

TABLE OF CONTENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE PATENT TRIAL & APPEAL BOARD

In re Patent of: Dennis Fink
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Title: Apparatus and Method for Programming an Amplifier

EXPERT DECLARATION OF DANIEL ELLIS, Ph.D.

TABLE OF CONTENTS

I.	BACKGROUND AND QUALIFICATIONS	1
II.	OVERVIEW OF THE '544 PATENT	2
III.	LEVEL OF ORDINARY SKILL IN THE ART	3
IV.	STATE OF THE ART	3
A.	U.S. Patent No. 5,822,775 to Sudo et al. ("Sudo").....	3
B.	U.S. Patent No. 5,450,624 to Porambo et al	5
C.	PCT Application No. PCT/NO/00178 to Krokstad et al	6
D.	Texas Instruments TMS320 Second Generation Digital Signal Processors Data Sheet.....	8
E.	Patent Owner's Admitted Prior Art	9
V.	MY UNDERSTANDING OF CLAIM INTERPRETATION, ANTICIPATION, AND OBVIOUSNESS	9
VI.	CLAIM 1 OF THE '544 PATENT	10
A.	All of the Features of Claim 1 would have been Obvious to a Person having Ordinary Skill in the Art over Sudo	10
B.	All of the Features of Claim 1 would have been Obvious to a Person having Ordinary Skill in the Art over Sudo in view Krokstad	11
VII.	DEPENDENT CLAIMS 2-15, 18-21, and 23-26	12
A.	The subject matter of claim 2 would have been Obvious over Sudo in view of either Porambo or Krokstad	12
B.	The subject matter of claim 3 would have been Obvious over Sudo in view of either Porambo or Krokstad	13
C.	The subject matter of claim 4 would have been Obvious over Sudo in view of either of Porambo or Krokstad	14
D.	The subject matter of claim 5 would have been Obvious over Sudo in view of either Porambo or Krokstad	15
E.	The subject matter of claim 6 would have been Obvious over Sudo in view of Porambo or Krokstad.....	15
F.	The subject matter of claim 7 would have been Obvious over Sudo in view of either Porambo or Krokstad and the Patent Owner's Admitted Prior Art (APA).....	16
G.	The subject matter of claim 8 would have been Obvious over Sudo in view of Porambo or Krokstad in further view of the TMS320 Data Sheet	17

TABLE OF CONTENTS (continued)

H.	The subject matter of claim 9 would have been Obvious over Sudo in view of Porambo or Krokstad.....	17
I.	The subject matter of claim 10 would have been Obvious over Sudo in view of Porambo or Krokstad.....	18
J.	The subject matter of claim 11 would have been Obvious over Sudo in view of Porambo or Krokstad.....	18
K.	The subject matter of claim 12 would have been Obvious over Sudo in view of Porambo or Krokstad.....	19
L.	The subject matter of claim 13 would have been Obvious over Sudo in view of Porambo or Krokstad.....	20
M.	The subject matter of claim 14 would have been Obvious over Sudo in view of Porambo and Krokstad	20
N.	The subject matter of claim 15 would have been Obvious over Sudo in view of Porambo or Krokstad.....	21
O.	The subject matter of claim 18 would have been Obvious over Sudo in view Porambo or Krokstad	22
P.	The subject matter of claim 19 would have been Obvious over Sudo in view of Krokstad.....	23
Q.	The subject matter of claim 20 would have been Obvious over Sudo and Porambo in light of the Patent Owner’s Admitted Prior Art.....	23
R.	The subject matter of claim 21 would have been Obvious over Sudo in view of Porambo or Krokstad in further view of Patent Owner’s Admitted Prior Art (APA)	24
S.	The subject matter of claim 23 would have been Obvious over Sudo and Porambo in further view of the Patent Owner’s Admitted Prior Art (APA)	25
T.	The subject matter of claim 24 would have been Obvious over Sudo and Porambo or Krokstad in further view of the Patent Owner’s Admitted Prior Art (APA)	25
U.	The subject matter of claim 25 would have been Obvious over Sudo and Porambo or Krokstad in further view of Patent Owner’s Admitted Prior Art (APA)	26
V.	The subject matter of claim 26 would have been Obvious over Sudo Porambo or Krokstad in view of the Patent Owner’s admitted prior art (APA).....	27

EXPERT DECLARATION OF DANIEL ELLIS, Ph.D.

