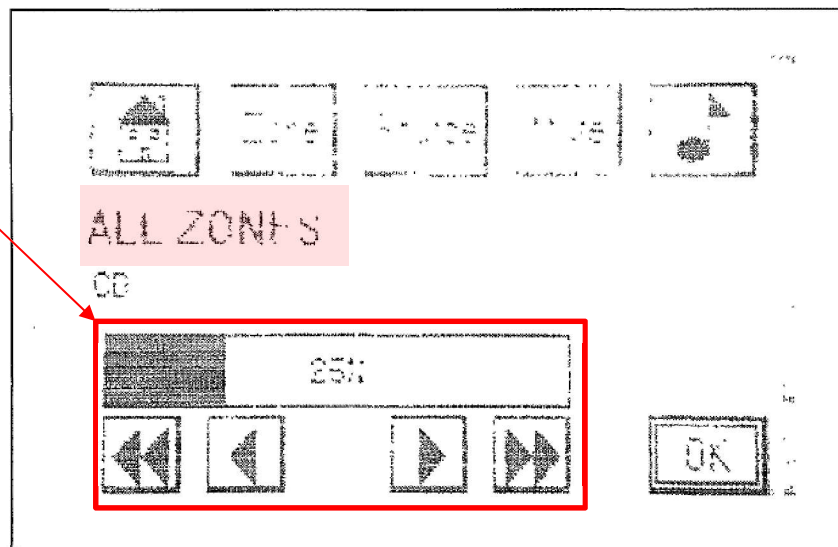
A volume meter
“representing an
audio volume of
one of the
players”



EX1006, 66, Fig. 106 (annotated).

