

Title of the Invention.

PC Surround Mixer

9704065-31

1POS

Description

With the introduction of DVD and other audio sources into the PC market, there will be a trend that game titles deploy the surround format in three or more channels to give a realistic surround environment to the game players. However, games will still make use of the two common data (WAVE and MIDI) to create effects such as gun shootings, or dialogues. So a possible good combination is a game title producing surround output signals and WAVE or MIDI signals. If both signals cannot be derived from the same output source, the game players will need two sets of speakers or a separate mixer to have the effect.

Block Diagram

The objective of the PC Surround Mixer is to mix signals (WAVE or MIDI) specific to PC together with signals from a surround stream. Figure 1 shows the block diagram.

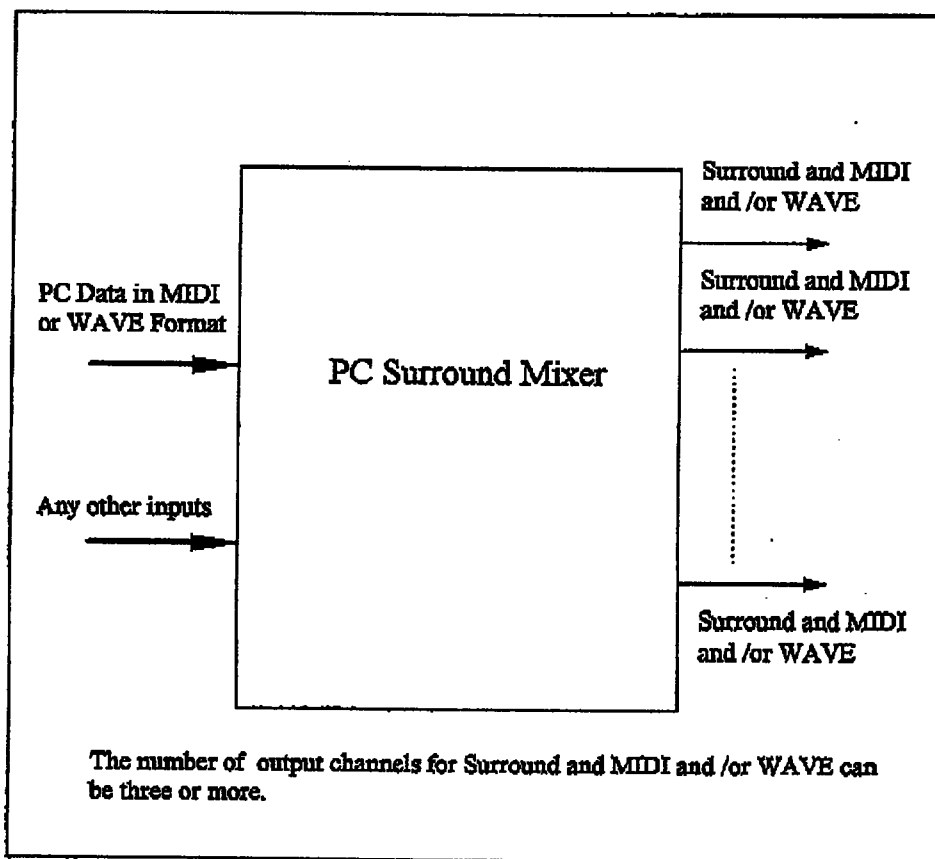


Figure 1. PC Surround Mixer

The inputs to the system include data in WAVE or MIDI format, and any other signals. The outputs will be at least 3 channels each having a output with surround and MIDI or WAVE. The PC data is in digital form while the other signals can be in analog or digital form. All the signals can be serial (within itself or multiplexed with other channels) or parallel, synchronous or asynchronous. The

This Sheet Has Been Replaced



mixer can process the input signals and even generate any signals within itself. There can be many output channels, but as long as three of the output channels contains the information of surround signals and MIDI or WAVE signals, this will be regarded as a PC Surround Mixer.

Mathematical model

Figure 2 describes the system in a mathematical model so as to give a more precise definition.

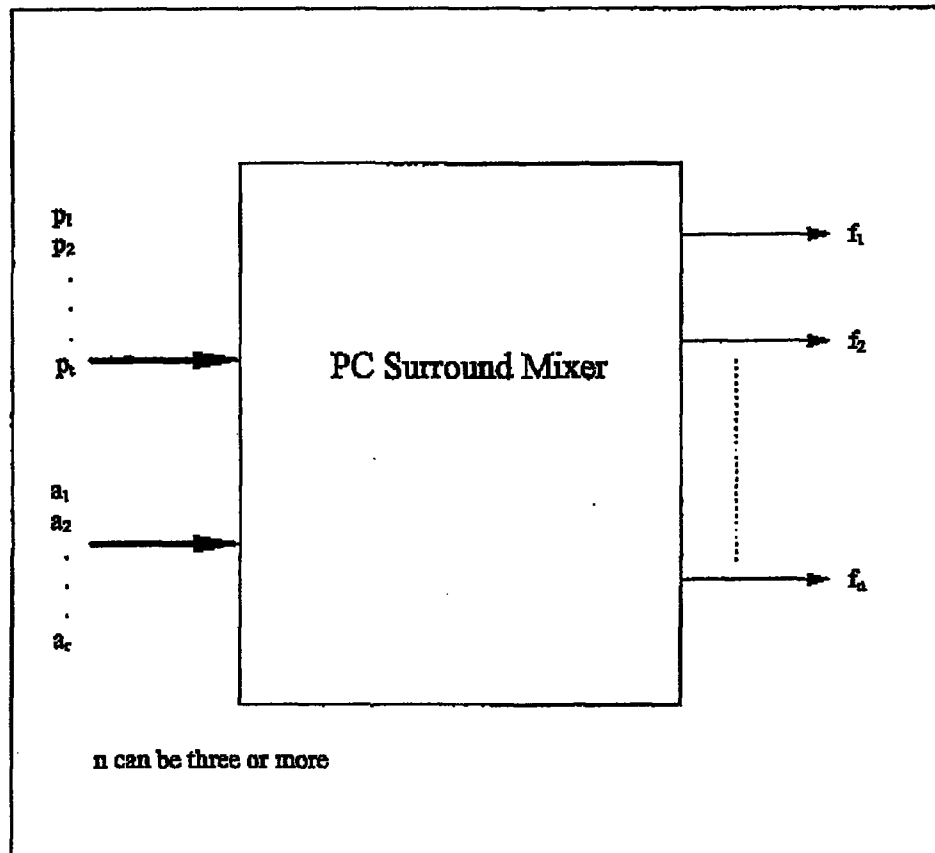


Figure 2. Mathematical Models of PC Surround Mixer.

In order to satisfy the PC Surround Mixer system the following applies:

1. At least one of the inputs is PC data in WAVE or MIDI format ($p_1, p_2, p_3, \dots, p_n$) and $t > 0$.
2. There may or may not be any other input signals: $s_1, s_2, s_3, \dots, s_n$.
3. The outputs are defined by:

$$f_i = F_i(s_1, s_2, s_3, \dots, s_n, p_1, p_2, p_3, \dots, p_n, b_1, b_2, b_3, \dots, b_n),$$

ie, it is a function depending on the s, p and b .

in which

$(p_1, p_2, p_3, \dots, p_n) \in (p_1, p_2, p_3, \dots, p_n)$ which are the channels of WAVE and/or MIDI

$(s_1, s_2, s_3, \dots, s_n) \in (s_1, s_2, s_3, \dots, s_n)$ which are the channels of an audio system, normally termed as surround system other than WAVE and MIDI, p_i

$(b_1, b_2, b_3, \dots, b_n)$ are any other signals



the number of s, p , and b can be zero in some of the F_i , i.e. F_i can be not depending on either s, p , or b

4. Three of the output $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ shall have a characteristic that there is at least a s term and a p term, i.e. the output depends on s and p .

Some of the possible practical examples of the system will be presented and the application of the patent is explained. These examples are not trying to describe all the possible combinations, instead they are only to give more insight of the PC Surround Mixer.

Example 1

Figure 3 is a mixer using a summing circuit to mix 6 surround channels with two channels of WAVE to give 3 channels of surround and WAVE contents, and 3 remaining channels of pure surround.

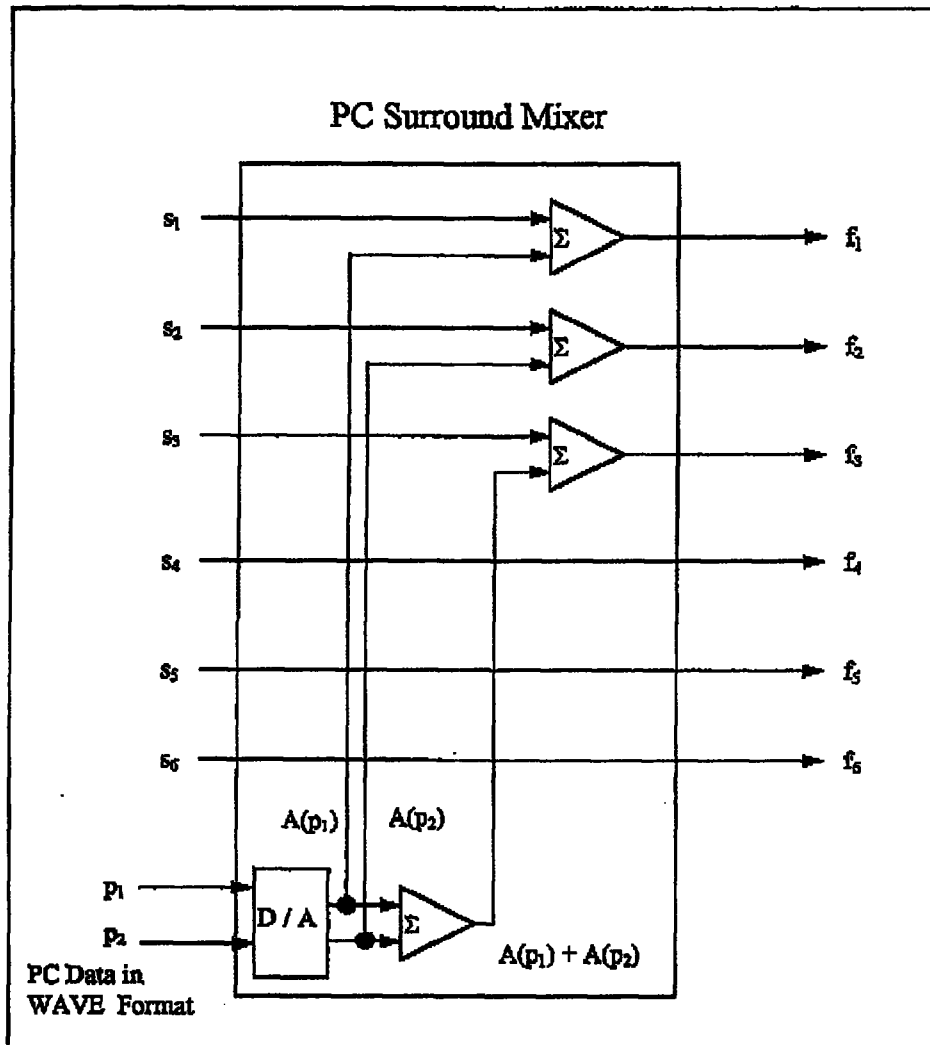


Figure 3. Example 1 of PC Surround Mixer.