I, Daniel Ellis, Ph.D., declare as follows:

I. BACKGROUND AND QUALIFICATIONS

1. I am currently an Associate Professor of Electrical Engineering at Columbia University in New York City and the Principal Investigator at the Laboratory for the Recognition and Organization of Speech and Audio (“LabROSA”) at Columbia University.

2. I teach and research in the area of signal processing applied to extracting information from sound. My research interests include:

- Signal processing and machine learning for analysis and classification of general audio, speech, and music;
- Audio source separation in underconstrained conditions;
- Computational models of human sound processing and organization;
- Automatic speech recognition in adverse environments; and
- Visualization and browsing tools for audio and speech databases.

3. I earned a Bachelor of Arts degree with honors from the Department of Engineering at Cambridge University in June 1987 and a Master of Science degree from the Department of Electrical Engineering and Computer Science of the Massachusetts Institute of Technology (“M.I.T.”) in February 1992. I received

my Ph.D. from the Department of Electrical Engineering and Computer Science at M.I.T. in June 1996.

4. I have been retained by QSC Audio Products, LLC to advise on the validity of claims 1-26 of U.S. Patent No. 5,652,544 (“the ’544 patent”) given the state of the art at the time of its filing and the knowledge of a person of ordinary skill in the art to which the ’544 patent pertains. I am being paid an hourly consulting rate of \$250 per hour. My compensation is in no way contingent on the results of this or any other proceeding relating to the ’544 patent.

5. In preparing this declaration, I have reviewed the ’544 patent and claims along with its prosecution history. In addition, I have reviewed the prior art references cited with the Petition for *Inter Partes* Review.

II. OVERVIEW OF THE ’544 PATENT

6. The ’544 patent describes a very simple idea. In a nutshell, the ’544 patent describes an amplifier that includes a programmable digital signal processor where the amplifier includes a programming signal input port to which an external programmer can be removably attached. Given the state of the art in 1994, I am surprised that the Patent Office would have allowed a patent on this idea.

III. LEVEL OF ORDINARY SKILL IN THE ART

7. As part of my analysis, I have been asked to comment on what a person of ordinary skill in the art would have considered to have been obvious when the '544 patent was filed.

8. The level of ordinary skill in the art is evidenced by the prior art references that accompany the Petition for *Inter Partes* Review. In my opinion, a person of ordinary skill in the art for this '544 patent would have had a Master's Degree in electrical or electronics engineering and Master's level course work along with practical experience designing and testing electronic amplifiers and the associated signal processing functions. Based on my experience, I have an understanding of the capabilities of a person of ordinary skill in the art. I have supervised and directed many such persons over the course of my career.

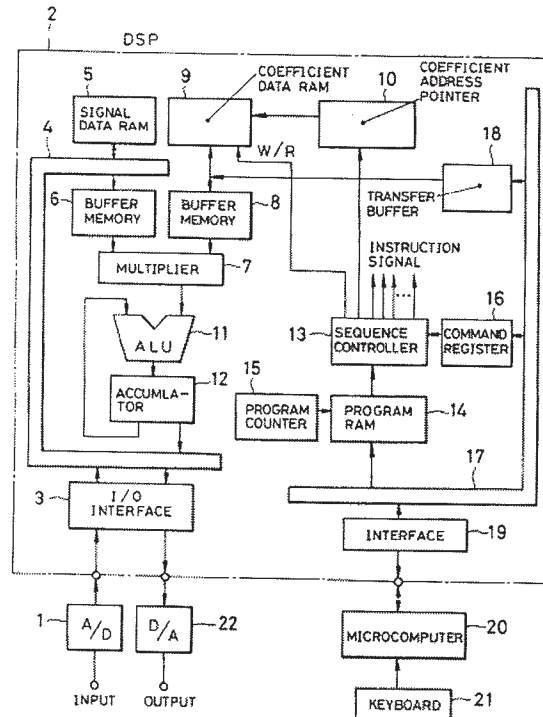
9. A person of ordinary skill in the art would have been familiar with a range of different amplifier and signal processing systems and would have understood that analog signal processing functions could be duplicated by a digital signal processing subsystem.

IV. STATE OF THE ART

A. U.S. Patent No. 5,822,775 to Sudo et al. ("Sudo")

10. The Sudo patent describes a system that uses a DSP to process audio signals. Figure 1 from the Sudo patent is shown below.

