

New Speaker Setup for Multichannel Processors

Content

New Speaker Setup – Changes	2
Updating from a Previous SW Version.....	2
Restoring Old Backups	2
More Flexible Output Usage.....	2
More than One Output for LFE	3
Distances Will be Remembered.....	3
Speaker Setup Functionality	4
Bass Management	5
Speaker Cutoff Frequency	5
Which Cutoff Frequency Should You Choose?	5
XL and XXL Speakers	5
Front and Rear Subs.....	6
LFE subs and transducers.....	6
LFE channel	6
Bi-amping	6
Natural Roll-off	7
Assignment of Speakers to Bass Positions.....	7
Dolby Atmos, DTS:X and Auro-3D.....	8
Dolby-Enabled Speakers	8
Mixed Extra Channels	8

New Speaker Setup – Changes

The speaker setup functionality in the multichannel processors has been updated to accommodate some changes to the decoder as well as to introduce added flexibility to the setups.

This first chapter will outline the differences between the previous setup and the new setup. The rest of the document will describe the functionality in more details.

Updating from a Previous SW Version

When updating a processor from a software version with the previous speaker setup, nothing will change – the speaker setup stored in the device will still be handled according to the old rules and limitations. This ensures that all existing setups will keep working without having to change anything.

Once any changes are made to the speaker setup however, the new rules will be applied.

As always, any changes to the speaker setup will require re-running the RoomPerfect measurements. In this case, this is even more important than usually, since some setups will use a different channel layout internally, so before RoomPerfect has been run again, there might not be sound in all channels.

In addition to this, some setups will also have changes to how the speakers are assigned to the output connectors on the device, so when making any changes to the speaker setup, make sure to check how the outputs are routed.

For most setups, however, there will not be any changes until the new features are used.

Downgrading from the new Software to an older version, however, is not supported. If this is done, the speaker setup will need to be recreated and RoomPerfect will need to be run again, unless you have a backup from the old version to restore from instead.

- It is always good practice to backup your device before making any changes or updating the software...

Restoring Old Backups

If you have a backup, which was created with an old version of the software, it is still possible to restore these settings to a device with the new software. In this case, the software will recognize that the speaker setup from the backup was created with an old version and it will behave just as described above, so the speaker setup will be handled according to the old rules and limitations until something is changed.

More Flexible Output Usage

The above-mentioned differences in how speakers are assigned to the output connectors are caused by a new, more flexible, algorithm for this assignment.

In the previous version of the speaker setup, there were some restrictions on which signals could be routed to which output connectors. Most of these restrictions have been removed in the new version, leading to more flexibility in which speaker setups are possible.

An example could be a setup without any rear surround speakers. In the old version, the LRS/RRS connectors would not be assignable to anything else in this situation, but now they can be used for e.g. wides or top middles.

More than One Output for LFE

The increased flexibility for output connectors also leads to the ability to assign more than one output for LFE subs.

While a symmetric setup is the optimal for more than one sub, this is not always possible – either because the user wishes to use different subs or because the room does not allow for a left/right placement of the speakers. In these cases, it is now possible to send the LFE to more than one output and assign different gain-values and distances to each.

In addition, one or more LFE outputs can be designated as a transducer-output. Transducers are tactile, bass-shaker type devices rather than subs emitting sound. LFE outputs designated as transducers will only play the LFE-channel – redirected bass from other channels will not be sent to the transducers. Also, they will not be measured during RoomPerfect since they do not play sound.

Distances Will be Remembered

Distances to speakers are set up as part of the RoomPerfect procedure. Since RoomPerfect needs to be re-run whenever the speaker setup changes, this caused the distances to be deleted whenever the setup changed.

But for most minor changes to the speaker setup, the physical distances do not change, so having to re-enter the distances for each new RoomPerfect run was an annoyance.

This has been solved in the new version, where distances to speakers which are still the same will be kept even when changing the speaker setup. The user will have to remember to change any added or moved speakers, but any speakers still in the same position will be remembered by the device.

Speaker Setup Functionality

The purpose of the speaker setup is to tell the system which speakers and subwoofers are available and how big those are, i.e. how much bass they are capable of reproducing.

When this document refers to “speakers” this only refers to “normal” speakers and does not include any subwoofers.

Notice the difference between “LFE sub”, which is the output(s) used for LFE and the sub(s) connected to them, and “LFE channel”, which is the actual LFE channel. A setup without an LFE sub can still play the LFE channel, it will just be played by other subs or speakers.

The speaker setup allows for subwoofers labelled “Sub L” and “Sub R” as well as “Sub LR” and “Sub RR”. These will be referred to in the document as “front subs” and “rear subs”, respectively.