In this case:

$(s_1, s_2, s_3, \dots, s_6)$ are six analog channels of a surround sound.

$$f_1 = s_1 + A(p_1)$$

$$f_2 = s_2 + A(p_2)$$



$$f_3 = s_3 + A(p_1) + A(p_2)$$

$$f_4 = s_4$$

$$f_5 = s_5$$

$$f_6 = s_6$$

in which $A(x)$ is a transformation of the x data into an analog WAVE form.

Comparing with our model, we can see that the criteria of the PC Surround Mixer are met by:

1. The inputs are PC WAVE data.
2. There are other inputs and they are:

$$(a_1, a_2, a_3, \dots, a_6) = (s_1, s_2, s_3, \dots, s_6)$$

3. The $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ are:

$$f_1 = s_1 + A(p_1)$$

$$f_2 = s_2 + A(p_2)$$

$$f_3 = s_3 + A(p_1) + A(p_2)$$

$$f_4 = s_4$$

$$f_5 = s_5$$

$$f_6 = s_6$$

It can be seen that b 's are not depended in all output, which is allowed in the PC Surround Mixer.

And finally,

4. The three output $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ having a characteristics of at least a s term and a p term are:

$$f_1 = s_1 + A(p_1)$$

$$f_2 = s_2 + A(p_2)$$

$$f_3 = s_3 + A(p_1) + A(p_2)$$

Example 2

Figure 4 is similar to the function of Figure 1 but the operations are in digital forms. The input $s_1, s_2, s_3, \dots, s_6$ are now in digital forms. The four criteria are satisfied similarly except that $A(p_i)$ are replaced by p_i .



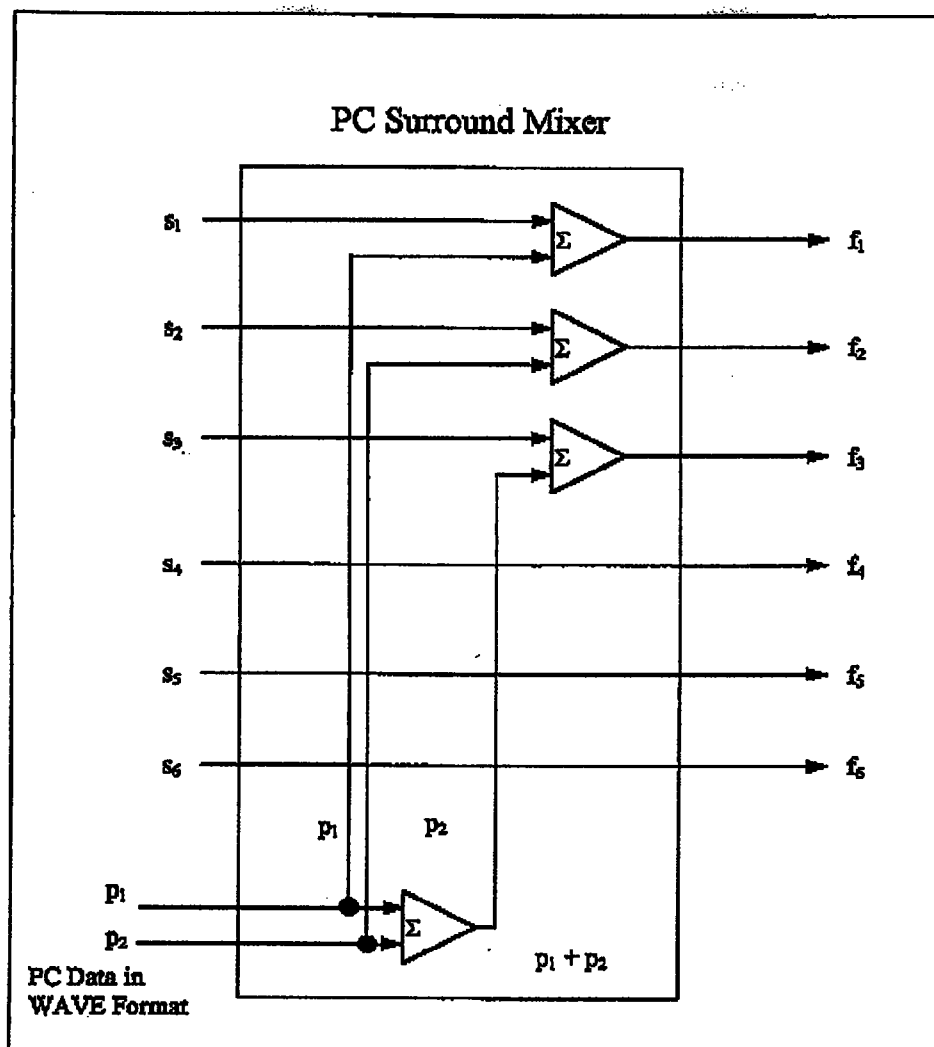


Figure 4. Example 2 of PC Surround Mixer.

Example 3

Figure 5 is similar to Figure 1 with the summation circuits Σ being replaced by multiplexers M . The operation of M is defined by if $b_1 = 0$, $f_i = x$; if $b_1 = 1$, $f_i = y$, and $b_1 = (a_7 \text{ AND } c)$ where c is an internally generated signal.

Note:

1. One (a_7) of the inputs can be a control signal and not a surround, MIDI or WAVE signal.
2. The outputs also depend on $b_1 = (a_7 \text{ AND } c)$.



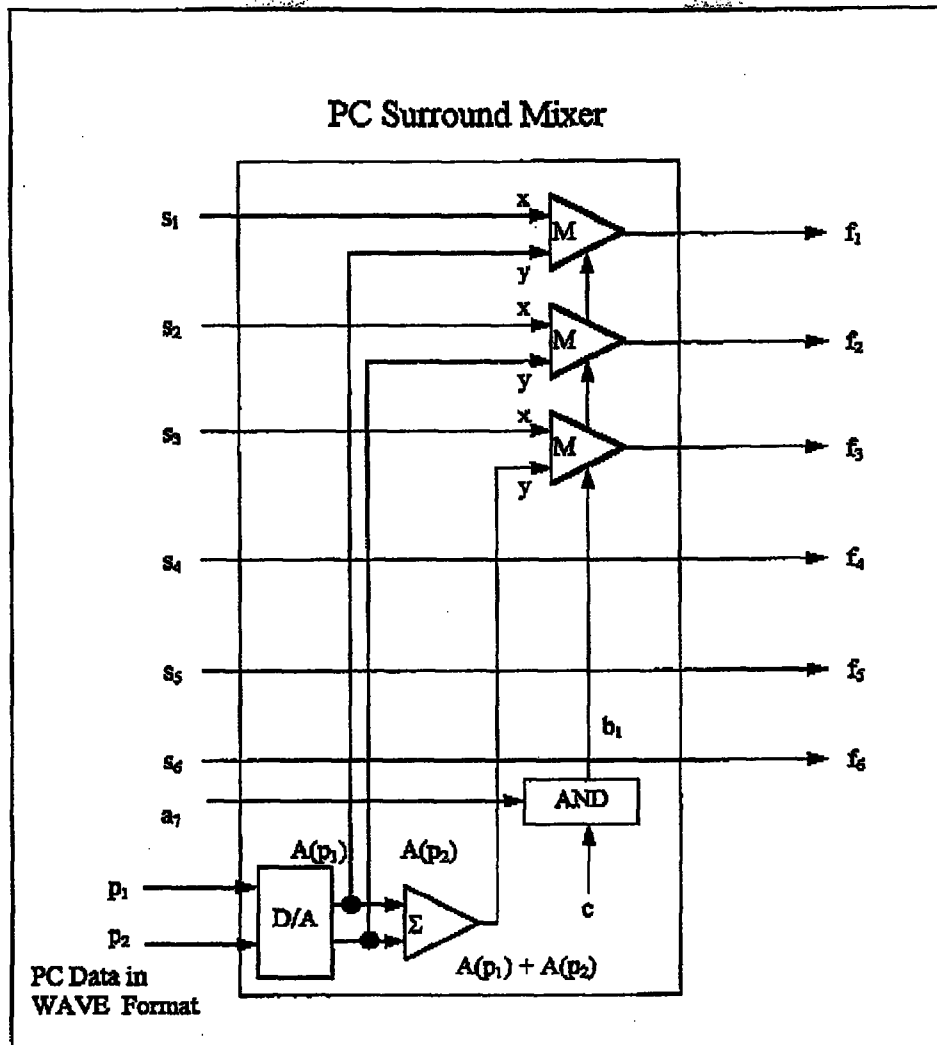


Figure 5. Example 3 of PC Surround Mixer.

Example 4

Figure 6 is similar to Figure 1, the six inputs: ($s_1, s_2, s_3, \dots, s_6$) are analog channels of a surround sound. L is a low pass filter defined as:

for frequency $f < f_L$, output = input,
for frequency $f > f_L$, output = 0,

MIDI is a generator of MIDI analog signal by a table look up so that the frequency, duration, attack time, decay time, and amplitude of the analog output waveform are determined by the data supplied by the input PC data p_i .

so the outputs are given by:

$$\begin{aligned} f_1 &= s_1 + \text{MIDI}(p_1) \\ f_2 &= s_2 + \text{MIDI}(p_2) \\ f_3 &= s_3 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_4 &= s_4 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_5 &= s_5 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_6 &= s_6 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \end{aligned}$$



Comparing with our model, we can see that the criteria of the PC Surround Mixer are met by:

1. Two inputs are PC MIDI data.
2. There are other inputs and they are:

$$(s_1, s_2, s_3, \dots, s_6) = (s_1, s_2, s_3, \dots, s_6)$$

3. The $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ are:

$$\begin{aligned} f_1 &= s_1 + \text{MIDI}(p_1) \\ f_2 &= s_2 + \text{MIDI}(p_2) \\ f_3 &= s_3 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_4 &= s_4 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_5 &= s_5 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_6 &= s_6 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \end{aligned}$$

Also, it can be seen that b's are not depended in all output, which is allowed in the PC Surround Mixer.