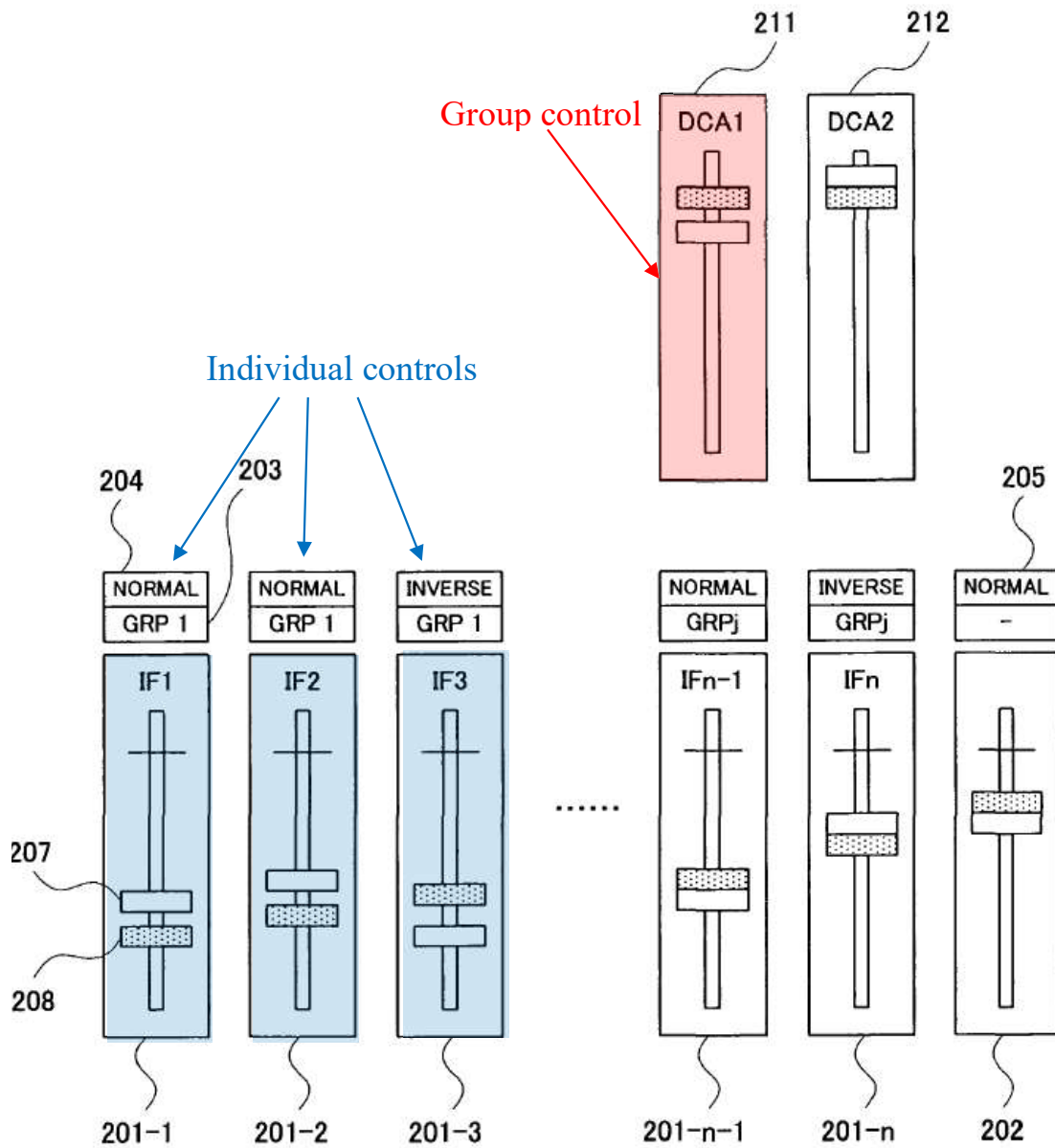
Figure 103

“another one of the
volume meters
representing an
audio volume of a
group of players”



EX1006, 63, Fig. 103 (annotated).

276. And as explained for limitation [38g] in Ground 2 (Section XI.B.2.f) and shown below, Aiso discloses a console panel that provides individual **fader controls** for setting the input levels or output levels of individual channels and **group controls** that change the input or output levels set by all the faders belonging to the group (e.g., “GRP1”). EX1007, 3:9-32, 4:1-10, Fig. 2.



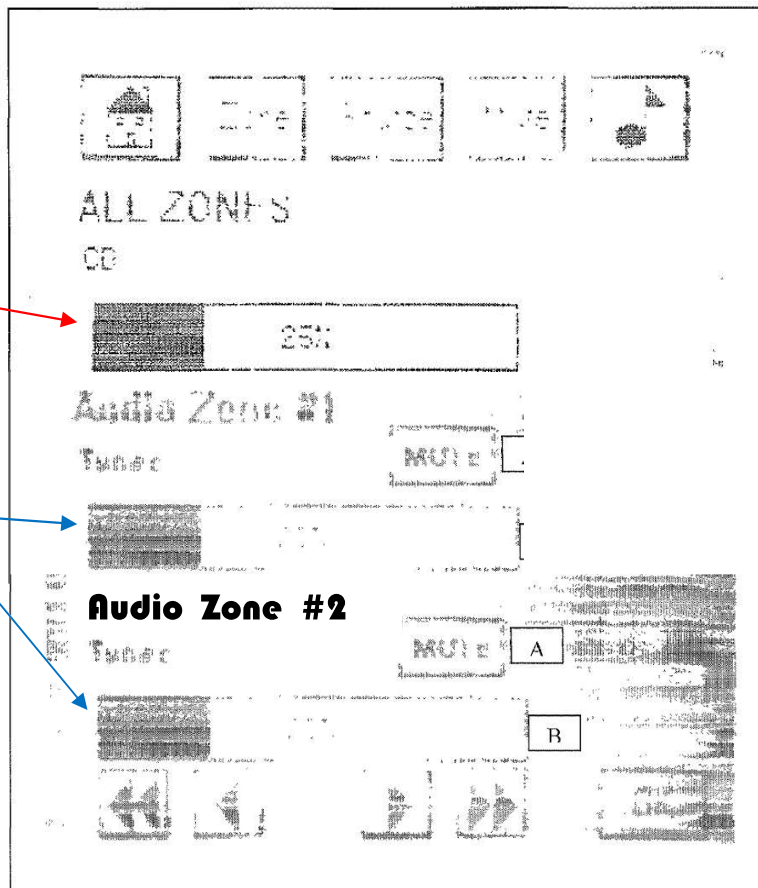
F I G . 2

EX1007, Fig. 2 (annotated). Allen combined with Geiwitz and Aiso renders obvious “displaying on a screen a list showing a plurality of volume meters” that includes a volume meter for representing an audio volume of an individual player

and a group volume meter that represents an audio volume of a group of players, as shown below:

“another one of the volume meters representing an audio volume of a group of players”

“at least one of the volume meters representing an audio volume of one of the players”



EX1006, 63, 66, Figs. 103, 106 (modified, annotated); *see* Section XI.B.2.f (limitation [38g] in Ground 2).

