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(54) **Audio mixing console and mobile control unit**

(57) The invention relates to an audio mixing console comprising a plurality of buses to which a plurality of audio signal input channels are provided; a channel managing unit configured to control an access of a plurality of mobile control units to the audio mixing console, to identify each of the mobile control units, and to assign access and control rights to each of the mobile control units, the access and control rights indicating to what extent each of the mobile control units is allowed to control the plurality of buses. The console contains an interface configured for a wireless communication with the plurality of mobile control units and configured to transmit, to each of the mobile control units, at least one audio signal parameter

selected for the corresponding mobile control unit from the plurality of buses, wherein the interface is further configured to receive, from each of the mobile control units, control signals indicating how the at least one audio signal parameter selected for the corresponding mobile control unit has been adjusted by the mobile control unit. An audio signal processing unit configured to process the plurality of buses and to process, for each of the mobile control units, the at least one selected audio signal parameter selected for the corresponding mobile control unit based on the control signals received from the corresponding mobile control unit taking into account the access and control rights of the corresponding mobile control unit.

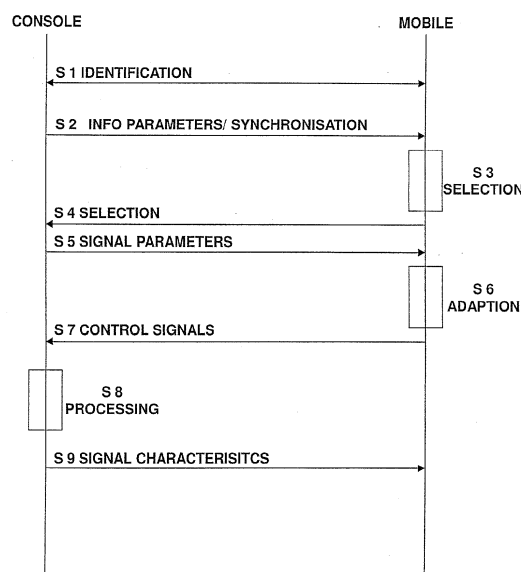


FIG. 2

Description

[0001] The present invention relates to an audio mixing console, to a method for operating an audio mixing console, and to a mobile control unit that can be used to control the audio mixing console.

Background

[0002] In the technical field of audio mixing consoles and mobile control units or remote controls for a remote controlling of the audio mixing console, different possibilities exist. It is known to use hardware modules which do not interact with the audio mixing console and are typically reliant on the audio mixing console providing suitable sub mixes, e.g. premixed groups of audio signal channels. These systems provide a transport mechanism for delivering audio sub mixes to the artist via a dedicated remote control/mobile control unit which remixes these sub mixes as the artist requires. These systems restrict each artist to having the same sub mixes and do not readily accommodate using wireless systems.

[0003] Furthermore, software applications exist allowing remote control of the mixer in a manner in which the remote control is allowed to control all or majority of system parameters. In general, it is not possible to uniquely identify different remote controls or allowing a single custom actuator to operate a plurality of audio signal parameters and generally customization of controls is not practical since the remote control software mimics the host and are engineer centric and dedicated to the engineer controlling the audio mixing console, rather than being artist centric. Thus, they lack flexibility for an individual artist.

[0004] In a traditional monitor set-up the artist relies on the monitor engineer. This may also be problematic since the artist must rely on the engineer correctly understanding the artist gestures and the engineer correcting the mix accordingly when the engineer has to focus frequently on a key band member.

Summary

[0005] Accordingly, a need exists to alleviate at least some of the above-mentioned disadvantages and to provide an audio mixing console and a mobile control unit allowing an artist to more easily control their own mix.

[0006] This need is met by the features of the independent claims. Further embodiments are described in the dependent claims.

[0007] According to a first aspect, an audio mixing console is provided comprising a plurality of audio signal output buses to which a plurality of audio signal input channels are provided. Furthermore, a channel managing unit is provided configured to control an access of a plurality of mobile control units to the audio mixing console. The channel managing unit is configured to identify each of the mobile control units and is configured to as-

sign access and control rights to each of the mobile control units, the access and control rights indicating to what extent each of the mobile control units is allowed to control the plurality of buses. The audio mixing console furthermore contains an interface configured for wireless communication with the plurality of mobile control units and configured to transmit, to each of the mobile control units, at least one selected audio signal parameter for adjustment of the audio characteristic by the corresponding mobile control unit from any parameters available associated with the bus or buses to which the mobile control unit is subscribed. The interface is further configured to receive, from each of the mobile control units, control signals indicating how the subscribed at least one audio signal parameter have been adjusted by the mobile control unit. Furthermore, an audio signal processing unit is provided configured to process the plurality of buses and to process, for each of the mobile control units, any audio signal parameter selected for the corresponding mobile control unit based on the control signals received from the corresponding mobile control unit taking into account the access and control rights of the corresponding mobile control unit.

[0008] The mixing console can be in communication with different mobile control units. For each mobile control unit different audio signal channels are combined to a bus and the audio signal parameters of the bus are transmitted to the corresponding mobile control unit. The user of the mobile control unit can then adjust audio signal parameters using actuators on the mobile control unit and control signals are sent back to the audio mixing console where the audio signal characteristics are processed by the audio signal processing unit as indicated by the control signals received from the mobile control unit. This allows a customization of the different mobile control units to different artists on stage, and each artist can view his/her signal and can adapt it according to its needs. The audio signal itself may not be transmitted to the mobile control unit, only the audio signal parameters such as signal level, signal dynamics or tone characteristics may be transmitted to the mobile control unit. The parameters can be parameters such as levels, on/off, pan and other audio signal parameters associated with the plurality of audio signal channels to the specific bus or buses to which the mobile control unit is subscribed. The user of the audio mixing console is always able to control the generated signals as access and controls rights provided which define to which extent each mobile control unit is allowed to control the different parameters of the audio mixing console do not restrict access to the audio parameters on the mixing console itself and as the mixing of the audio signal channels still occurs on the mixing console.