FIG. 1



11. Sudo describes that a microcomputer 20 is connected to the main bus 17 [of the DSP 2] through an interface 19 (“The microcomputer 20 is connected to the main bus 17 through an interface 19”). Sudo explains:

When any key on the keyboard 21 is selected, the microcomputer 20 reads out the processing program corresponding to the selected key from the ROM (not shown), transfers the program through the interface 19 and main bus 17 and stores it program RAM 14. A group of coefficient data which are used in the processing program, are read out from the ROM and transferred and stored in the coefficient data RAM 9 through the interface 19, main bus 17 and transfer buffer 18. Id. at 4:8-12.

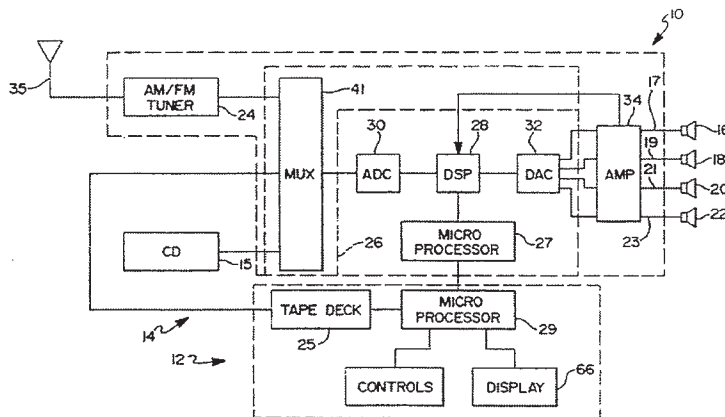
12. As can be seen from the above, the interface 19 is operating as a programming port through which signals for a digital signal processing function and digital signal processing function parameters are programmed into the memories of the DSP.

13. The fact that the microcomputer 20 is shown connected to the DSP through the interface 19 suggests that the microcomputer 20 is not hardwired to the DSP but is connected via some sort of removable connection.

14. Sudo does not disclose that the DSP is connected to an amplifier. However, Sudo does mention that the outputs of the DSP should be connected to a circuit or apparatus at the post stage. 4:1-5. In my opinion, a person of ordinary skill in the art would know that the circuitry or apparatus referred to in the post stage would include a power amplifier and speakers. In addition, the Porambo reference discussed below shows that it was well known to connect a DSP to a power amplifier and speakers in an audio system.

B. U.S. Patent No. 5,450,624 to Porambo et al.

15. Porambo discloses an audio system for use in a car that uses a DSP 28 to modify the sound of an input audio signal before it is provided to a power amplifier 24 and speakers 16-22.



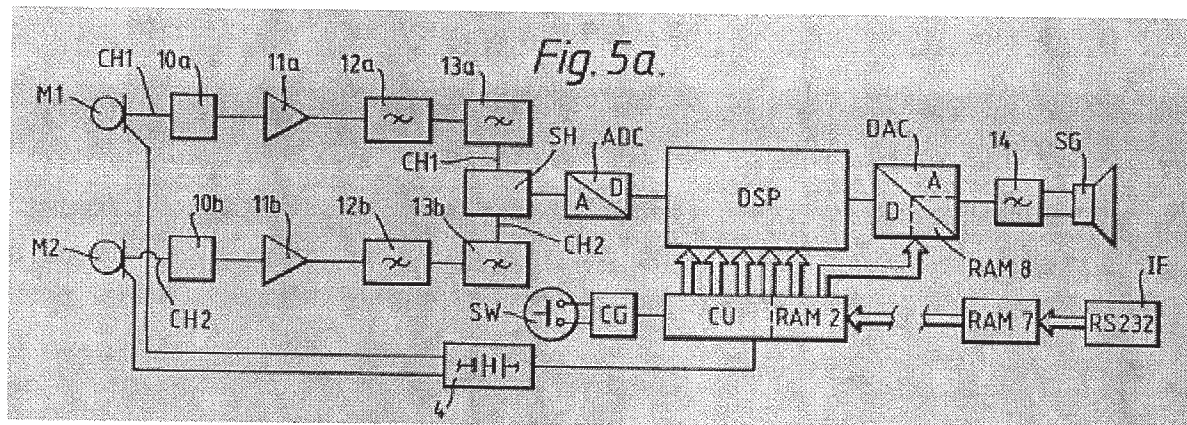
16. Although not explicitly described in Porambo, a person of ordinary skill in the art would understand that the microprocessor 29 used in the car radio would be programmed to read the settings of the controls and provide digital signal processing parameters to the DSP in order to perform such functions as adjusting the volume, bass, treble etc.