277. And as explained in the Rationale to combine Allen, Geiwitz, and Aiso (Section XI.D.1), a POSITA would have been motivated to further modify Allen’s user interface screen using Geiwitz icon-based user interface designs to display the individual volume meters of players belonging to a group and the group volume

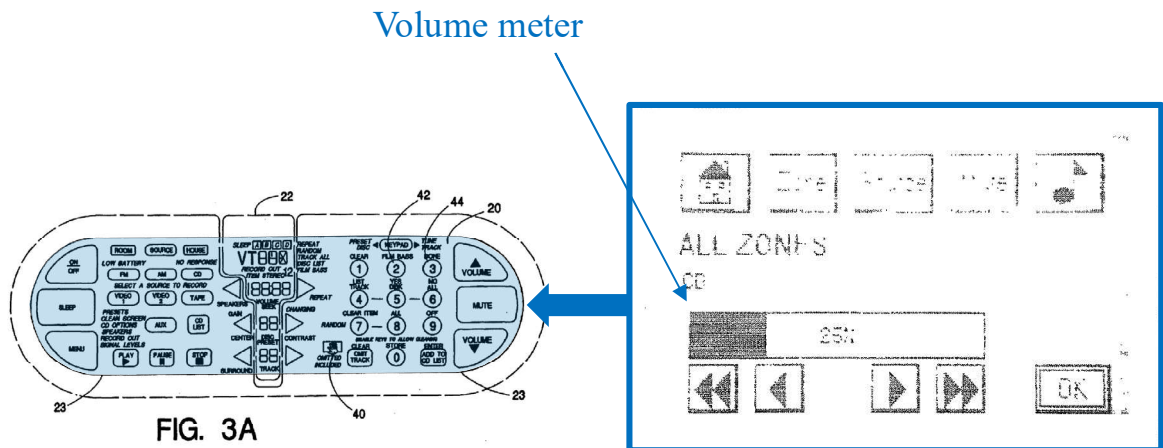
meter for collectively changing the volumes of all players of the group on the same screen, in view of Aiso's teachings. A POSITA would have known how to implement this additional modification to Allen's user interface screen as modified by Geiwitz in view of Aiso's teaching and would have had a reasonable expectation of success in doing so because such modification requires only ordinary skill.

Section XI.D.1.

- g. [38h]: adjusting one of the volume meters as desired after one of the volume meters from the list is selected, wherein the one of the volume meters is for the group of players, represented by an averaged value of audio volumes of the players in the group, and**

278. In my opinion, Allen, Geiwitz, and Aiso render obvious limitation [38h].

279. As discussed above in [25j] (Ground 3, Section XI.C.2.i), a POSITA would have found it obvious to use Geiwitz's icon-based user interface design showing a group volume meter for Allen's collective volume control, as shown below:



EX1008, Fig. 3A (annotated); EX1006, 63, Fig. 103 (annotated). And as discussed above in [38g] (Ground 4, Section XI.D.2.f) , Allen, Geiwitz, and Aiso render obvious displaying on Geiwitz's touchscreen “a list showing a plurality of volume meters,” one of which would be the group volume meter (“one of the volume meters is for the group of players”).

280. And as discussed in [25j] (Ground 3, Section XI.C.2.i), it would have been obvious to a POSITA that a group volume meter for collective control in Allen combined with Geiwitz would have been represented by the averaged value of the audio volumes of a combination of two or more sound reproduction devices (“players in the group”). A POSITA would have understood that in Allen combined with Geiwitz and Aiso, adjusting the group volume meter, such as by using the volume adjusters, would change a volume of each of the players in the group in accordance with an adjustment made by a user. EX1008, 4:8-17, 5:37-6:13; EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103; Section XI.C.2.i (Ground 3, limitation [25j]).