[0009] The audio signal channels and audio signal parameters selected to be available for a mobile control unit may only be set from the audio mixing console. Once the selection and subscription of mobile control unit to mixing console is complete, the user of the mobile control unit,

e.g. the artist, can individually adjust select and adjust any of the subscribed audio signal characteristics he/she is interested in.

[0010] Furthermore, the mix remains on the console so that the audio engineer of the audio mixing console is still in control of the overall system.

[0011] When at least two audio signal parameters have been selected for one of the mobile control units, the channel managing unit may be configured to generate a combined signal parameter in which the at least two audio signal parameters were combined. The interface can then be configured to transmit the combined signal parameter to said one mobile control unit. The interface then further receives a combined control signal indicating how to process the combined signal parameter. The audio signal processing unit processes the selected at least two audio signal parameters based on the combined control signal. In this embodiment a single actuator on the mobile control unit may be used to control a plurality of audio signal parameters. By way of example, the combined parameter may be the audio signal of a first keyboard and of a second keyboard of a band, the combined signal parameter being the signal of the two keyboards together. The user of the mobile control unit can then adjust this combined signal parameter as needed using a single actuating element on the mobile control unit.

[0012] In this context the console may receive a combined selection signal from said one mobile control unit, the combined selection signal containing information as to which of the plurality of audio signal parameters should be combined for said one mobile control unit. The channel managing unit then generates the combined audio signal parameter for said one mobile control unit based on the combined selection signal received from said one mobile control unit. The information which of the audio signal parameters should be combined to a single actuator on the mobile control unit comes from the mobile control unit. The channel managing unit then generates the required combined signal parameter based on the combined control signal. In this embodiment it is possible for the user to group audio signal parameters from one or several audio input channels as needed and to control a plurality of audio parameters with a single control actuator of the mobile control unit.

[0013] Preferably the audio engineer of the audio mixing console is able to override the audio processing proposed by the mobile control units. Console control signals generated when an actuating member of the mixing console itself is actuated override the control signals for an audio signal channel received from the mobile control units. This means, that when a user on a mobile control unit provides a control signal for an audio signal parameter and the user of the main console generates console control signals for the same audio signal parameter, the console control signals override the control signals received from the mobile control unit.

[0014] Furthermore, an information display system may be provided on the mixing console that displays au-

dio signal parameters selected by one of the mobile control units. The information display can indicate the audio signal parameters or characteristics processed by the audio signal processing unit based on commands received from the mobile control unit. A user of the audio mixing console has, in this embodiment, the visibility of what the artist is mixing/hearing. The user of the audio mixing console can then take over the mix at any time as the console control signals override the control signals from the mobile control units. Furthermore, the user of the audio mixing console may unsubscribe a mobile control unit if needed.

[0015] The interface can be configured to only exchange control signals for selected audio signal parameters subscribed to by the mobile control unit and not the complete digital audio signals contained in the selected audio signal channel and bus. As a consequence the mixing will still take place on the mixing console and thus the user/engineer of the console is still in full control of the mix.

[0016] Furthermore, the mixing console may contain a database containing information about all known mobile control units allowed to access the audio signal parameters, the database furthermore containing information about access and control rights of all known mobile control units. This makes it possible to automatically connect to all mobile control units known to the mixing console as soon as they are detected. This can accelerate a login process of a mobile control unit to the mixing console, as there is no need to check whether a detected mobile control unit is allowed to access the console if the detected mobile control unit is known to the console (e.g. through a unique ID of the mobile control unit).

[0017] The wireless communication between the mobile communication control unit and the mixing console may take place using Wi-Fi technology. However, it should be understood that any other wireless transmission technology may be used, e.g. Bluetooth.

[0018] Furthermore, the interface may be configured in such a way to remember all connections to the mobile control units that were detected and to automatically reconnect to one of the mobile control units if the wireless connection to said one mobile control unit has been interrupted. This allows a better usability as, if a wireless connection is interrupted, a new log-on process of the mobile control unit to the mixing console is not necessary.

[0019] As it is possible that the different mobile control units each select their own unique audio signal parameters from audio channels and buses and control them, the channel managing unit may be configured to make sure that any audio signal parameters associated with an output bus including levels from input channels to an output bus is only selected once by one of the mobile control units. This shall avoid that an audio signal parameter associated with a mobile control unit is changed by another mobile control unit in another way.

[0020] Furthermore, it is possible that the system of audio console, wireless interface and mobile control units

is configured in such a way that it provides sufficient bandwidth to transmit all audio signal parameters subscribed to each the mobile control units. Furthermore, the bandwidths of the interface may be such that a basic metering of two channels per attached mobile control unit is possible simultaneously.

[0021] The invention furthermore provides a method for operating an audio mixing console on which a plurality of buses and plurality of audio mixing channels is provided. According to one step of the method an access of a plurality of mobile control units is controlled by identifying each of the mobile control units which are presently in wireless connection with the mixing console and by determining the access and control rights assigned to each of the connected mobile control units. Furthermore, audio signal parameters of at least one selected bus selected for the corresponding mobile control unit is transmitted to its corresponding mobile control unit, and from each of the connected mobile control units, to which audio signal parameters were transmitted, control signals indicating how the audio signal parameters of the selected bus selected for the corresponding mobile control unit were adjusted by their corresponding mobile control unit are received. At least one selected audio signal parameter for the corresponding mobile control unit is then processed by the audio signal processing unit of the mixing console based on the control signals received from the corresponding mobile control unit.

[0022] The audio mixing console may be operated as described above.