C. PCT Application No. PCT/NO/00178 to Krokstad et al.

17. The Krokstad patent application discloses a DSP controlled audio amplifier for use in a hearing aid. In Krokstad, a digital signal processor is used to provide signal processing functions such as compression and equalization, filtering, etc. The user can touch a control keypad on the outside of the device in order to cause a new set of parameters for a specific response function to be moved into the memories of the DSP. *See* Ex. 1007, pages 20-21.

18. Krokstad also shows the use of an RS232 input port that is used to program the DSP with functions that are selected for a particular user. *Id.* at page

20 (“Normally the user will be offered a menu of several response functions with a corresponding number of stored parameter sets . . . The menu is installed in the control unit (CU)”) and page 21 (“A typical menu of response functions can include, e.g. five such functions. Each of the response functions is adapted to the user’s hearing”). As described on page 21, a control unit (CU) connected to the DSP is programmed with a personal computer that is connected by an RS232 serial input port.



19. In Krokstad, the D/A converter operates as the power amplifier. However, if additional power is required, Krokstad describes that an additional power amplifier could be used. See page 18 middle of the page and Fig. 4d.

20. In my opinion, a person of ordinary skill in the art would recognize that the control unit (CU) discussed in Krokstad would be implemented with a programmable microprocessor.

21. Even though Krokstad is designed for use in a hearing aid, the general topology of the amplifier is the same as that of the '544 patent. An input analog

signal is received, converted to digital with an A/D converter, applied to the DSP, converted back to analog with a D/A converter and applied to a power amp (if required) before being supplied to a speaker.

22. In my opinion, a person of ordinary skill in the art would recognize that the signal processing functions in an amplifier design does not depend on the power level of the application, and would remain the same across low power applications, such as for hearing aids, and higher power applications, such as public address systems.

23. The Krokstad reference provides further evidence that DSP-controlled amplifiers having a programming signal input port into which a computer can be removably connected in order to program the DSP with a desired digital signal processing function and digital signal function parameters were well known in the art.

D. Texas Instruments TMS320 Second Generation Digital Signal Processors Data Sheet.

24. The TMS320 data sheet was published in 1991 and discloses information about general purpose digital signal processors that were available in 1991 prior to the earliest filing date of the '544 patent. In particular, the TMS320 data sheet is evidence that it was well known to include non-volatile memory (ROM/EPROM) in a DSP. See Ex. 1008, page 6.

E. Patent Owner's Admitted Prior Art

25. The '544 patent discloses that amplifiers having a plurality of control knobs for controlling gain, volume, an equalizer circuit, a level threshold, etc. on a control panel of the amplifier were well known in the art. See Ex. 1001, 5:46-55.

V. MY UNDERSTANDING OF CLAIM INTERPRETATION, ANTICIPATION, AND OBVIOUSNESS

26. In preparing this declaration, I have been asked to comment on whether the features recited in the claims of the '544 patent would have been obvious to a person of ordinary skill in the art at the time the '544 patent was filed.

27. It has been explained to me that the United States Patent Laws prevent an individual from obtaining a patent 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 of ordinary skill in the art at the time the invention was made. In addition, I understand that any patent claim that recites subject matter that as a whole would have been obvious to a person of ordinary skill in the art is invalid.

28. In addition, I understand that a claim is unpatentable if every element of a claim is disclosed in a single prior art reference. The disclosure may be explicit, implicit, or inherent. It has been explained to me that something is "inherently" disclosed if it is necessarily present in light of what is disclosed.

addition, Porambo shows that it was well known to connect a DSP to a power amplifier and a speaker load.

32. In my opinion, a person of ordinary skill in the art would have considered combining the teachings of a programmable DSP disclosed by Sudo with a power amplifier and speakers as disclosed in Porambo as an obvious way to design a programmable DSP system that can produce amplified audio signals that could be heard.

33. Therefore it is my opinion that the subject matter of claim 1 would have been obvious to a person of ordinary skill in the art.

B. All of the Features of Claim 1 would have been Obvious to a Person having Ordinary Skill in the Art over Sudo in view Krokstad.

34. In my opinion, claim 1 would have also been obvious to a person of ordinary skill the art in view of Sudo and Krokstad. To the extent that Sudo does not explicitly describe an external programmer that is removably connected to a DSP, this feature would have been obvious to a person of ordinary skill in the art in view of Krokstad.