And finally,

4. The three output $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ having characteristics of at least a s term and a p term can be arbitrarily chosen as:

$$\begin{aligned} f_1 &= s_1 + \text{MIDI}(p_1) \\ f_2 &= s_2 + \text{MIDI}(p_2) \\ f_3 &= s_3 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \end{aligned}$$





WHAT IS CLAIMED IS :

1. A surround mixer for a personal computer substantially as herein described, with reference to and as illustrated in the accompanying drawings.

This Sheet Has Been Replaced



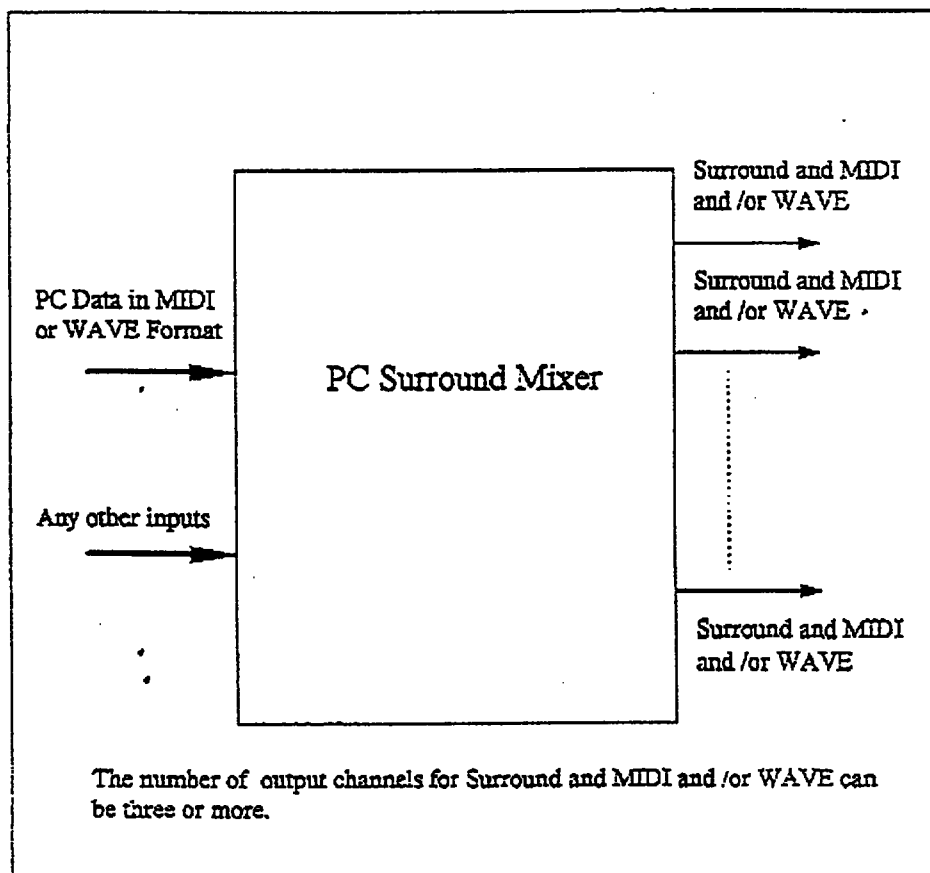


Figure 1. PC Surround Mixer

This Sheet Has Been Replaced



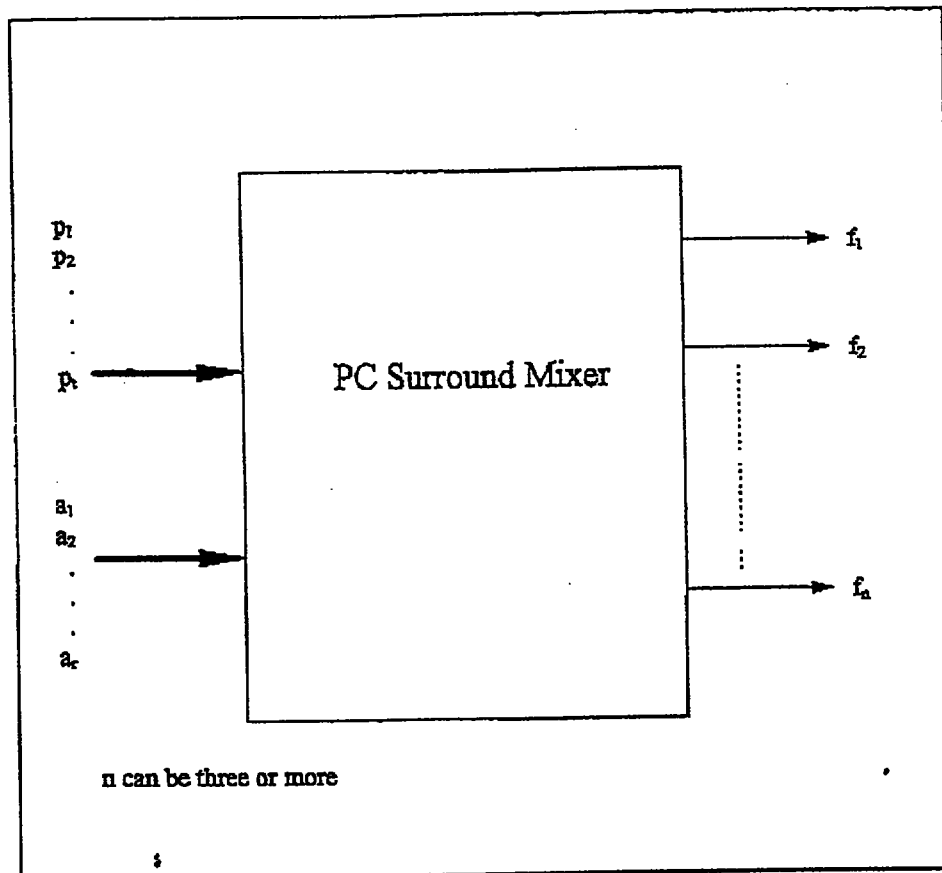


Figure 2. Mathematical Models of PC Surround Mixer.

This Sheet Has Been Replaced



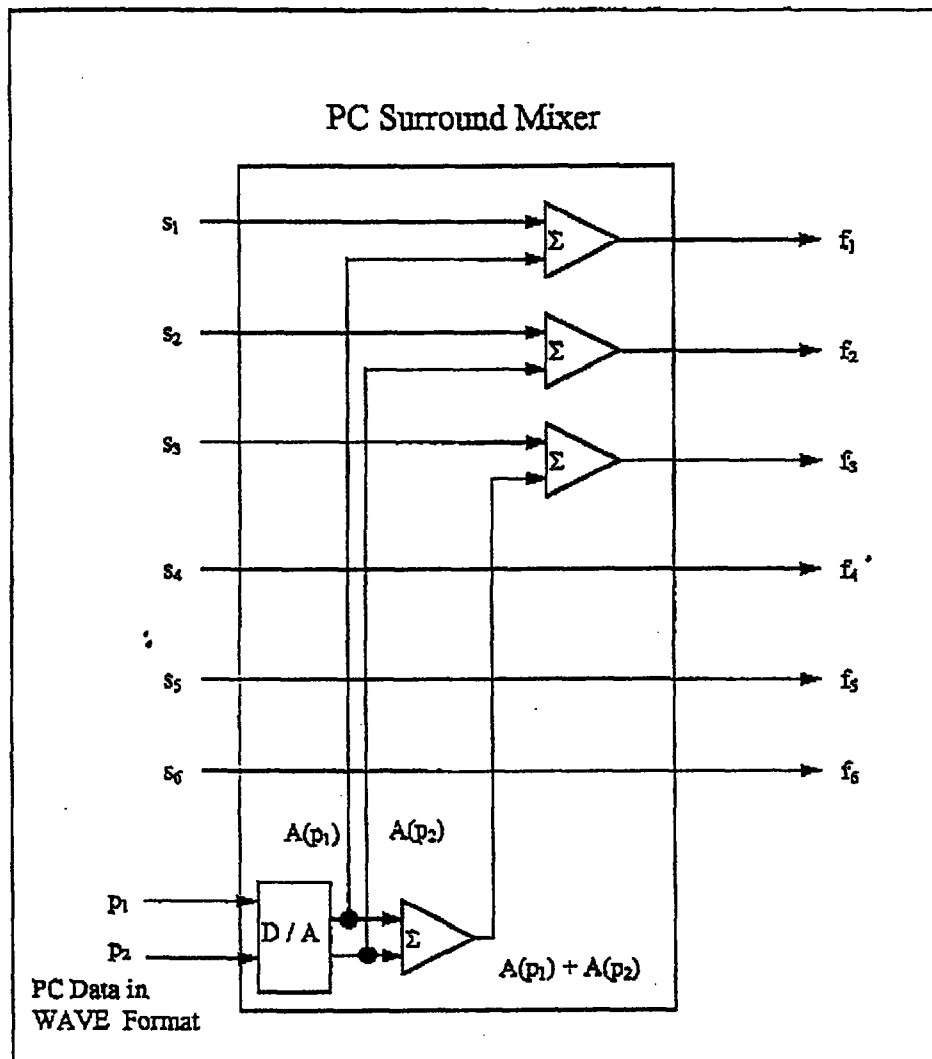


Figure 3. Example 1 of PC Surround Mixer.