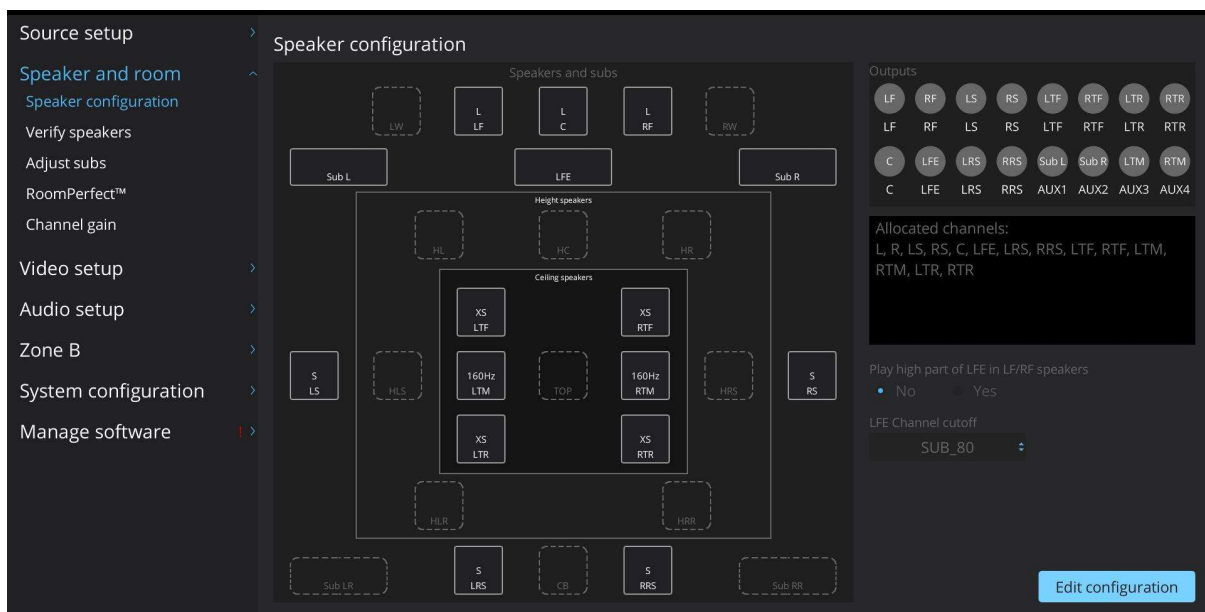


Figure 1: Screenshot from the speaker setup part of the on-screen setup menu

Bass Management

Speaker Cutoff Frequency

For all the speakers in the system, a speaker size must be chosen. The speaker size informs the system of how much bass, the speaker is capable of playing, by selecting a cutoff frequency. Signal below this frequency will then be redirected to another speaker or subwoofer in the system.

Available selections for speaker size are:

- None (Means the output is unused)
- XXL and XL (Plays full range signal, the difference will be explained later in the document)
- L (Cutoff frequency 40Hz)
- M (Cutoff frequency 80 Hz)
- S (Cutoff frequency 100Hz)
- XS (Cutoff frequency 120Hz)
- Custom (User selectable cutoff frequency)

Which Cutoff Frequency Should You Choose?

When selecting a cutoff frequency for your speakers, you should select a frequency higher than the lowest frequency, your speaker is able to play.

If the redirected bass will be played by a subwoofer (and not a full range speaker), you should also make sure that the cutoff frequency is lower than the highest frequency the subwoofer can play.

XL and XXL Speakers

Selecting the speaker size as XL or XXL designate the speaker as capable of playing a full range signal. The difference is that the XXL-size tells the system, that the speaker can also play bass from other channels in the system.

The system can only redirect bass to XXL speakers placed at the LF/RF, LS/RS and LRS/RRS positions.

In a system with front/rear subs present, there will be no difference between XL and XXL since the redirected bass is played by the subs instead.

In a system with only an LFE sub, the LFE sub will be playing the LFE channel, while the XXL speakers will be playing the redirected bass.

In a system with no subs at all, the XXL speakers will be playing the redirected bass as well as the LFE channel.

When XXL speakers are playing the redirected bass, the system will distribute the channels on Left and Right side. This means that in a setup with XXL speakers in front for instance, while the bass from the center channel will be split into both left and right front speakers, the bass from the left surround channel will be played only by the left speaker and the bass from the right surround speaker will be played only by the right front speaker.

Similarly, when there are XXL speakers in front as well as the surround or rear speakers, the system will distribute channels between them. For instance, a Dolby Atmos setup with 4 top channels and XXL on both front and surround will send bass from LTF and RTF channels to the front speakers, while bass from LTR and RTR channels will be send to the surrounds.

Normally a system without any subs will need to have XXL speakers to receive LFE and redirected bass. There is however one exception; it is possible to make a system without subs and with all XL speakers. Since there is no redirected bass, the system can handle this without XXL speakers, but in such a system, the LFE channel will not be played by any speakers.

Front and Rear Subs

The front and rear subs in the speaker setup is a way to add more than a single sub to the system. Typically, the front subs will be placed in each corner behind the front speakers, while the rear subs are placed in the corners of the room behind the listening position. It is possible to use front/rear subs alone or in combination with an LFE sub.

If front/rear subs are used without an LFE sub in the system, they will play both the LFE channel and the redirected bass.