35. Krokstad shows a DSP in an amplifier that is programmed with a personal computer that is connected to an RS232 port (a type of removable connection). Ex. 1007, page 21.

36. In my opinion, a person of ordinary skill in the art would have found it obvious to use a removable connection (as shown by Krokstad) in order to connect the separate microcomputer 20 of Sudo to the DSP for any number of reasons such as to allow the DSP to be programmed with a personal computer that was purchased separately from the DSP or to allow the external programmer to be able to program more than one DSP or to use a single programmer to program multiple amplifiers to have the same characteristics by repeatedly programming each one with the same set of instructions and parameters.

37. Therefore, the subject matter of claim 1 as a whole would have been obvious to a person of ordinary skill in the art.

VII. DEPENDENT CLAIMS 2-15, 18-21, and 23-26

A. The subject matter of claim 2 would have been Obvious over Sudo in view of either Porambo or Krokstad.

38. Claim 2 recites a control circuit for receiving the programming signal and converting the programming signal to a control signal to be sent to the signal processing circuit for modifying at least one of the signal processing function and the signal processing function parameter defined in said signal processing circuit.

39. Upon review of the '544 patent, I cannot find any description of a circuit that converts a programming signal that is received from the external programmer into a control signal that is sent to the DSP. The descriptions of converting in the '544 patent all refer to converting input commands to the external

programmer into control signals that are sent to the DSP. See for example, Ex. 1001 3:56-62 and 7:44-51.

40. If the control circuit in claim 2 is interpreted to refer a circuit that supplies a programming signal to a signal processor, then it is my opinion that this would have been obvious to a person of ordinary skill in the art in view of either Sudo, Porambo, or Krokstad.

41. Sudo discloses an interface circuit 19 that supplies programming signals to the DSP. Porambo inherently discloses a microprocessor that supplies signals read from the control knobs to the DSP. Krokstad shows a control unit (CU) that supplies programming signals to the DSP based on the electronic signals received from a personal computer via the RS232 port.

42. In a broad sense, each of these devices convert received programming signals into the proper format of the digital data that is used to program the DSP. In my opinion, a person of ordinary skill in the art would have considered it obvious to use some sort of control circuit to convert a received programming signal into the proper format required by the DSP.

B. The subject matter of claim 3 would have been Obvious over Sudo in view of either Porambo or Krokstad.

43. Claim 3 requires that the signal processor includes a storage device for storing at least one of the signal processing function and the signal processing function parameter produced by the control circuit.

44. In my opinion, a person of ordinary skill in the art would have considered the combination of features set forth in claim 3 to have been obvious in light of either Sudo or Krokstad.

45. Both Sudo and Krokstad disclose DSPs having internal memories. Sudo discloses the use of a program RAM 14 and a coefficient RAM 9. Ex. 1005 Fig. 1. Krokstad discloses that the control unit and DSP have internal RAMs. Ex. 1007, Fig. 5a.

46. In my opinion, a person of ordinary skill in the art would have considered the use of a storage device in a signal processor for storing a signal processing function or signal processing parameters as an obvious way to store digital data in a DSP. Therefore the subject matter of claim 3 would have been obvious.

C. The subject matter of claim 4 would have been Obvious over Sudo in view of either of Porambo or Krokstad.

47. Claim 4 requires that the control circuit of claim 2 be a programmable microprocessor.

48. In my opinion, a person of ordinary skill in the art would have considered the use of a programmable microprocessor as a control circuit to receive a programming signal and convert it into a control signal of the proper format to program the DSP to have been an obvious way to interface with a DSP.

Prior to 1994, microcontrollers (e.g. control circuits) and programmable microprocessors were interchangeable components.

49. Therefore, the subject matter of claim 4 would have been obvious to a person of ordinary skill in the art when the '544 patent was filed.

D. The subject matter of claim 5 would have been Obvious over Sudo in view of either Porambo or Krokstad.

50. Claim 5 adds a storage device for storing at least one programming signal.

51. For the same reasons set forth above in connection with claim 3, it is my opinion that a person of ordinary skill in the art would have considered the use of a storage device for storing a programming signal in a DSP as an obvious way to store programs in the DSP. Therefore, claim 5 would have been obvious.

E. The subject matter of claim 6 would have been Obvious over Sudo in view of Porambo or Krokstad.

52. Claim 6 adds the limitation of an amplifier housing where the signal processing circuit and power amplifier are located in the amplifier housing.