[0023] The invention furthermore relates to a mobile control unit configured to generate the control signals for the audio signal parameters of the audio mixing console. The mobile control unit comprises an interface configured for the wireless communication with the mixing console and configured to receive information about the available audio signal channels and buses on the mixing console. The mobile control unit furthermore contains a bus selecting module configured to select at least one of the audio signal parameters. This information is transmitted to the audio mixing console and signal characteristics of the selected item are processed accordingly. Furthermore, an actuating module is provided configured to adapt the audio signal parameters of the selected audio signal channel and configured to generate the control signals based on the actuation of the actuating module. The interface then transmits the generated control signals to the mixing console.

Brief Description of the Drawings

[0024] The invention will be described in further detail below with reference to the accompanying drawings, in which

Fig. 1 shows an audio mixing console and several mobile control units which can individually control the settings of individually selected audio channels

and buses,

Fig. 2 shows the signal exchange between the mixing console and the mobile control unit, and

Fig. 3 schematically shows how different audio signal channels can be selected by different mobile control units.

Detailed Description

[0025] In Fig. 1 an audio mixing console 100 is shown. A plurality of audio signal input channels 180 enter the mixing console 100 and are processed in the audio mixing console using a digital signal processing unit 110 in order to generate audio output signal buses 325 and 335. In the embodiment shown the generated audio output signal has two different buses. However, it should be understood that the audio output signal may have any number of buses which may be singular (mono) or operated as a group e.g. a pair of buses used as stereo, 6 buses used as 5.1 audio. The audio mixing console comprises an interface 120 allowing a wireless communication with different mobile control units 200. The mobile control unit can be a mobile phone, a portable computer, a tablet computer or any similar portable computing device. The communication between the main mixing console 100 and the mobile control units 200 may be assured using a TCP/IP Wi-Fi interface.

[0026] The main mixing console 100 can contain different actuating members 130. For the sake of clarity, the different actuating members are not shown in detail. However, it should be understood that different actuating members present on contemporary mixing consoles are also provided on console 100. Furthermore, the actuating members may be provided using hardware elements such as sliders and knobs, furthermore, soft switches provided on a display may be used. The actuating members 130 can be used to control the processing of the audio input signal channels 180 or any other audio parameter or characteristic in the DSP unit 110. The audio signals and the corresponding signal parameters and characteristics may be displayed on a display 140. The audio mixing console furthermore contains a channel managing unit 150. The channel managing unit controls the access of the plurality of mobile control units 200 to the mixing console and to the different audio signal channels 180 or any other audio characteristic in the DSP unit 110. In a database 160 the access and control rights of the different mobile control units 200 may be stored. The access and control rights describe in detail to what extent identified mobile control units are allowed to control the audio signal input channels 180 and buses 325, 335 or any other audio characteristic in the DSP module 110.

[0027] It should be understood that the audio mixing console can contain a plurality of other features known by mixing consoles of the prior art. For the sake of clarity, only those features are described in detail which help in the understanding of the present invention. Furthermore, the different functions 110 to 160 are shown as separate

entities. It should be understood that the different functions may be aggregated in other combinations of elements. Furthermore, the different functions may be incorporated by software or hardware or by a combination of software and hardware.

[0028] This also applies to the mobile control unit 200 shown in Fig. 1 which contains an interface 210 for the wireless communication to the audio mixing console. Furthermore, a display 220 is provided on which the controlled parameters or actuator values of the corresponding mobile control unit are displayed. An actuating module 230 is provided allowing the audio signal parameters or characteristics of the audio signal channel to be adapted according to the needs of the user of the mobile control unit. The actuating module further allows selecting the audio signal parameters to be controlled by the mobile control unit. A control unit 240 generates a selection signal that is transmitted to the mixing console and that informs the mixing console which of the signals parameter (s) has been selected. The control unit 240 and the actuating module 230 form a bus selecting module which allows the selection of an audio signal parameter to be controlled by the mobile control unit 200. For the wireless communication between console 100 and the mobile control unit 200 Wi-Fi technology may be used by the interfaces 120 and 210. In a search mode the console may be instructed to look for mobile control units that are in the "visible" range of the interface of the console.

[0029] The mobile control units provided on stage may be controlled by different artists, e.g. a first mobile control unit may be provided at an artist playing a keyboard, another mobile control unit may be provided at a singer, a third one may be used by a drummer etc. The mobile control unit 200 now allows each artist to control their own mix. From the range of audio signal parameters available to any mobile control unit each artist can select a parameter(s) that he or she wants to control to affect the characteristic of the monitor mix they hear. In the audio mixing console, i.e. the channel managing unit 150 can identify the different mobile control units and the user of the audio mixing console can assign different access and control rights to the different mobile control units. When an artist has selected several audio signal channels or parameters to be controlled by a single actuator of the mobile control unit, the channel managing unit generates the required instructions to adjust each of the combined audio signal parameters based on a combined control signal received from the mobile control unit. The artist or user of the mobile control unit can then adapt the combined audio signal as needed, e.g. the overall signal level may be adapted or the level of each selected bus. Furthermore, the dynamics of each audio bus or any tone characteristic of the bus may be changed by changing audio signal parameters using the mobile control unit. As an alternative, single audio signal parameters of the different selected audio signal channels or buses are controlled and transmitted separately.

[0030] The user of the mobile control unit adapts the

audio signal as needed using the actuation module and control signals are generated by a control unit 240 of the mobile control unit. The control signals are transmitted to the audio mixing console where the processing of the audio signal is carried out as desired by the user of the mobile control unit. The actuation module can comprise hard keys or software-based switches may be displayed to the user on display 220.