This Sheet Has Been Replaced



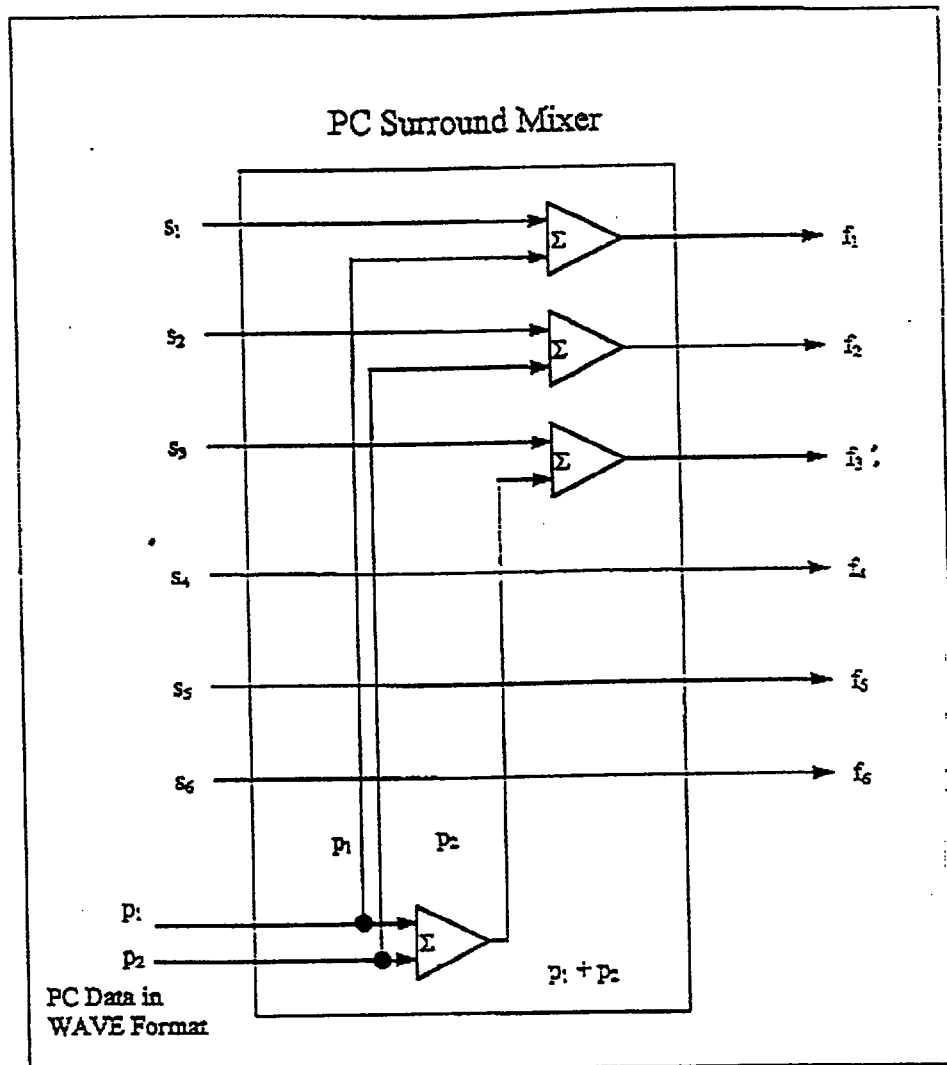


Figure 4. Example 2 of PC Surround Mixer.



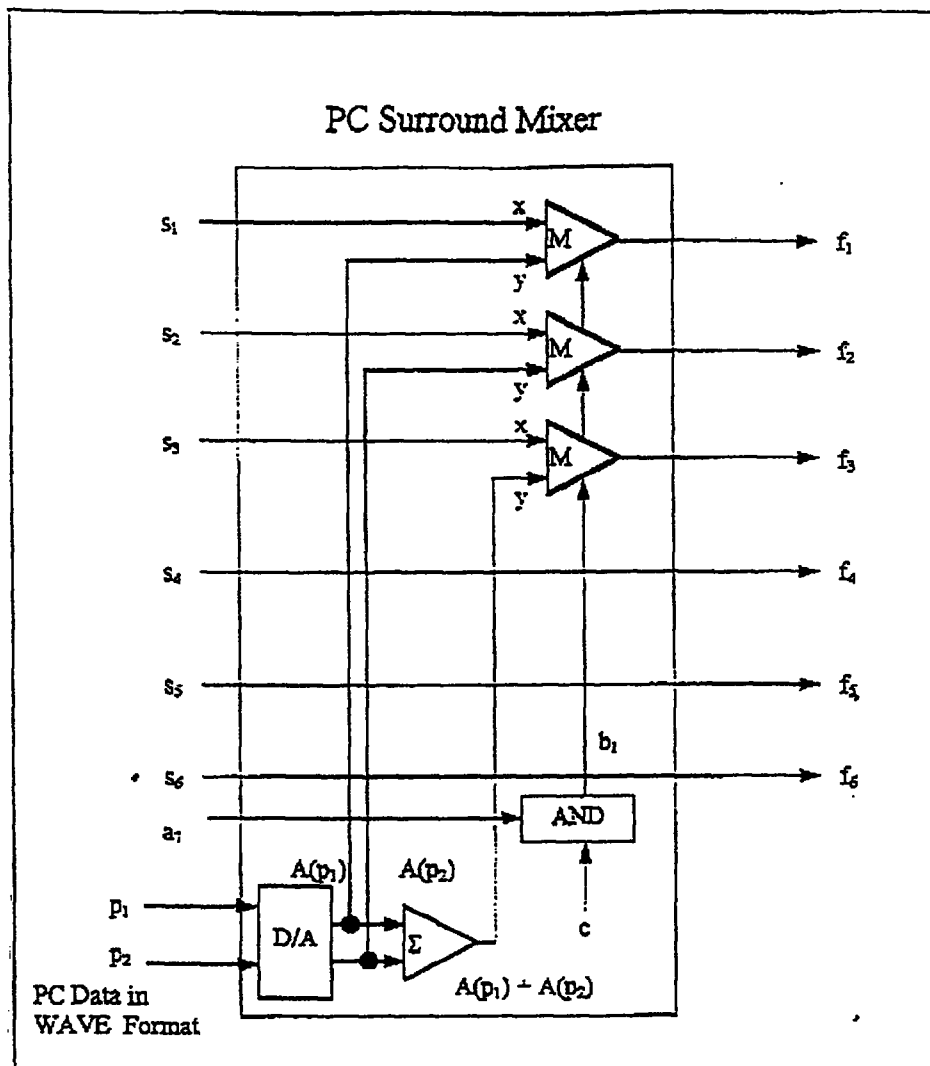


Figure 5. Example 3 of PC Surround Mixer.



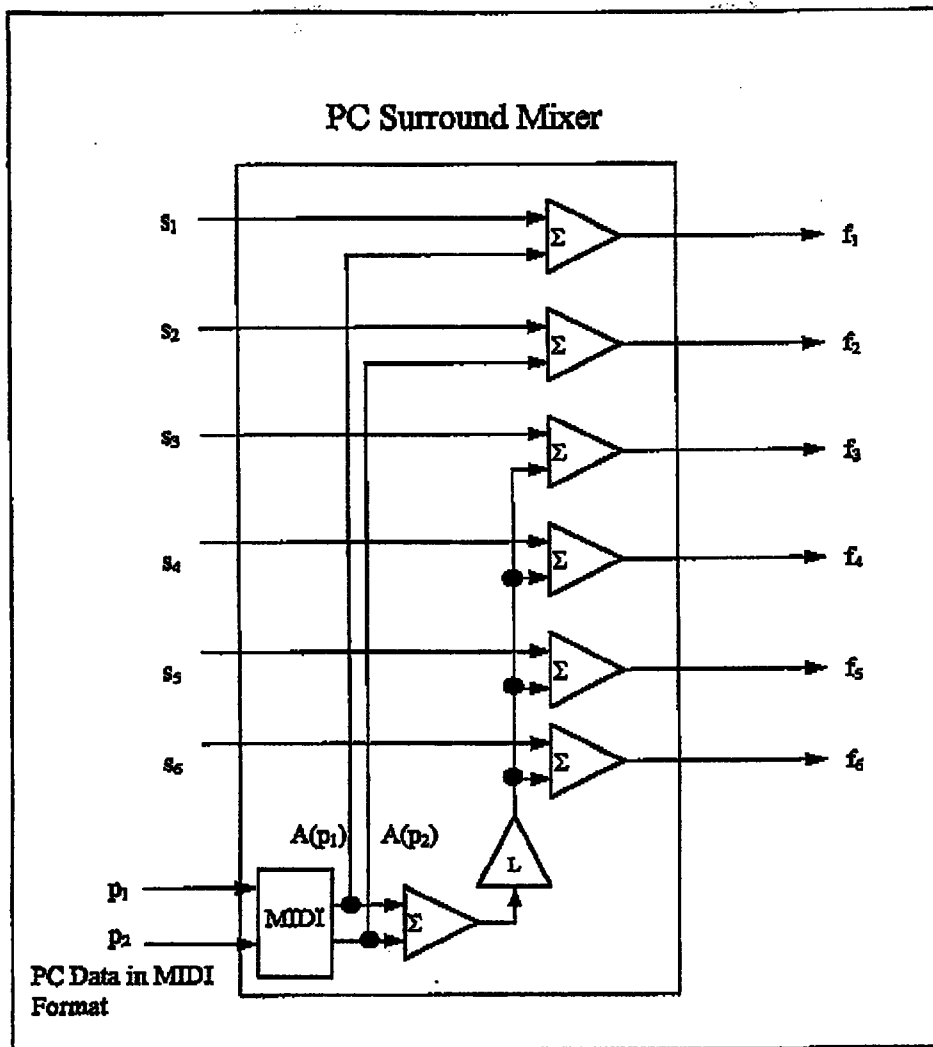
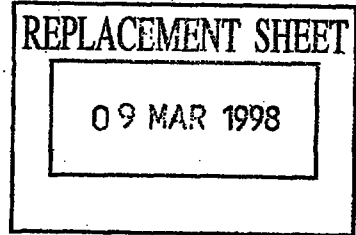


Figure 6. Example 4 of PC Surround Mixer.





Title of the Invention.

PC Surround Mixer

Description

With the introduction of DVD and other audio sources into the PC market, there will be a trend that game titles deploy the surround format in three or more channels to give a realistic surround environment to the game players. However, games will still make use of the two common data (WAVE and MIDI) to create effects such as gun shootings, or dialogues. So a possible good combination is a game title producing surround output signals and WAVE or MIDI signals. If both signals cannot be derived from the same output source, the game players will need two sets of speakers or a separate mixer to have the effect.

Block Diagram

The objective of the PC Surround Mixer is to mix signals (WAVE or MIDI) specific to PC together with signals from a surround stream. Figure 1 shows the block diagram.

The inputs to the system include data in WAVE or MIDI format, and any other signals. The outputs will be at least 3 channels each having a output with surround and MIDI or WAVE. The PC data is in digital form while the other signals can be in analog or digital form. All the signals can be serial (within itself or multiplexed with other channels) or parallel, synchronous or asynchronous. The mixer can process the input signals and even generate any signals within itself. There can be many output channels, but as long as three of the output channels contains the information of surround signals and MIDI or WAVE signals, this will be regarded as a PC Surround Mixer.