53. Porambo discloses an audio unit where the DSP and power amplifier are located in the same control box 14. Porambo 4:1-12. Krokstad discloses placing all the electronic components in a single housing 2a as shown in Figure 1. See. Ex. 1007 at page 8, lines 6-8 ("The electronic components which form part of the hearing aid are provided in a first secondary section 2a.").

54. In my opinion, a person of ordinary skill in the art would have considered placing a signal processor and power amplifier in a single housing in the manner shown by Porambo or Krokstad and it would be obvious for any number of reasons such as to keep the components of the amplifier physically together or to shorten the length of signal leads between components. Therefore claim 6 would have been obvious to a person of ordinary skill in the art.

F. The subject matter of claim 7 would have been Obvious over Sudo in view of either Porambo or Krokstad and the Patent Owner's Admitted Prior Art (APA).

55. Claim 7 adds the additional limitation of a control panel, where the programming signal input port is provided on the control panel.

56. The '544 patent describes that it is conventional to include controls for an amplifier on a control panel. *See* Ex. 1001 at 5:52-54. In my opinion, a person of ordinary skill in the art of amplifier design would have considered placing a programming signal input port (interface 19 of Sudo or RS232 port of Krokstad) on a control panel where the other controls are located as an obvious way to group the input controls for the amplifier. Therefore, the subject matter of claim 7 would have been obvious.

G. The subject matter of claim 8 would have been Obvious over Sudo in view of Porambo or Krokstad in further view of the TMS320 Data Sheet.

57. Claim 8 adds the further limitations that the signal processing circuit comprises a plurality of electronic components and adds a non-volatile storage means for storing a set [of] performance characteristics.

58. Sudo discloses a DSP with a plurality of electronic components (program counters, command registers, buffers, multiplier, I/O interface, etc.) See Ex. 1005 Fig. 1. In addition, the use of a non-volatile memory in a DSP is disclosed in the TMS320 data sheet. See Ex. 1008, page 6 (ROM, EPROM), etc.

59. In my opinion, a person of ordinary skill in the art would know that signal processing circuits contain a plurality of electronic components. In addition such a person would have considered the use of a non-volatile memory (storage means) in the DSP as an obvious way to retain programs or data in the DSP in the event that power is removed from the device. Therefore, the subject matter of claim 8 would have been obvious.

H. The subject matter of claim 9 would have been Obvious over Sudo in view of Porambo or Krokstad.

60. Claim 9 adds limitations regarding the external programmer including an input/output port, data input device and a controller.

61. In my opinion, each of the elements recited in claim 9 would inherently be found in a microcomputer or personal computer used to program a

DSP of the type described in either Sudo or Krokstad. Therefore, it would have been obvious to a person of ordinary skill in the art to include the elements of claim 9 in an external programmer as a way to program a DSP in an amplifier.

I. The subject matter of claim 10 would have been Obvious over Sudo in view of Porambo or Krokstad.

62. Claim 10 requires that the external programmer include a display screen for displaying input programming information and information read by the controller.

63. In my opinion, a person of ordinary skill in the art would understand that the microcomputer of Sudo or the personal computer of Krokstad would necessarily include a display screen for displaying input programming information and information read by the controller (e.g. CPU). A person of ordinary skill in the art would have considered the use of such a display screen to be an obvious way to interact with the user of the microcomputer of personal computer used to program the DSP. Therefore, the subject matter of claim 10 would have been obvious.

J. The subject matter of claim 11 would have been Obvious over Sudo in view of Porambo or Krokstad.

64. Claim 11 adds the additional limitation that the external programmer includes a storage device for storing the input programming information and previously selected control signals.

65. The external program disclosed in Sudo includes a storage device (RAM and ROM). *See* Ex. 1005, 3:54-55. In addition, Sudo mentions that the processing program is transferred to the DSP each time the desired sound field is switched. *Id.* at 1:37-41. In my opinion, a person of ordinary skill in the art would have considered using a storage device to store input programming information and previously selected control signals as an obvious way to keep track of the last sound field selected by the user in order to determine if the desired sound field was switched and the external programmer should download a new program and parameters to the DSP.