[0031] The operator of the audio mixing console still has the complete control and visibility of what the artist is mixing as the mix is still carried out on the console itself and can be viewed on display 140. The user of the audio mixing console can furthermore take over the mixing at any time and unsubscribe the artist if the requirement arises. Furthermore, the system is secure in the event of loss of control from the mobile control unit since the mix remains on the console and the audio signals are not transmitted to the mobile control unit, but only the control signals and audio signal parameters or characteristics.

[0032] As can be seen from the above, the system shown in Fig. 1 is a focussed application allowing access to a small and specific subset of the console parameters. It should be understood that the mobile control unit is not a full console remote application allowing the controlling of all features of the console.

[0033] The interfaces provided on the console and on the mobile control unit should be designed in such a way that there are suitable bandwidths to allow the controlling of at least two channels per mobile control unit. However, the bandwidths may be such that all audio signal parameters associated with mixing all inputs channels 180 to a bus and audio signal parameters of the bus are connected available to one single mobile control unit.

[0034] The ability that each audio signal controlled by one of the mobile control units is customized by the artist is additionally shown in Fig. 3. In the embodiment shown in Fig. 3, three of the input channels 180 are shown. The vertical lines on the left hand side of Fig. 3 represent the audio signal input channels of the mixing console. Before the individual audio signal channels can be selected by the user, different processing may be carried out, such as the adaptation of the dynamics, or an equalization of the signals may be carried out as symbolized by the modules 175, 170 shown on the upper left hand side of Fig. 3. These processing are unique to each input and in this embodiment are never accessible by the mobile control units. A first mobile control unit may select a number of the audio signal channels. These selected audio signal channels selected by the first mobile control unit may be added in adder 310 to a bus 325 and further processing steps may be carried out as symbolized by the different modules after adder 310 and may be controlled by the first mobile control unit if permissions allow. The borderline 320 shown in Fig. 3 symbolizes the signal channels selected by one mobile control unit to one bus 325, whereas the borderline 330 symbolizes three other audio signal channels selected by another of the mobile control units to another bus 335.

[0035] The audio signal input channels 180 describe a signal path that is common to all destinations. The processing of the audio input channels 180 is the same for all outputs. The user of the mobile control unit can select a signal parameter or a signal characteristic of one or of more audio input channels to generate a bus. An adaptation of a signal parameter of a bus does not affect the audio signal input channels. When a signal parameter of one bus is changed, the audio signal input channel remains unchanged. However, a signal processing such as a processing shown by modules 170 and 175 affects all of the selected buses. An adaptation of an audio signal parameter on an audio signal input channel affects all listeners which are listening to a bus, whereas the adaptation by a user of a mobile control unit in one of the buses does not affect the listeners of other buses.

[0036] As can be seen from the above, each mobile control unit 200, i.e. each artist or user of a mobile control unit, can individually select the audio signal parameters and channels to be controlled. By way of example, the user may select the controlling of relative levels of the different selected audio signal channels or the overall signal level of a combined audio signal generated by a combination of the different selected audio signal channels.

[0037] The audio mixing console 100 may be configured in such a way that it automatically connects to all known mobile control units 200 as they are discovered. Furthermore, the audio mixing console 100 can allow a manual connection to a single mobile control unit 200. The connection may be indicated by the main console or by the mobile control unit.

[0038] It can happen that the audio signal channel 180 or bus 325, 335 selected by one of the mobile control units 200 changes. By way of example, when a mobile control unit 200 has selected an audio signal from one signal source and if there is a change of the bus widths from mono (1 channel) to stereo (2 channels), the connection between the mobile control unit and the main console may be automatically disconnected and the control history may be erased.

[0039] In Fig. 2 the signal exchange between the console and the mobile control unit is summarized. In a first step S1 an identification of a mobile control unit is carried out. By way of example, each mobile control unit may have its own IP number or name allowing the audio mixing console to uniquely identify the mobile control unit. When a mobile control unit has been identified, the mixing console can check whether control and access rights for the identified mobile control unit exist. Based on these rights, access to the mixing console may be granted or not. If the mobile control unit is not yet known to the mixing console, the user of the console can assign new control and access rights to the identified mobile control unit. In step S2, synchronization may be carried out. During this synchronization the mobile control unit is informed of the audio signal parameters that can be selected by the mobile control unit taking into account the access and control

rights assigned to the mobile control unit in question. In step S3 the user of the mobile control unit may select the audio signal parameters or characteristics that should be controlled by the mobile control unit using e.g. the actuating module 230, this information is transmitted in step S4 to the console in a selection signal. The console determines the signal characteristics of the selected audio signal channel or bus, e.g. the exact audio signal parameters of each selected audio signal channel or the signal characteristics of a combined audio signal in which the different selected audio signal channels are combined.

[0040] In the next step S5, the audio signal parameters and/or characteristics are then transmitted to the mobile control unit. In step S6, the audio signal parameters and/or characteristics are adapted as desired by the user of the mobile control unit and in step S7 the control signals are transmitted back to the audio mixing console. In step S8, the processing of the selected audio signal channels and/or bus is carried out using the control signals received from the mobile control unit.

[0041] In step S9 the audio signal parameters and characteristics of the processed audio signals are then transmitted back to the mobile control unit where the processing can be monitored.

[0042] The processing of the audio signal parameters selected by one of the mobile control units is also visualized on the audio mixing console itself. The user of the audio mixing console can thus stay in control of the mixing and can override any signal processing commanded by the mobile control units.