281. Furthermore, for reasons explained in limitation [38h] (Ground 2, Section XI.B.2.g), a POSITA would have further understood that Allen's user interface screen as modified with Geiwitz's teaching would allow at least two suitable alternative ways to adjust the group volume meter. First, a POSITA would have understood that Allen's user interface screen as modified with Geiwitz's teaching would include a set of volume adjusters under each listed volume meter as taught in Geiwitz (e.g., EX1006, Figs. 63, 66, 103, 106), and adjusting the volume adjusters changes the value of the volume meter displayed above the volume adjusters. A POSITA would have understood that adjusting the volume adjusters under the group volume meter would have selected the group volume meter from the list of displayed volume meters and would have adjusted the volume adjusters based on the desired listening experience of the whole group (*"adjusting one of the volume meters as desired after one of the volume meters from the list is selected"*).

282. Second, a POSITA would have understood that another suitable design would have Allen's user interface screen, as modified, present one set of volume adjusters for adjusting any of the volume meters in the list, and a user would adjust the group volume meter after selecting the group volume meter from the list (*"adjusting one of the volume meters as desired after one of the volume meters from the list is selected"*), such as by scrolling a highlight across the list of volume meters, and adjust the volume adjuster selected by the highlight. EX1006, 91.

283. As I discussed in Ground 3, A POSITA would have understood that both designs would be suitable for adjusting the group volume meter in Allen's user interface screen as modified by Geiwitz's and Aiso's teaching. A POSITA would have known how to implement this additional modification to Allen's user interface screen as modified by Geiwitz's and Aiso's teaching and would have had a reasonable expectation of success in doing so because such modification requires only ordinary skill. For example, a POSITA would have understood to further update the operating system and its software modules on Allen's remote controller to generate instructions for addressing pixels as needed for showing the additional icons with the suitable sizes, shapes, and locations on the screen while maintaining the volume display and adjustment functions of the icons.

- h. [38i]: said adjusting of the one of the volume meters includes changing a volume of each of the group of players synchronously in accordance with an adjustment made by a user.**

284. In my opinion, Allen, Geiwitz, and Aiso render obvious limitation [38i].

285. Allen discloses performing collective volume adjustment of a group of players by changing the volumes of all players from their start position while maintaining the offset between the players (*"changing a volume of each of the group*

of players synchronously in accordance with an adjustment made by a user”).

EX1008, 4:8-17, 5:37-6:13.

286. As discussed in limitation [25j] (Ground 3, Section XI.C.2.i) and limitation [38h] (Ground 4, Section XI.D.2.g), in Allen combined with Geiwitz and Aiso, a POSITA would have understood that adjusting the group volume meter displayed in the list, such as by using the volume adjusters, would change a volume of each of the players in the group (“*changing a volume of each of the group of players*”) in the same fashion (“*synchronously*”) in accordance with an adjustment made by a user, such as an increase or decrease by 1% or 5%. EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103.

3. Claim 42

287. In my opinion, Allen, Geiwitz, and Aiso render obvious claim 42.

- a. **The apparatus of claim 38, wherein the processor executing the code in the memory causes the application module and the screen driver to perform operations of maintaining relative volume loudness difference among each of the players in the group.**

288. As discussed above in Ground 3, limitation [25f] (Section XI.C.2.e), Allen discloses, or at least render obvious, the processor executing the code in the memory causes the application module and the screen driver to perform operations.

289. Additionally, Allen discloses that when the volume of a group of players is adjusted collectively, “all rooms are adjusted accordingly from their

starting position, and any offset between the rooms is remembered” (“*maintaining relative volume loudness difference among each of the players in the group*”). EX1008, 4:8-17, 5:37-6:13. As discussed above in Ground 4, limitation [38i] (Section XI.D.2.h), a POSITA would have understood that in Allen combined with Geiwitz and Aiso, adjusting the group volume meter displayed in the list, such as by using the volume adjusters, would change the volume of each of the players in the group in the same fashion in accordance with an adjustment made by a user, such as an increase or decrease by 1% or 5%, while maintaining the offset between the players (“*maintaining relative volume loudness difference among each of the players in the group*”). EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103; EX1008, 4:8-17, 5:37-6:13.