66. Therefore, the subject matter of claim 11 would have been obvious to a person of ordinary skill in the art.

K. The subject matter of claim 12 would have been Obvious over Sudo in view of Porambo or Krokstad.

67. Claim 12 requires that the data input device has a plurality of keys.

68. Sudo discloses a microcomputer having a keyboard that is used as an external programmer. Ex. 1005 3: 61. Krokstad discloses programming a DSP in an amplifier with a personal computer that would inherently include a keyboard with a plurality of keys.

69. In my opinion, a person of ordinary skill in the art would have considered the use a data input device having a plurality of keys as disclosed by

Sudo or Krokstad to be an obvious way of allowing data or programming signals to be input into the external programmer.

70. Therefore the subject matter of claim 12 would have been obvious.

L. The subject matter of claim 13 would have been Obvious over Sudo in view of Porambo or Krokstad.

71. Claim 13 requires that the controller of the external programmer comprise a microprocessor that receives programming information from at least one of an input device and a control circuit of the amplifier.

72. Sudo discloses that the microcomputer that is used as an external programmer includes a CPU (i.e. a microprocessor) that receives programming information from a keyboard (i.e. an input device).

73. In my opinion, a person of ordinary skill in the art would have considered the use of a microprocessor that receives programming information from an input device such as a keyboard to have been an obvious way to supply desired programming information to the external programmer.

74. Therefore the subject matter of claim 13 would have been obvious.

M. The subject matter of claim 14 would have been Obvious over Sudo in view of Porambo and Krokstad.

75. Claim 14 adds that the controller of the external programmer include a connector for removably connecting the programmer to the amplifier.

76. Sudo discloses the use of a microcomputer as an external programmer, which implies the presence of some sort of connector that connects the microcomputer to the interface 19 on the DSP.

77. Krokstad discloses a DSP in an amplifier that is programmed with a personal computer via an RS232 port. It would be understood by persons of ordinary skill in the art that a connector from the personal computer to the RS232 port would be needed in order to connect the computer to the DSP.

78. In my opinion, a person of ordinary skill in the art would have considered the use of a connector to removably connect the programmer to the amplifier to have been obvious in view of Sudo or Krokstad as convenient way to allow the external programmer to be easily connected to, or disconnected from, the DSP.

79. Therefore, the subject matter of claim 14 would have been obvious.

N. The subject matter of claim 15 would have been Obvious over Sudo in view of Porambo or Krokstad.

80. Claim 15 requires that the programmer be a standard computer.

81. Sudo discloses programming the DSP with a microcomputer and Krokstad discloses programming a DSP with a personal computer. Both of these devices could be considered a “standard computer.”

82. In my opinion, a person of ordinary skill in the art would have considered the use of a standard computer to program a DSP in an amplifier to

have been obvious in light of either Sudo or Krokstad as a way to avoid having to build a special purpose computer as an external programmer.

83. Therefore, the subject matter of claim 15 would have been obvious.

O. The subject matter of claim 18 would have been Obvious over Sudo in view Porambo or Krokstad.

84. Claim 18 adds the additional limitation that the amplifier executes an operation according to said at least one of a signal processing function and a signal processing function parameter after said external programmer is disconnected from the amplifier.

85. In my opinion, this feature is inherently disclosed by Krokstad. A person of ordinary skill in the art would recognize that a programmed hearing aid is not going to be worn by the user with the personal computer attached. Therefore, the programming computer would be disconnected before the hearing aid amplifier is to be used.

86. A person of ordinary skill in the art would have considered the idea of having an amplifier operate when the external programmer is disconnected to be an obvious way to allow a single external programmer to be used to program multiple DSPs.

87. Therefore the subject matter of claim 15 would have been obvious.

P. The subject matter of claim 19 would have been Obvious over Sudo in view of Krokstad.

88. Claim 19 requires that the external programmer be a standard computer.

89. In my opinion, a person of ordinary skill in the art would have considered the idea of using a standard computer as an external programmer to have been obvious in light of either Sudo or Krokstad for the same reasons discussed above in connection with dependent claim 15.

90. Therefore the subject matter of claim 19 would have been obvious.

Q. The subject matter of claim 20 would have been Obvious over Sudo and Porambo in light of the Patent Owner's Admitted Prior Art.

91. Claim 20 adds the limitation that the signal processor receives and stores a processing function and signal processing parameters for a crossover function.

92. The '544 patent indicates at 1:33 that it was well known to provide a crossover function with a signal processor in an amplifier. In addition, it was well known by those of ordinary skill in the art that DSPs could be used to perform the functions previously performed by discrete circuit components. Therefore, it is my opinion that a person of ordinary skill in the art would have considered the idea of using a DSP to perform a previously known crossover function as an obvious way

to provide the function in an amplifier without having to provide separate circuit components.