[0043] In the following it is explained how the state diagram shown in Fig. 2 changes when the user has selected two or more signal parameters which should be combined for a control on the mobile control unit. Steps S1 to S3 correspond to the steps already described above. In step S4 the console receives a combined selection signal from the mobile control unit, the combined selection signal containing the information which audio signal parameters should be combined for the requesting mobile control unit. In a step not shown in Fig. 2 the channel managing unit generates a combined audio signal parameter which is then transmitted in step S5 to the mobile control unit. In step S6 the user of the mobile control unit can adapt the combined signal parameter as needed. By way of example, when the combined signal parameter is the signal level of all guitars present on the audio signal input channels, the signal level of all guitars may be adapted with a single actuator on the mobile control unit as a combined guitar signal is generated that can be adapted by the mobile control unit. The mobile control unit generates a combined control signal indicating how the combined signal parameters should be processed. This combined control signal is then sent back in step S7 and in step S8 the combined control signal is processed as indicated by the user of the mobile control unit. In step S9 the signal parameters can then be transmitted back to the mobile control unit where the processing can be monitored.

[0044] An audio signal parameter may be any parameter. The parameter may affect the signal characteristic, but does not necessarily affect the signal characteristic, as a parameter may a frequency range of an audio signal to be selected by the user.

[0045] The steps carried out in Fig. 2 can be carried out for each of the mobile control units that is in communication with the audio mixing console. Each mobile control unit can select a different set of audio signal channels and buses and can adapt the selected signal channels as needed.

Claims

1. An audio mixing console (100) comprising:

- a plurality of buses (325, 335) to which a plurality of audio signal input channels (180) are provided,
- a channel managing unit (150) configured to control an access of a plurality of mobile control units (200) to the audio mixing console (100), to identify each of the mobile control units (200), and to assign access and control rights to each of the mobile control units (200), the access and control rights indicating to what extent each of the mobile control units (200) is allowed to control the plurality of buses,
- an interface (120) configured for a wireless communication with the plurality of mobile control units (200) and configured to transmit, to each of the mobile control units, at least one audio signal parameter selected for the corresponding mobile control unit (200) from the plurality of buses (325, 335), wherein the interface (120) is further configured to receive, from each of the mobile control unit (200), control signals indicating how the at least one audio signal parameter selected for the corresponding mobile control unit has been adjusted by the mobile control unit (200),
- an audio signal processing unit (110) configured to process the plurality of buses and to process, for each of the mobile control units, the at least one selected audio signal parameter selected for the corresponding mobile control unit (200) based on the control signals received from the corresponding mobile control unit taking into account the access and control rights of the corresponding mobile control unit.

2. The mixing console according to claim 1, wherein the channel managing unit (150) is configured to generate, when at least two audio signal parameters have been selected for one of the mobile control units, a combined signal parameter in which the at least two audio signal parameters were combined,

the interface (120) being configured to transmit the combined signal parameter to said one mobile control unit, the interface (120) receiving a combined control signal indicating how to process the combined signal parameter, the audio signal processing unit (120) processing the selected at least two audio signal parameters based on the combined control signal.

3. The mixing console (100) according to claim 2, wherein, when a combined selection signal is received from said one mobile control unit (200), the combined selection signal containing information as to which of the plurality of audio signal parameters should be combined for said one mobile control unit (200), the channel managing unit (150) is configured to generate the combined audio signal parameter for said one mobile control unit based on the combined selection signal received from said one mobile control unit (200).
4. The mixing console (100) according to any one of the preceding claims, further comprising an information display (140) configured to display said at least one selected audio signal parameter selected for one of the mobile control units based on the control signals received from said one mobile control unit.
5. The mixing console (100) according to any one of the preceding claims, further comprising at least one actuating member (130) allowing the audio signal parameters of each of the plurality of buses (325, 335) to be controlled using console control signals, wherein the console control signals for any of the audio signal parameters override the control signals for said one audio signal parameter received from one of the mobile control units (200).
6. The mixing console (100) according to any one of the preceding claims, wherein the interface (120) is configured to only exchange control signals for said at least one selected audio parameter with the mobile control unit (200), and not the complete audio signal contained in at least one selected bus (325, 335).
7. The mixing console (100) according to any one of the preceding claims, further comprising a database (160) containing information about all known mobile control units (200) allowed to access the plurality of audio signal parameters and information about access and control rights of all known mobile control units.
8. The mixing console (100) according to any one of the preceding claims, wherein the channel managing unit (150) is configured to assure that any selected audio signal parameter of a bus is only selected for

one of the mobile control units (200).

9. The mixing console (100) according to any one of the preceding claims, wherein the interface (120) is configured to remember all connections to mobile control units (200) and is configured to automatically reconnect to one of the mobile control units (200) if the wireless connection to said one mobile control unit has been interrupted (200).

10. The mixing console according to any one of the preceding claims, wherein the interface (120) is configured in such a way that it provides enough bandwidth to transmit all audio signal parameters of all buses to one or more of the mobile control units (200).

11. A method for operating an audio mixing console (100) on which a plurality of buses (325, 335) with a plurality of audio signal input channels (180) are provided, the method comprising the steps of:

- controlling an access of a plurality of mobile control units (200) to the audio mixing console, by identifying each of the mobile control units which is presently in wireless connection with the mixing console (100), and by determining access and control rights assigned to each of the connected mobile control units (200), the access and control rights indicating to what extent each of the mobile control units is allowed to control each of the plurality of buses,
- transmitting, to each of the connected mobile control units (200), at least one selected audio signal parameter selected from the plurality of buses (325, 335) by the corresponding mobile control unit (200),
- receiving, from each of the connected mobile control units (200), control signals indicating how the at least one audio signal parameter selected for the corresponding mobile control unit (200) have been adjusted by the corresponding mobile control unit (200),
- processing, by an audio signal processing unit (110) of the mixing console (100), for each of the connected mobile control units (200), the at least one selected audio signal parameter selected for the corresponding mobile control unit (200) based on the received control signals from the corresponding mobile control unit taking into account the access and control rights of the corresponding mobile control unit (200).