4. Claim 43

290. In my opinion, Allen, Geiwitz, and Aiso render obvious claim 43.

- a. The apparatus of claim 38, wherein the one of the volume meters from the list selected is for the group of players, and wherein said adjusting the one of the volume meters includes causing an equal change to a volume of each of the players in the group.**

291. Allen combined with Geiwitz and Aiso renders obvious that one of the volume meters displayed in the list represents an audio volume of a group of players for reasons discussed in Ground 4, limitation [38g] (Section XI.D.2.f). Allen combined with Geiwitz and Aiso also renders obvious selecting the group volume

meter from the list for reasons discussed in Ground 4, limitation [38h] (Section XI.D.2.g). As such, Allen combined with Geiwitz and Aiso renders obvious that one of the volume meters from the list selected is for the group of players.

292. And as discussed above, a POSITA would have understood that in Allen combined with Geiwitz and Aiso, adjusting the group volume meter displayed in the list (“*adjusting the one of the volume meters*”), such as by using the volume adjusters, would change the volume of each of the players in the group in the same fashion in accordance with an adjustment made by a user, such as an increase or decrease by 1% or 5% (“*causing an equal change to a volume of each of the players in the group*”). EX1005, 25:26-26:8; EX1006, 62-63, Fig. 103; EX1008, 4:8-17, 5:37-6:13.

E. Grounds 2 and 4 Render Obvious Claims 16, 19, and 23

293. In my opinion, claims 16, 19, and 23 are substantially similar to claims 38, 42, and 43, respectively. The preamble of these claims recite “a method for controlling a plurality of players.” Geiwitz (Ground 2) or Allen (Ground 4) teaches the preamble of these claims because both Grounds disclose methods of controlling audio devices of a connected audio system as discussed in Ground 1, limitation [25pre] (Section XI.A.1.a), and Ground 3, limitation [25pre] (Section XI.C.2.a). *See also* Sections X.A (Overview of Geiwitz), X.C (Overview of Allen). The following

chart identifies my analysis applicable for each element of these claims under Grounds 2 and 4.

Claim Element	Ground 2	Ground 4
[16a] displaying on a screen a list showing a plurality of volume meters, at least one of the volume meters representing an audio volume of one of the players, and another one of the volume meters representing an audio volume of a group of players, when there is such a group; and	Limitation [38g] Sections XI.B.1, XI.B.2.f	Limitation [38g] Sections XI.D.1, XI.D.2.f
[16b] adjusting one of the volume meters as desired after one of the volume meters from the list is selected, wherein the one of the volume meters is for the group of players represented by an averaged value of audio volumes of the players in the group, and	Limitation [38h] Sections XI.B.1 XI.D.2.g	Limitation [38h] Sections XI.D.1, XI.D.2.g

Claim Element	Ground 2	Ground 4
[16c] said adjusting of the one of the volume meters includes changing a volume of each of the group of players synchronously in accordance with an adjustment made by a user.	Limitation [38i] Sections XI.B.1, XI.B.2.h	Limitation [38i] Sections XI.D.1, XI.D.2.h
19. The method of claim 16, further comprising maintaining relative volume loudness difference among each of the players in the group.	Claim 42 Sections XI.B.1, XI.B.3	Claim 42 Sections XI.D.1, XI.D.3
23. The method of claim 16, wherein the one of the volume meters from the list selected is for the group of players, and wherein said adjusting the one of the volume meters includes causing an equal change to a volume of each of the players in the group.	Claim 43 Sections XI.B.1, XI.B.4	Claim 43 Sections XI.D.1, XI.D.4

XII. CONCLUSION

294. For the reasons set forth above, it is my opinion that one skilled in the art would have found claims 16, 19, 23, 25, 32, 35, 38, 42, and 43 of the '014 patent to be obvious.

295. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

296. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: October 15, 2025

Respectfully submitted,



Dr. David Anderson