Mathematical model

Figure 2 describes the system in a mathematical model so as to give a more precise definition.

In order to satisfy the PC Surround Mixer system the following applies:

1. At least one of the inputs is PC data in WAVE or MIDI format ($p_1, p_2, p_3, \dots, p_t$) and $t > 0$.
2. There may or may not be any other input signals: $a_1, a_2, a_3, \dots, a_n$.
3. The outputs are defined by:

$f_i = F_i(s_1, s_2, s_3, \dots, s_q, p_1, p_2, p_3, \dots, p_t, b_1, b_2, b_3, \dots, b_n)$,
ie, it is a function depending on the s, p and b .

in which

$(p_1, p_2, p_3, \dots, p_t) \in (p_1, p_2, p_3, \dots, p_t)$ which are the channels of WAVE and/or MIDI

$(s_1, s_2, s_3, \dots, s_q) \in (s_1, s_2, s_3, \dots, s_q)$ which are the channels of an audio system, normally termed as surround system other than WAVE and MIDI, p_i

$(b_1, b_2, b_3, \dots, b_n)$ are any other signals

the number of s, p , and b can be zero in some of the F_i , i.e. F_i can be not depending on either s, p , or b

4. Three of the output $f_i = F_i(s_1, s_2, s_3, \dots, s_q, p_1, p_2, p_3, \dots, p_t, b_1, b_2, b_3, \dots, b_n)$ shall have a characteristic that there is at least a s term and a p term, ie. the output depends on s and p .

Some of the possible practical examples of the system will be presented and the application of the patent is explained. These examples are not trying to describe all the possible combinations, instead they are only to give more insight of the PC Surround Mixer.

This is the replacement sheet

Date: - 9 MAR 1998

Example 1

Figure 3 is a mixer using a summing circuit to mix 6 surround channels with two channels of WAVE to give 3 channels of surround and WAVE contents, and 3 remaining channels of pure surround.

In this case:

$(s_1, s_2, s_3, \dots, s_6)$ are six analog channels of a surround sound.

$$f_1 = s_1 + A(p_1)$$

$$f_2 = s_2 + A(p_2)$$

$$f_3 = s_3 + A(p_1) + A(p_2)$$

$$f_4 = s_4$$

$$f_5 = s_5$$

$$f_6 = s_6$$

in which $A(x)$ is a transformation of the x data into an analog WAVE form.

Comparing with our model, we can see that the criteria of the PC Surround Mixer are met by:

1. The inputs are PC WAVE data.
2. There are other inputs and they are:

$$(a_1, a_2, a_3, \dots, a_6) = (s_1, s_2, s_3, \dots, s_6)$$

3. The $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ are:

$$f_1 = s_1 + A(p_1)$$

$$f_2 = s_2 + A(p_2)$$

$$f_3 = s_3 + A(p_1) + A(p_2)$$

$$f_4 = s_4$$

$$f_5 = s_5$$

$$f_6 = s_6$$

It can be seen that b 's are not depended in all output, which is allowed in the PC Surround Mixer.

And finally,

4. The three output $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_6, b_1, b_2, b_3, \dots, b_6)$ having a characteristics of at least a s term and a p term are:

$$f_1 = s_1 + A(p_1)$$

$$f_2 = s_2 + A(p_2)$$

$$f_3 = s_3 + A(p_1) + A(p_2)$$

Example 2

Figure 4 is similar to the function of Figure 1 but the operations are in digital forms. The input $s_1, s_2, s_3, \dots, s_6$ are now in digital forms. The four criteria are satisfied similarly except that $A(p_i)$ are replaced by p_i .

Example 3

Figure 5 is similar to Figure 1 with the summation circuits Σ being replaced by multiplexers M . The operation of M is defined by if $b_i = 0$, $f_i = x$; if $b_i = 1$, $f_i = y$, and $b_i = (a_7 \text{ AND } c)$ where c is an internally generated signal.

Note:

1. One (a_7) of the inputs can be a control signal and not a surround, MIDI or WAVE signal.
2. The outputs also depend on $b_i = (a_7 \text{ AND } c)$.

This is the replacement sheet

Date: - 9 MAR 1998

Example 4

Figure 6 is similar to Figure 1, the six inputs: $(s_1, s_2, s_3, \dots, s_6)$ are analog channels of a surround sound. L is a low pass filter defined as:

for frequency $f < f_L$, output = input,
for frequency $f > f_L$, output = 0,

MIDI is a generator of MIDI analog signal by a table took up so that the frequency, duration, attack time, decay time, and amplitude of the analog output waveform are determined by the data supplied by the input PC data p_i

so the outputs are given by:

$$\begin{aligned} f_1 &= s_1 + \text{MIDI}(p_1) \\ f_2 &= s_2 + \text{MIDI}(p_2) \\ f_3 &= s_3 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_4 &= s_4 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_5 &= s_5 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_6 &= s_6 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \end{aligned}$$

Comparing with our model, we can see that the criteria of the PC Surround Mixer are met by:

1. Two inputs are PC MIDI data.
2. There are other inputs and they are:

$$(a_1, a_2, a_3, \dots, a_6) = (s_1, s_2, s_3, \dots, s_6)$$

3. The $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_n, b_1, b_2, b_3, \dots, b_n)$ are:

$$\begin{aligned} f_1 &= s_1 + \text{MIDI}(p_1) \\ f_2 &= s_2 + \text{MIDI}(p_2) \\ f_3 &= s_3 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_4 &= s_4 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_5 &= s_5 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \\ f_6 &= s_6 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \end{aligned}$$

Also, it can be seen that b 's are not depended in all output, which is allowed in the PC Surround Mixer.

And finally,

4. The three output $f_i = F_i(s_1, s_2, s_3, \dots, s_6, p_1, p_2, p_3, \dots, p_n, b_1, b_2, b_3, \dots, b_n)$ having characteristics of at least a s term and a p term can be arbitrarily chosen as:

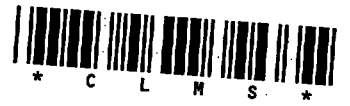
$$\begin{aligned} f_1 &= s_1 + \text{MIDI}(p_1) \\ f_2 &= s_2 + \text{MIDI}(p_2) \\ f_3 &= s_3 + L(\text{MIDI}(p_1) + \text{MIDI}(p_2)) \end{aligned}$$

Inventors:

No.	First Name	Last Name	Home Address	Work Phone	Internet email	Citizenship
1.	Hock Guan	Tan	18 Parry View, Singapore 547078	65- 8954277	hgtan@ctlsg. creaf.com	Singaporean
2.	Edward K.W.	Law	Blk 636, Bedok Reservoir Road, #11- 27, Singapore 410636	65- 8954850	kwlaw@ctlsg. creaf.com	Australian

This is the replacement sheet

Date: 9 MAR 1998



- 4 -

WHAT IS CLAIMED IS :

1. A surround mixer for a personal computer substantially as herein described, with reference to and as illustrated in the accompanying drawings.

This Sheet Has Been Replaced



This is the replacement sheet

Date: - 9 MAR 1998

PC SURROUND MIXER

Abstract

A PC surround mixer combines input signals in PC data formats, such as WAVE or MIDI, with other signals, such as surround format. It outputs the combined signals on at least three channels. This combination of signals allows a system to have more realistic sound, while not needing extra sets of speakers to provide the different types of sound effects. The PC data is in digital format, while the other signals may be in analog or digital format. Other outputs may also be generated that may or may not include surround and PC data combinations.