12. The method according to claim 11, further comprising the steps of:

- generating, when at least two audio signal parameters have been selected for one of the mobile control units (200), a combined signal pa-

rameter in which the at least two selected audio signal parameters were combined,

- transmitting the combined audio signal parameter to said one mobile control unit (200),
- receiving, from said one mobile control unit (200) a combined control signal the combined control signal indicating how to process the combined audio signal parameters, and
- processing the at least two audio signal parameters based on the received combined control signal.

13. The method according to claim 11 or 12, further comprising the step of displaying a processed audio signal parameter processed by the audio signal processing unit based on the control signals received from said mobile control unit.

14. The method according to any of claims 11 to 13, wherein it is checked whether for one of the selected audio signal parameters, for which control signals are received from one of the mobile control units (200), console control signals transmitted for said one selected audio signal parameter from an actuating member provided on the mixing console are present, wherein the console control signals for said one audio signal parameter override the control signals for said one audio signal parameter received from said one mobile control unit (200) and said one selected audio signal parameter is processed based on the console control signals.

15. The method according to any one of claims 11 to 14, wherein the access to the plurality of buses (325, 335) is determined in such a way, that any given audio signal parameter of a bus is only selected for one of the mobile control units.

16. The method according to any one of claims 11 to 15, further comprising the step of automatically connecting to all identified mobile control units.

17. The method according to any one of claims 11 to 16, wherein should the number of or configuration of the plurality of buses associated with any mobile control unit be changed, the mobile control unit (200), to which signal parameters of the changed bus are transmitted, is automatically disconnected.

18. A mobile control unit (200) configured to generate control signals for a plurality of audio signal parameters of an audio mixing console (100), comprising:

- an interface (210) configured for a wireless communication with the mixing console (100) and configured to receive information about the available audio signal parameters on the mixing console,

- a bus selecting module (230, 240) configured to select at least one audio signal parameter from the plurality of audio signal parameters available in the audio mixer for a bus, wherein the interface (210) is configured to receive at least one audio signal parameter selected for the mobile control unit from the plurality of audio signal parameters available in the audio mixing console, 5

- an actuating module (230) configured to adapt the audio signal parameters of the selected bus and configured to generate control signals based on an actuation of the operating module, wherein the interface transmits the generated control signals to the mixing console. 10 15

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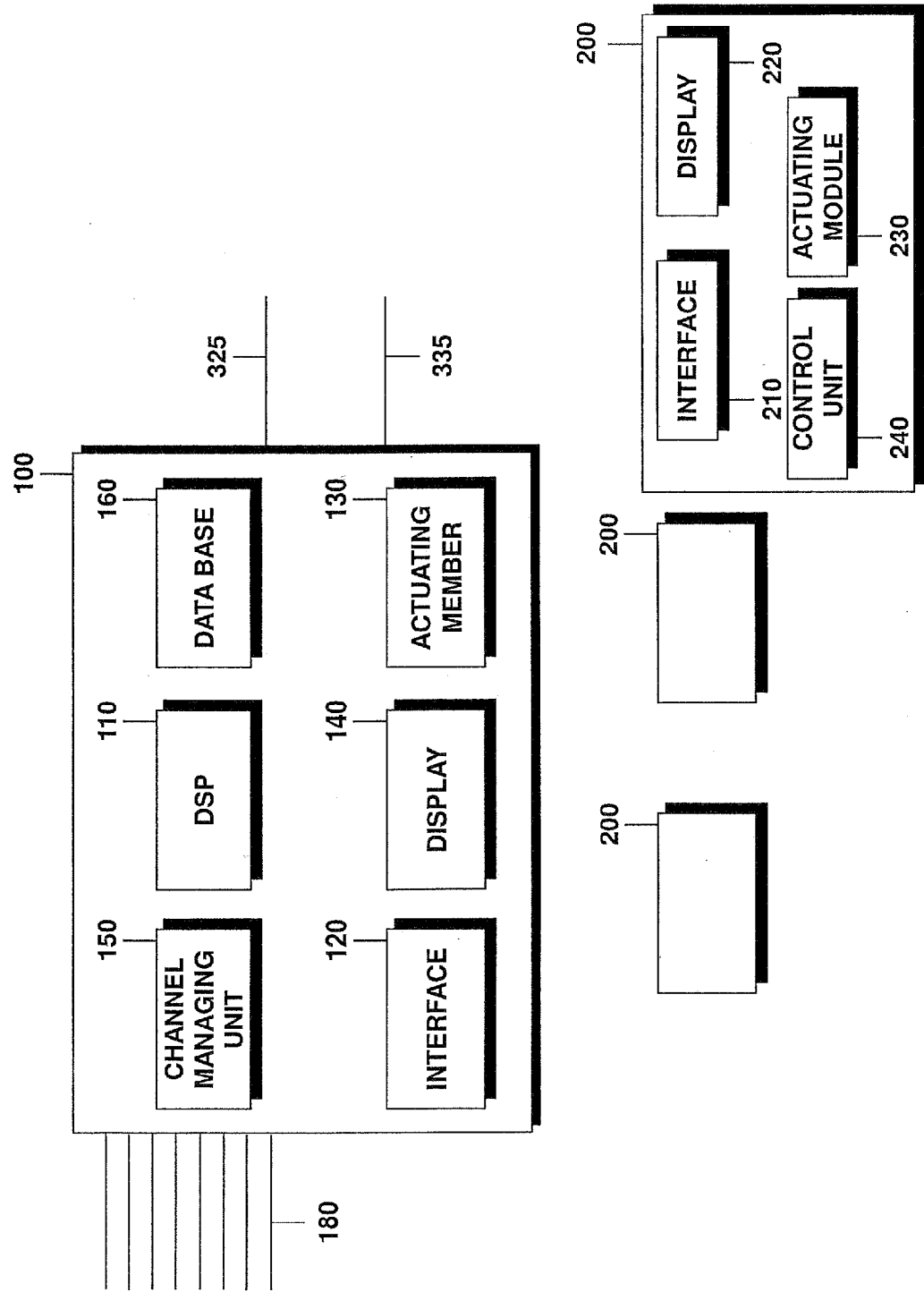