93. Therefore, the subject matter of claim 20 would have been obvious.

R. The subject matter of claim 21 would have been Obvious over Sudo in view of Porambo or Krokstad in further view of Patent Owner's Admitted Prior Art (APA).

94. Claim 21 adds the limitation that the DSP receives and stores a combination of at least two signal processing functions.

95. The Patent Owner's APA indicates at Ex. 1001 1:30-35 that it was well known to have signal processors that provide many different functions such as mixing, compression, equalizing, etc.

96. Krokstad discloses a DSP that performs more than one signal processing function in an amplifier (e.g. compression, equalization, pre-compensation, etc.) See Ex. 1007, page 20, lines 1-2.

97. In my opinion, a person of ordinary skill in the art would have considered the idea of using a DSP to receive and store at least two signal processing functions to have been obvious in view of either the APA or Krokstad as a convenient way to implement more than one function with a single DSP.

98. Therefore claim 21 would have been obvious.

S. The subject matter of claim 23 would have been Obvious over Sudo and Porambo in further view of the Patent Owner's Admitted Prior Art (APA).

99. Claim 23 adds the limitation that the DSP receives and stores a volume control function and parameters.

100. The '544 patent indicates that volume controls in amplifiers were conventional. Ex. 1001 5:52. In addition, it was well known by those of ordinary skill in the art that DSPs could be used to perform the functions previously performed by discrete circuit components.

101. In my opinion, a person of ordinary skill in the art would have considered it obvious to use a DSP to implement a previously known volume control function in an amplifier as a way to avoid having to provide separate circuitry in the amplifier to implement the function.

102. Therefore the subject matter of claim 23 would have been obvious.

T. The subject matter of claim 24 would have been Obvious over Sudo and Porambo or Krokstad in further view of the Patent Owner's Admitted Prior Art (APA).

103. Claim 24 adds the limitation that the DSP receives and stores an equalizing function and parameters.

104. Krokstad discloses a DSP in an amplifier that is programmed with equalizing an equalizing function and parameters. Ex. 1007, page 20, lines 1-16.

105. In addition, the '544 patent admits that the use of equalizing functions in an amplifier is conventional. Ex. 1001 5:52. In addition, it was well known by those of ordinary skill in the art that DSPs could be used to perform the functions previously performed by discrete circuit components.

106. In my opinion, a person of ordinary skill in the art would have considered it obvious to use a DSP to implement a previously known equalization function in an amplifier as disclosed in either Krokstad or the APA as a way to avoid having to provide separate circuitry in the amplifier to implement the function.

107. Therefore the subject matter of claim 24 would have been obvious.

U. The subject matter of claim 25 would have been Obvious over Sudo and Porambo or Krokstad in further view of Patent Owner's Admitted Prior Art (APA).

108. Claim 25 adds the limitation that the DSP receives and stores a compression function and parameters.

109. Krokstad discloses a DSP in an amplifier that provides a compression function. See Ex. 1006, page 20 ("compressor 33").

110. In addition, the '544 patent describes that compression was a well-known signal processing function in amplifiers. Ex. 1001 1:36.

111. In my opinion, a person of ordinary skill in the art would have considered using a DSP to provide a previously known function, such as

compression as disclosed in Krokstad or the '544 patent, to have been an obvious way to tailor the sound of an input signal to the amplifier in a desired manner without having to provide specialized circuitry to perform the function.

112. Therefore, the subject matter of claim 25 would have been obvious.

V. The subject matter of claim 26 would have been Obvious over Sudo Porambo or Krokstad in view of the Patent Owner's admitted prior art (APA).

113. Claim 26 adds the limitation that the DSP receives and stores a level threshold function and parameters.

114. The '544 patent admits that a level threshold function in an amplifier is conventional. Ex. 1001 5:52. In addition, it was well known by those of ordinary skill in the art that DSPs could be used to perform the functions previously performed by discrete circuit components.

115. In my opinion, a person of ordinary skill in the art would have considered it obvious to use a DSP to implement a previously known level thresholding function in an amplifier as a way to provide the function without to avoid having to provide separate circuitry in the amplifier to implement the function.

116. Therefore the subject matter of claim 26 would have been obvious.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further 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 and that such willful false statements may jeopardize the results of these proceedings.

2013-11-05
Date

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