Figure 1

This Sheet Has Been Replaced



This is the replacement sheet

Date: - 9 MAR 1998

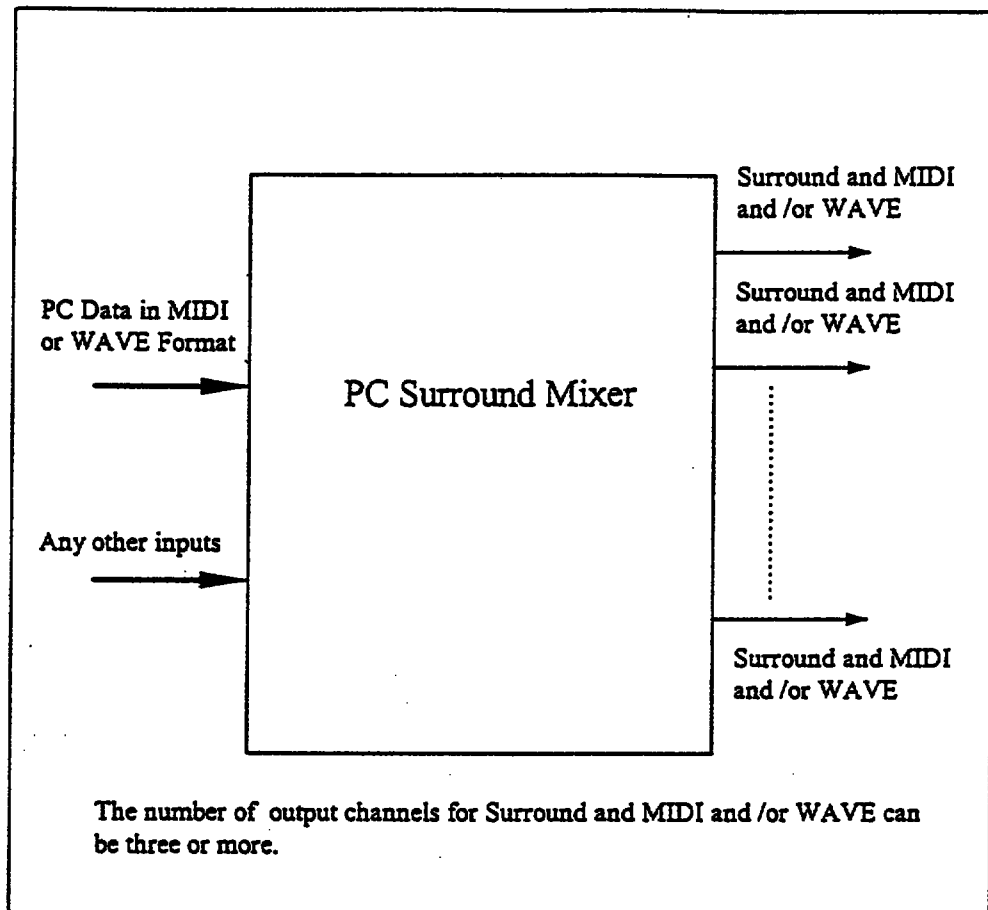


Figure 1. PC Surround Mixer

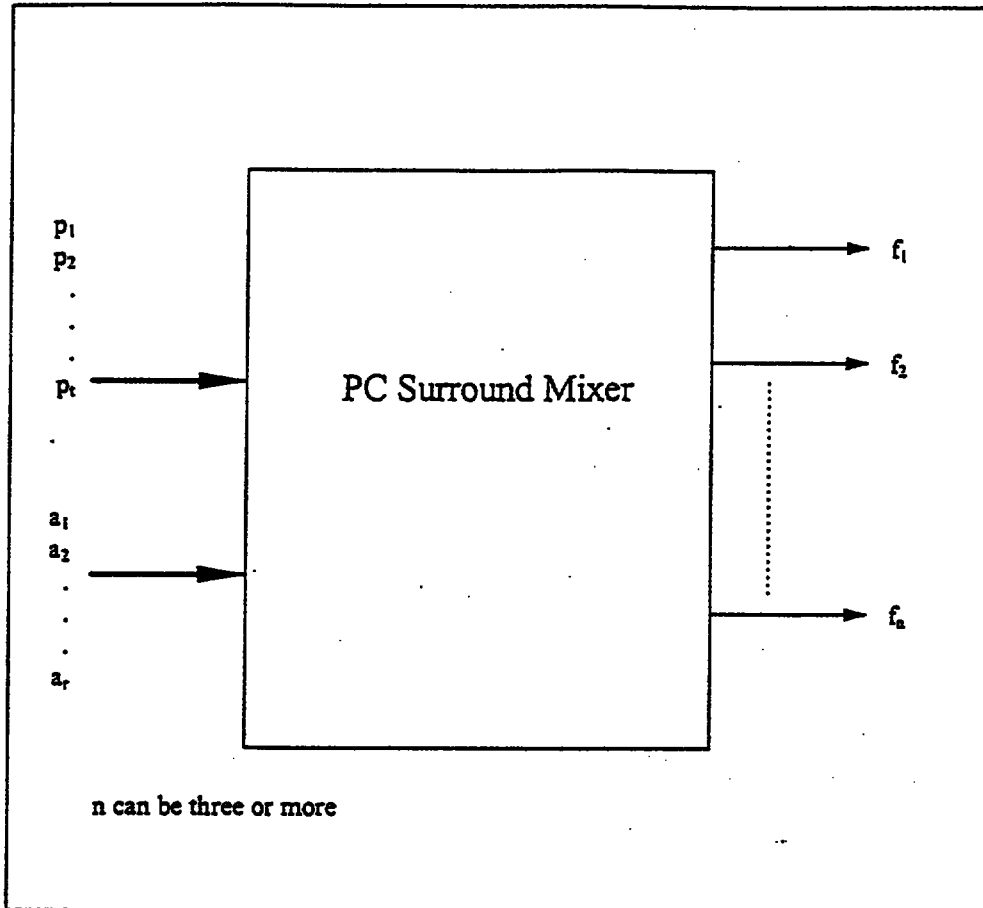


Figure 2. Mathematical Models of PC Surround Mixer.

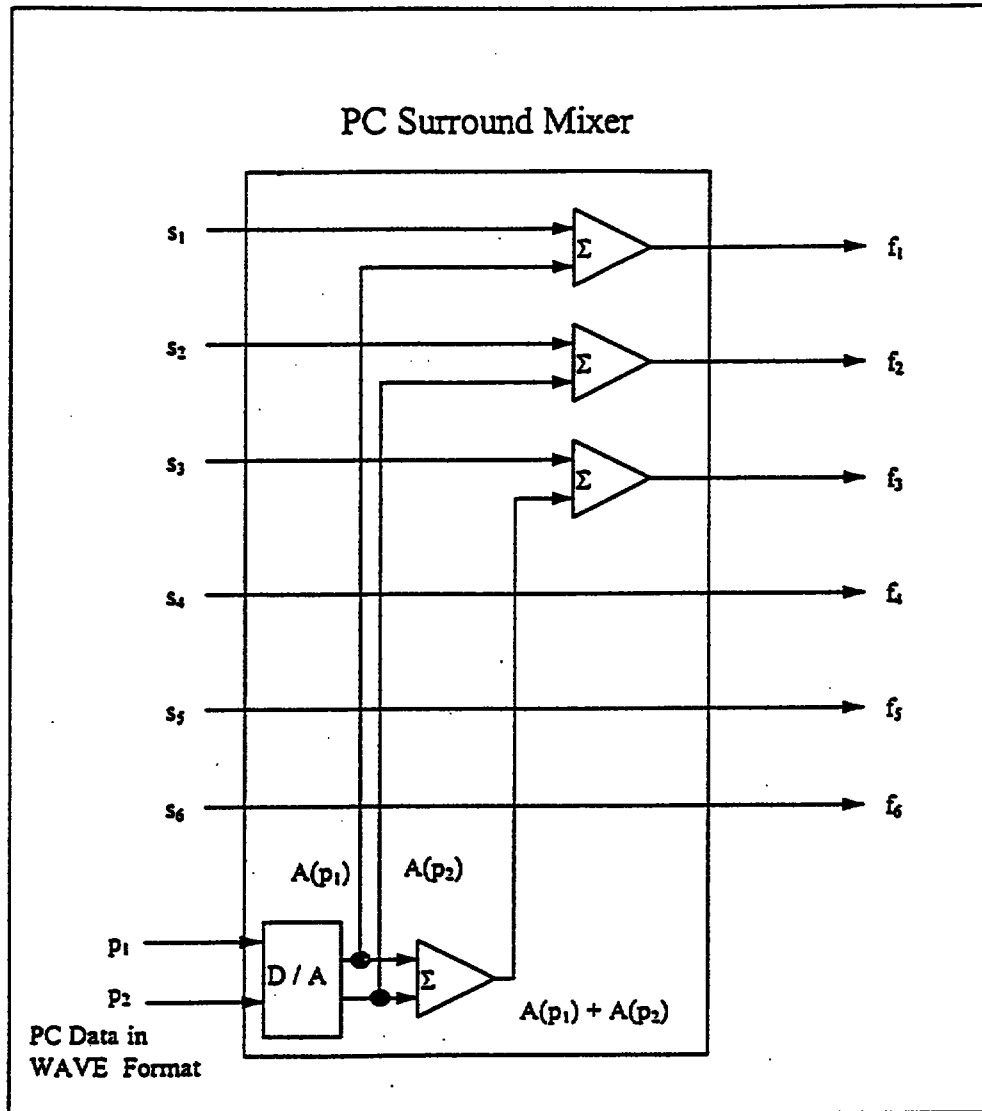


Figure 3. Example 1 of PC Surround Mixer.

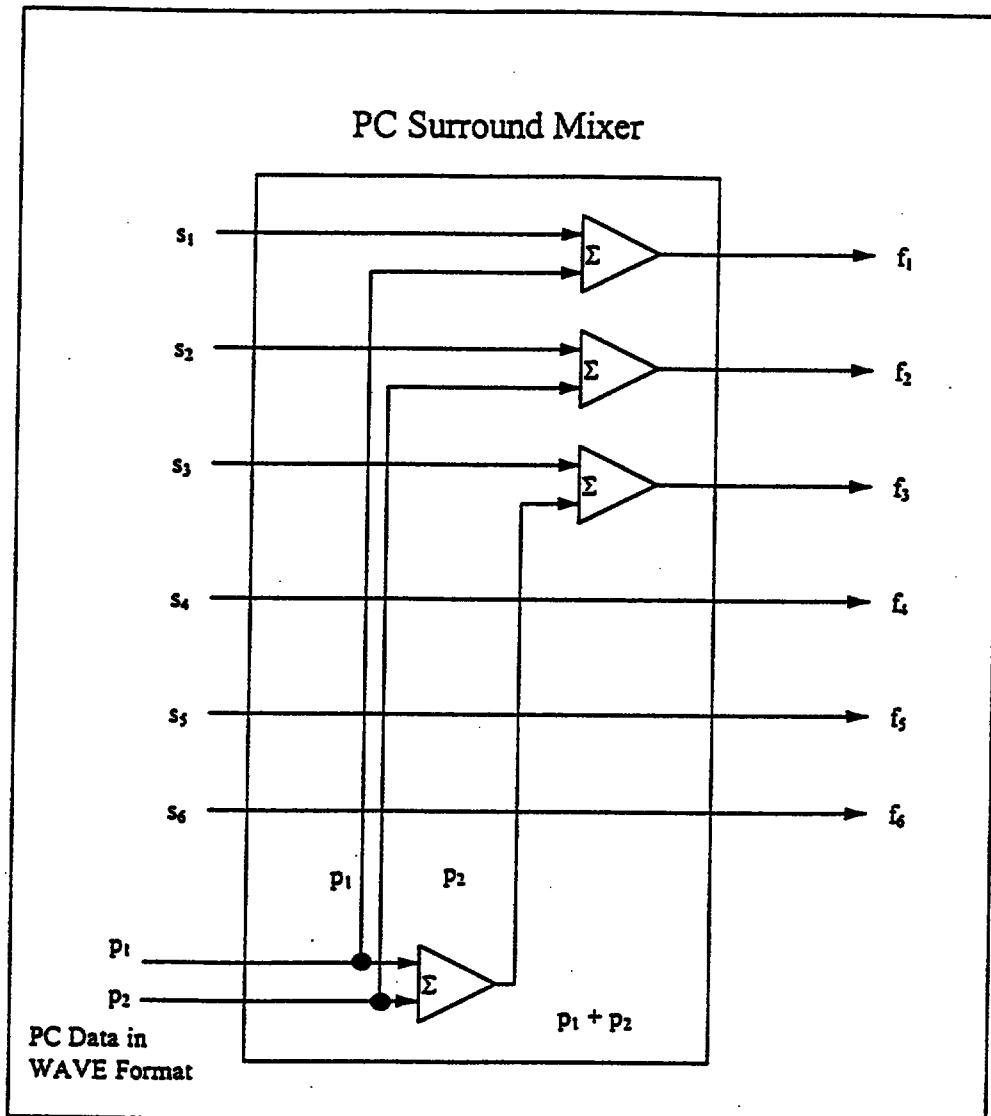


Figure 4. Example 2 of PC Surround Mixer.