FIG. 1

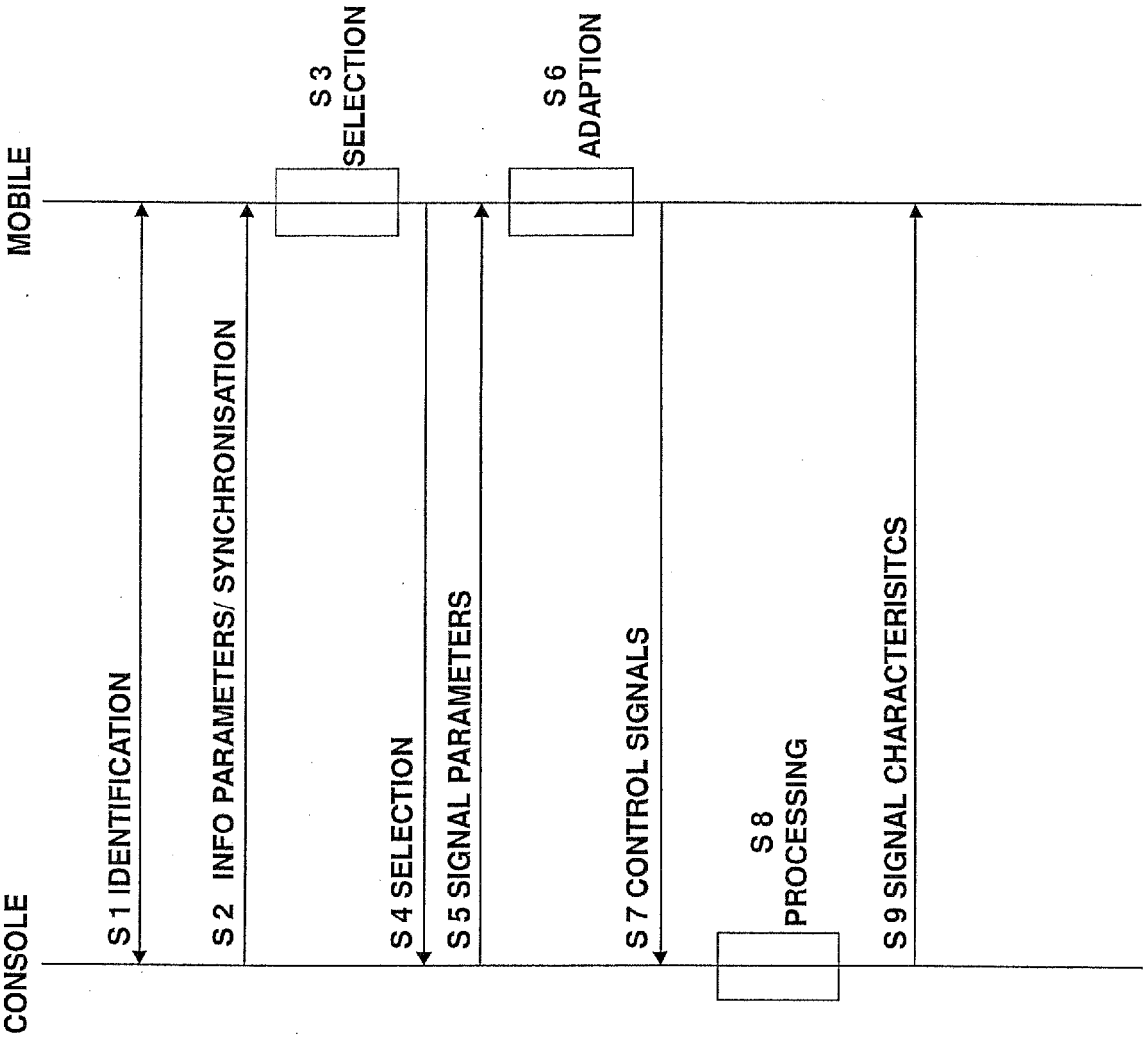


FIG. 2

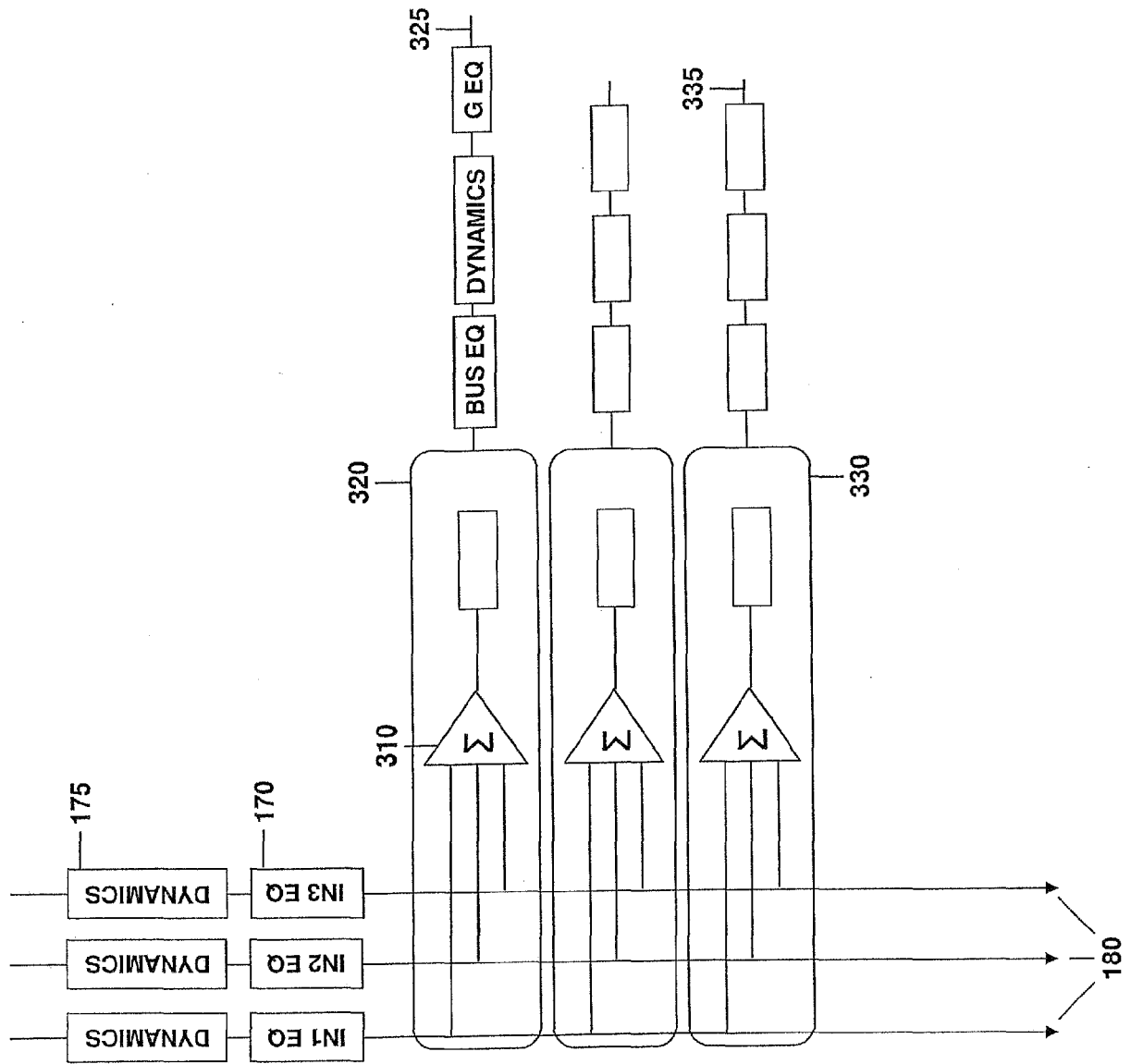


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 7453

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/179704 A1 (YAMASHITA SHINJIRO [JP] ET AL) 16 September 2004 (2004-09-16) * paragraphs [0054] - [0055], [0059], [0072], [0074], [0090] - [0091], [0095] - [0101] * * paragraphs [0111] - [0113] * * figures 1,4-5,7-8 *	1-18	INV. H04H60/04
A	Raggarballe: "Stagemix Yamaha M7CL", Youtube 10 November 2010 (2010-11-10), XP55030212, Retrieved from the Internet: URL:http://www.youtube.com/watch?v=-VvBZboDYyU [retrieved on 2012-06-18] * the whole document *	4,13	
A	Msmsystems: "iPad Yamaha M7CL stage mix App", YouTube 27 January 2011 (2011-01-27), XP55030223, Retrieved from the Internet: URL:http://www.youtube.com/watch?v=U_613cK0Mkw [retrieved on 2012-06-18] * the whole document *	5,14	
			TECHNICAL FIELDS SEARCHED (IPC)
			H04H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 June 2012	Examiner Iovescu, Vladimir
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03/82 (P04C01)



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 7453

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	C.S.G.; Pro Audio Division; Yamaha Corporation: "M7CL StageMix V2.0 User Guide", 1 August 2011 (2011-08-01), XP55029932, Retrieved from the Internet: URL: http://www.sesystems.com/Assets/assetmanagerfiles/yamahamanuals/yamaha_m7cl_stagemix_v20_ug_en.pdf [retrieved on 2012-06-14] * chapter 1.0 - 2.0, chapter 5.3 * & "Yamaha commercial audio - News archive 2011", Yamaha commercial audio 1 January 2012 (2012-01-01), XP55030230, Retrieved from the Internet: URL: http://www.yamahaproaudio.com/global/en/newsarchive/2011/ [retrieved on 2012-06-18] -----	9	
A	US 2011/130200 A1 (TERADA KOTARO [JP] ET AL) 2 June 2011 (2011-06-02) * paragraphs [0026], [0031], [0035], [0039], [0042], [0047], [0060], [0075] * * paragraphs [0077] - [0082] * * figures 1-2, 7-9 * -----	1-18	TECHNICAL FIELDS SEARCHED (IPC)
A	US 2009/282967 A1 (SKILLINGS STEVE [US]) 19 November 2009 (2009-11-19) * paragraphs [0033], [0037] * * figure 7 * -----	1-18	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 June 2012	Examiner Iovescu, Vladimir
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 15 7453

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-06-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004179704 A1	16-09-2004	CA 2460406 A1	11-09-2004
		JP 3928570 B2	13-06-2007
		JP 2004274620 A	30-09-2004
		US 2004179704 A1	16-09-2004

US 2011130200 A1	02-06-2011	EP 2341421 A2	06-07-2011
		JP 2011135562 A	07-07-2011
		US 2011130200 A1	02-06-2011

US 2009282967 A1	19-11-2009	AU 2009246252 A1	19-11-2009
		CN 102047566 A	04-05-2011
		EP 2297860 A2	23-03-2011
		JP 2011523810 A	18-08-2011
		TW 200951938 A	16-12-2009
		US 2009282967 A1	19-11-2009
		US 2012103172 A1	03-05-2012
		WO 2009140538 A2	19-11-2009