This is the replacement sheet

Date: - 9 MAR 1998

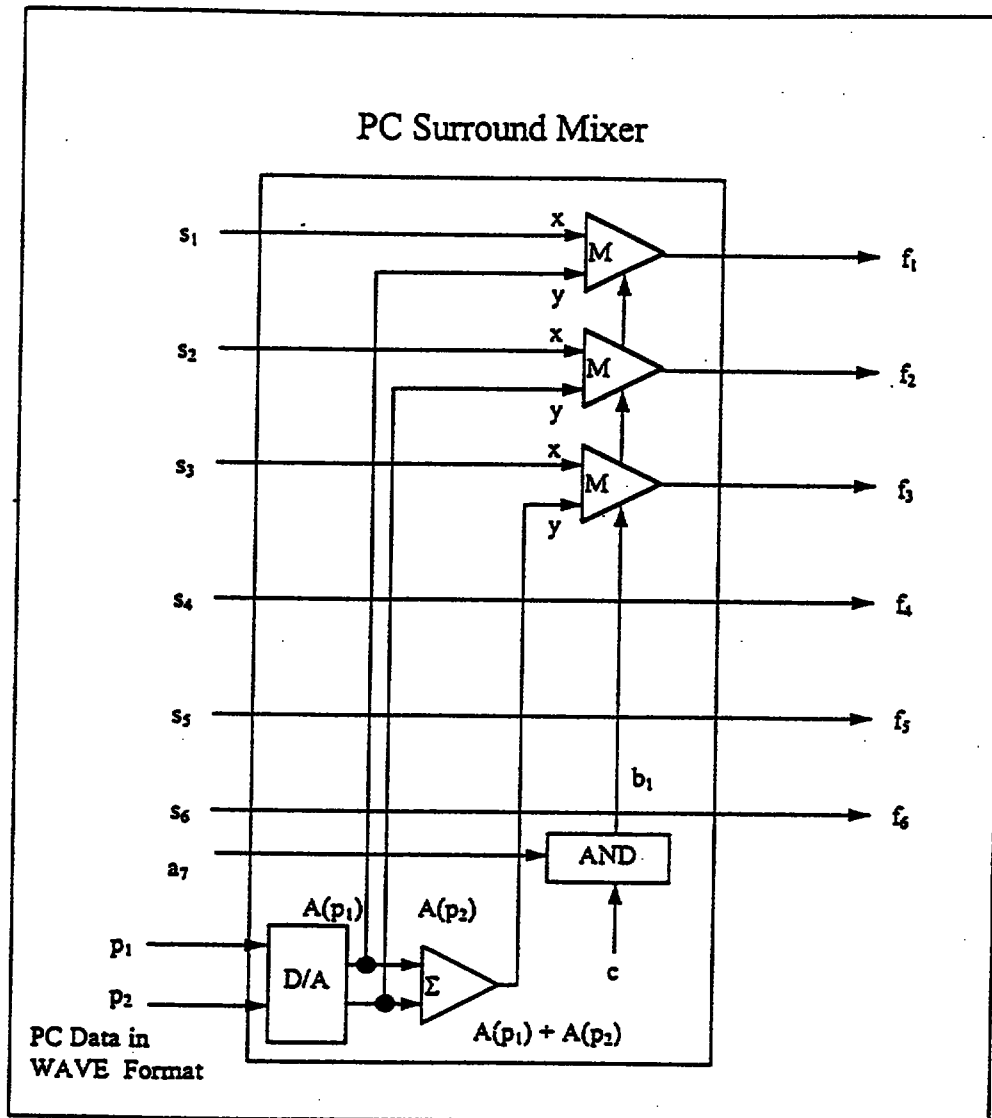


Figure 5. Example 3 of PC Surround Mixer.

This is the replacement sheet

Date: - 9 MAR 1998

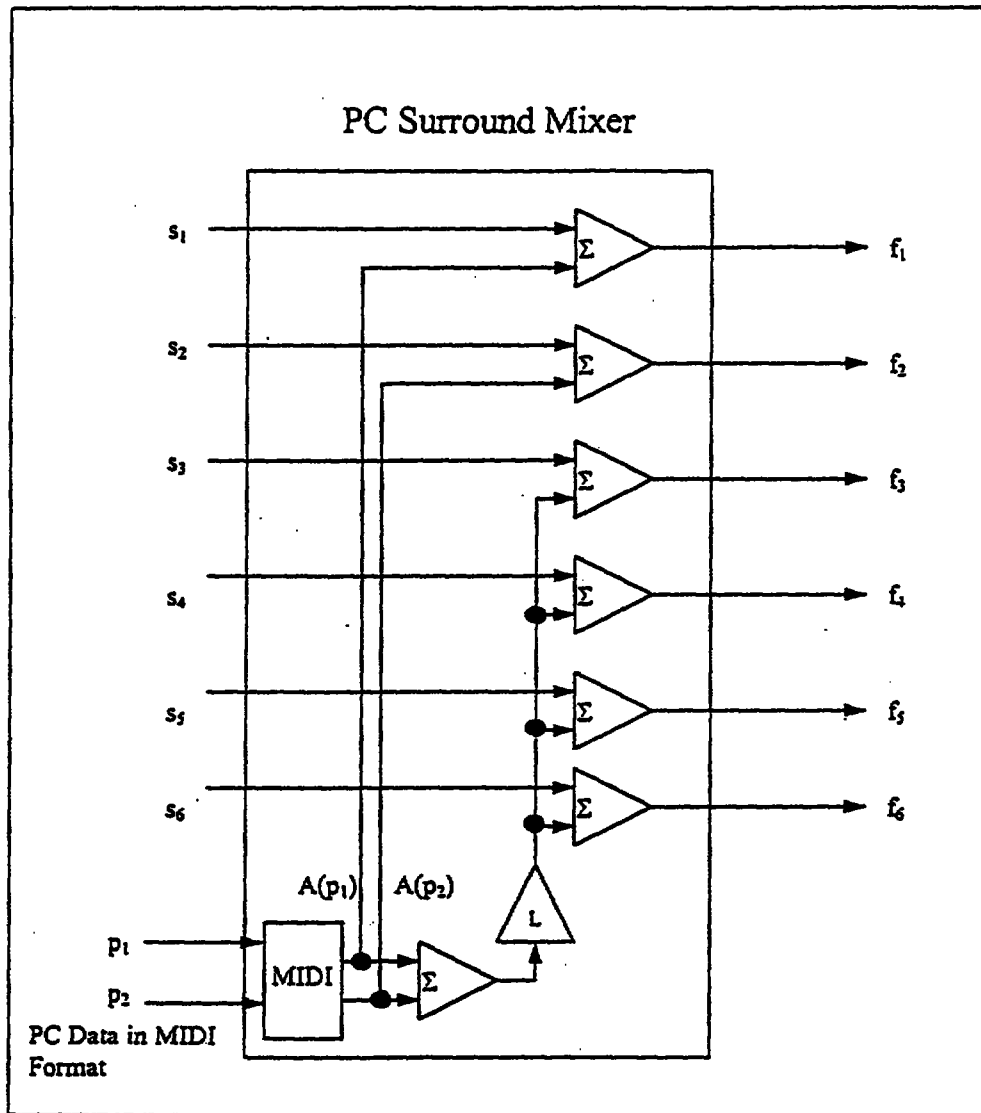


Figure 6. Example 4 of PC Surround Mixer.

This is the replacement sheet

Date: - 9 MAR 1998

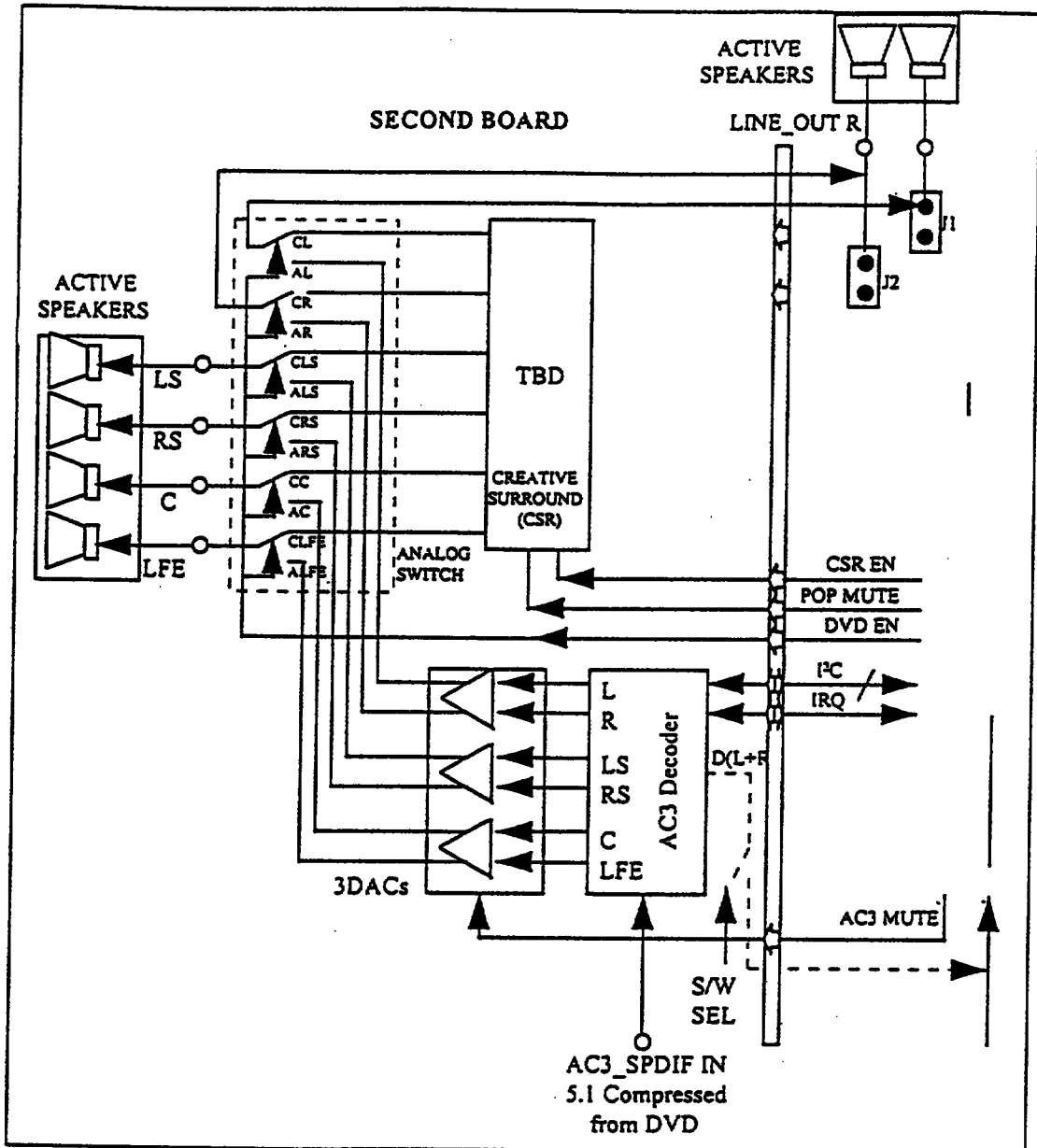


Figure 7. Conceptual Diagram of PC Surround Mixer.

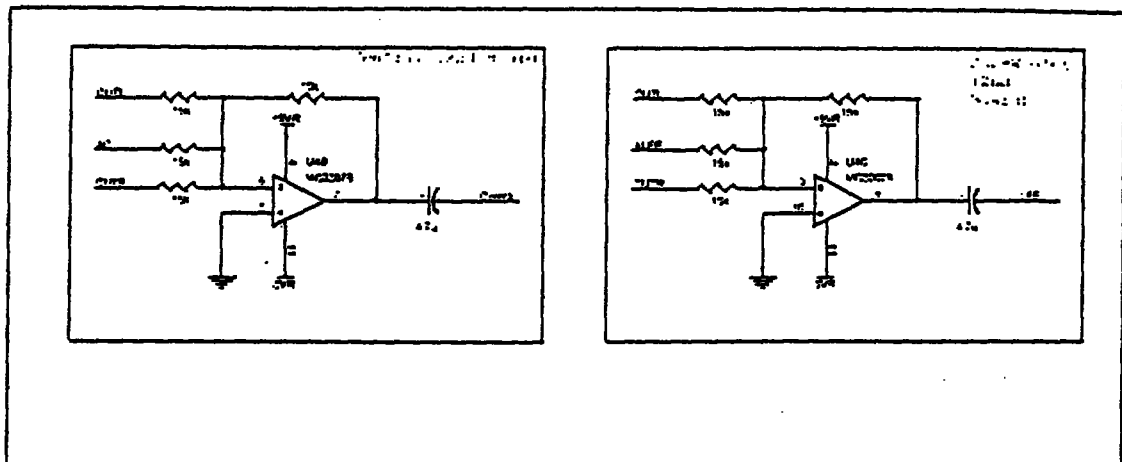


Figure 8. Part of a PC Surround Mixer Circuit

This is the replacement sheet

Date: - 9 MAR 1998



9704065-3
1POS

WHAT IS CLAIMED IS:

1. A PC audio mixer configured to mix a PC audio signal having one or more PC audio signal channels with an audio surround sound signal having three (3) or more audio surround sound channels, and generate an output signal having at least three (3) output channels which are functions of said PC audio signal and said audio surround signal.
2. The PC audio mixer as recited in claim 1, wherein said PC audio signal comprises a PC data signal, and wherein said PC audio mixer further comprises a PC data signal decoder configured to convert said PC data signal into an audio signal.
3. The PC audio mixer as recited in claim 2, wherein said audio signal comprises either a digital audio signal or an analog audio signal.
4. The PC audio mixer as recited in claim 2, wherein said PC data signal decoder is configured to convert a PC data signal into an audio signal, said PC data signal comprising a PC data signal selected from the group of PC data signals consisting of MIDI, WAV, AIFF, AU and MP3 audio signals.
5. The PC audio mixer as recited in claim 1, wherein said audio surround sound signal comprises a serially encoded surround sound signal, and wherein said PC audio mixer further comprises a surround sound signal decoder configured to convert said encoded surround signal into a parallel multi-channel audio signal.
6. The PC audio mixer as recited in claim 1, wherein one or more function generators generate said output.
7. The PC audio mixer as recited in claim 6, wherein one of said one or more function generators comprises an audio signal mixer configured to mix at least one of said one or more PC audio signal channels with at least one of said three or more audio surround sound channels, generating at least one of said at least three output channels which is a mix of said at least one said PC audio signal channels and said at least one of said audio surround sound channels.
8. The PC audio mixer as recited in claim 6, wherein one of said one or more function generators comprises an audio signal multiplexer configured to select at least one of said

This is the replacement sheet

Date: 12 MAR 1999



one or more PC audio signal channels or at least one of said three or more audio surround sound channels, generating at least one of said at least three output channels.

9. The PC audio mixer as recited in claim 8, wherein the selection of said at least one of said one or more PC audio signal channels or said at least one of said three or more audio surround sound channels by said multiplexer is controlled by a signal detector configured to detect the presence of said one or more PC audio channels or said three or more audio surround sound channels.

10. The PC audio mixer as recited in claim 7, wherein said PC audio signal and said audio surround sound signal comprise digital signals.

11. The PC audio mixer as recited in claim 7, wherein said PC audio signal is a digital signal, and said audio surround sound signal is an analog signal, and wherein said PC audio mixer further comprises a digital-to-analog converter configured to convert said PC audio signal to an analog signal before generating said output signal from said PC audio signal and said audio surround sound signal.

12. The PC audio mixer as recited in claim 7, wherein said audio surround sound signal comprises a six channel analog surround sound signal, and said PC audio signal comprises a two-channel analog audio signal.

13. The PC audio mixer as recited in claim 12, wherein said output signal comprises a six-channel surround sound output signal.

14. The PC audio mixer as recited in claim 13, wherein a first output channel comprises a mix of a first audio surround sound channel and a first PC audio signal channel, and a second output channel comprises a mix of a second audio surround sound channel and a second PC audio signal channel.

15. The PC audio mixer as recited in claim 14, further comprising a second audio signal mixer configured to mix said first PC audio signal channel with said second PC audio signal channel, generating a third PC audio signal channel, and wherein a third output channel comprises a mix of a third audio surround sound channel and said third PC audio signal channel.

16. The PC audio mixer as recited in claim 15, wherein fourth, fifth, and sixth

This is the replacement sheet

Date: 12 MAR 1999



output channels comprise fourth, fifth, and sixth audio surround sound channels, respectively.

17. The PC audio mixer as recited in claim 1, wherein said PC audio mixer is embodied in an analog hardware circuit.

18. The PC audio mixer as recited in claim 1, wherein said PC audio mixer is embodied in a digital hardware circuit.

19. The PC audio mixer as recited in claim 1, wherein said PC audio mixer is embodied in software.

20. An apparatus for generating a PC surround sound output signal from two or more audio source signals, comprising:

a first audio source signal having one or more first audio source signal channels;

a second audio source signal having one or more second audio source signal channels; and

a PC surround sound generating circuit configured to receive said first and said second audio source signals, and generate said PC surround sound output signal having three (3) or more output channels which are functions of said first and said second audio source signals.

21. The apparatus as recited in claim 20, wherein one or more function generators generate said output.

22. The apparatus as recited in claim 20, wherein said one or more function generates comprises a first mixing circuit configured to mix at least one of said first audio source signal channels with at least one of said second audio source signal channels, generating at least one of said three or more output channels which is a mix of said at least one of said first audio source signal channels and said at least one of said second audio source signal channels.

23. The apparatus as recited in claim 20, wherein one of said one or more function generators comprises an audio signal multiplexer configured to select at least one of said first audio source signal channels or at least one of said second audio source signal channels, generating at least one of said at least three output channels, the selection of said at least one of said first audio source signal channels or said at least one of said second audio source signal channels by said multiplexer being controlled by a signal detector configured to detect the presence of said one or more first audio source signal channels or said second audio source signal

This is the replacement sheet

Date: 12 MAR 1999



channels.

24. A PC sound circuit configured to receive two or more audio source signals and generate an audio output signal comprising one of said audio source signals, said PC sound circuit comprising an audio signal multiplexing circuit configured to receive said two or more audio source signals, select one of said two or more audio source signals, and generate an audio output signal comprising the selected one of said two or more audio source signals.

25. A system for generating and playing a PC audio output signal from two or more source signals, comprising:

a computer comprising a processor and a PC audio generating circuit configured to receive at least first and second audio source signals, and generate a PC audio output signal having three (3) or more output channels from said at least first and second audio source signals, said output channels being functions of said at least first and second audio source signals; and

three or more speakers configured to receive said output channels from said PC audio generating circuit and play said PC audio output signal.

26. The system as recited in claim 25, wherein each of said at least first and second audio source signals comprise one or more audio source signal channels, and wherein one or more function generators generate said PC audio output.

27. The system as recited in claim 26, wherein one of said one or more function generators comprises an audio signal mixer configured to mix at least one of said one or more audio source signal channels of a first one of said at least first and second audio source signals with at least one of said one or more audio source signal channels of a second one of said at least first and second audio source signals, generating at least one of said at least three output channels which is a mix of said at least one of said one or more audio source signal channels of said first one of said at least first and second audio source signals and said at least one of said one or more audio source signal channels of said second one of said at least first and second audio source signals.

28. The system as recited in claim 26, wherein one of said one or more function generators comprises an audio signal multiplexer configured to select at least one of said one or more audio source signal channels of a first one of said at least first and second audio source signals or at least one of said one or more audio source signal channels of a second one of said at least first and second audio source signals, generating at least one of said at least three

This is the replacement sheet

Date: 12 MAR 1999



output channels, the selection of said at least one of said one or more audio source signal channels of said first one of said at least first and second audio source signals or said at least one of said one or more audio source signal channels of said second one of said at least first and second audio source signals by said multiplexer being controlled by a signal detector configured to detect the presence of said at least one of said one or more audio source signal channels of said first one of said at least first and second audio source signals or said at least one of said one or more audio source signal channels of said second one of said at least first and second audio source signals.

29. A method for generating a PC audio signal having three (3) or more audio signal channels from two or more audio input signals having one or more audio signal channels, comprising the steps of:

receiving said two or more audio input signals; and

mixing at least one of said one or more audio signal channels from a first one of said two or more audio input signals with at least one of said one or more audio signal channels from a second one of said two or more audio input signals, generating one or more of said three or more PC audio signal channels of said PC audio signal.

This is the replacement sheet

Date: 12 MAR 1999

PC SURROUND MIXER

Abstract

A PC surround mixer combines input signals in PC data formats, such as WAVE or MIDI, with other signals, such as surround format. It outputs the combined signals on at least three channels. This combination of signals allows a system to have more realistic sound, while not needing extra sets of speakers to provide the different types of sound effects. The PC data is in digital format, while the other signals may be in analog or digital format. Other outputs may also be generated that may or may not include surround and PC data combinations.

Figure 1

This is the replacement sheet

Date: 12 MAR 1999