If front/rear subs are used in combination with an LFE sub, then the LFE sub will play the LFE channel while the front/rear subs will play the redirected bass.

When front/rear subs are playing the redirected bass, the system will distribute the channels on left and right side and between front and rear the same way as was mentioned for XXL speakers.

LFE subs and transducers

The LFE sub is the traditional LFE subwoofer output.

When used in combination with either XXL speakers or front/rear subs, the LFE sub will only play the LFE channel.

When used alone, the LFE sub will play the LFE channel as well as the redirected bass.

It is possible to assign more than one output for LFE subs to send the LFE to more than one output and assign different gain-values and distances to each. This allows for more than one subwoofer in the setup even if it is not possible to place these symmetrically as front/rear subs.

In addition, one or more LFE outputs can be designated as a transducer-output. Transducers are tactile, bass-shaker type devices rather than subs emitting sound. LFE outputs designated as transducers will only play the LFE-channel – redirected bass from other channels will not be send to the transducers. Also, they will not be measured during RoomPerfect since they do not play sound.

If a setup uses front/rear subs it can still assign an LFE transducer output without having any real subs for LFE. In this case, the sound from the LFE will still be played by the front/rear subs, but the LFE channel will also be send to the transducer for tactile feedback.

LFE channel

There is an option to select the cut-off for the LFE channel. This frequency is used to add a low pass filter to the LFE channel. This setting has no influence on the redirected bass (even when played by the LFE sub), the filter frequency for that has already been selected when setting up the speakers.

Normally all signal above the LFE cutoff will be discarded (there should be no content in the high part of the LFE channel anyway). If for some reason it is preferred to keep this signal, there is an option to send the high part of the LFE channel to the Left and Right speakers.

This option will send all content above the LFE cutoff frequency to the Left and Right speakers, so make sure that the speakers can handle this signal. It is normally not recommended to use this option.

Bi-amping

For the front speakers, it is possible to select an option to use bi-amping. By enabling this option, the system will route a copy of the signal for the left and right front speakers to another pair of outputs.

This signal is an exact copy of the existing signal for the front speakers. If the front speakers have been given a size with a cutoff frequency, that high pass filter is applied to these outputs as well. This means it is possible to use bi-amping for speakers and still have bass management redirect the bass to a sub instead.

Natural Roll-off

When natural roll-off is used, it means that the main speaker will receive the full range signal and be allowed to roll-off naturally as it would do on its own. The bass cutoff frequency will still be used to send the bass to a subwoofer or XXL speaker, but it will not be applied to the main (high pass) output.

Assignment of Speakers to Bass Positions

When XXL or front/rear subs are used, the redirected bass from speakers will be distributed to left or right side and when rear subs or XXL surround or rear speakers are involved also between front and rear. This table shows, where each speaker has their bass directed to in these situations.

Position	Description	Left / right	Front / rear
L	Left	Left	Front
R	Right	Right	Front
C	Center	Both	Front
LS	Left surround	Left	Rear
RS	Right surround	Right	Rear
LRS	Left rear surround	Left	Rear
RRS	Right rear surround	Right	Rear
CB	Center back	Both	Rear
LW	Left wide	Left	Front
RW	Right wide	Right	Front
LTF	Left top front	Left	Front
RTF	Right top front	Right	Front
LTM	Left top middle	Left	Front
RTM	Right top middle	Right	Front
LTR	Left top rear	Left	Rear
RTR	Right top rear	Right	Rear
HL	Height left	Left	Front
HR	Height right	Right	Front
HLS	Height left surround	Left	Rear
HRS	Height right surround	Right	Rear
HLR	Height left rear	Left	Rear
HRR	Height right rear	Right	Rear
HC	Height center	Both	Front
TOP	Top ceiling / VoG	Both	Front

Dolby Atmos, DTS:X and Auro-3D

The system supports Dolby Atmos, DTS:X and Auro-3D. The following speakers are supported for those systems:

Auro-3D:

- HL (Height Left)
- HR (Height Right)
- HLS (Height Left Surround)
- HRS (Height Right Surround)
- HC (Height Center)
- TOP (Top ceiling, AKA VoG / Voice of God)

Dolby Atmos and DTS:X:

- LTF (Left Top Front)
- RTF (Right Top Front)
- LTM (Left Top Middle)
- RTM (Right Top Middle)
- LTR (Left Top Rear)
- RTR (Right Top Rear)
- LW (Left Wide)
- RW (Right Wide)
- HLR (Height Left Rear)
- HRR (Height Right Rear)

In general Dolby Atmos and DTS:X use the same speakers.

If Dolby Atmos or DTS:X material is played in an Auro-3D setup, the system will try to match the Auro-3D specific speakers to the nearest Dolby Atmos equivalent, the same goes for playing Auro-3D material on a Dolby Atmos setup. The system will also handle hybrid setups with both types of speakers

Dolby-Enabled Speakers

For Dolby Atmos setups, it is possible to add Dolby Enabled Speakers instead of using top speakers mounted in the ceiling.

Dolby Enabled Speakers are extra speakers placed on top of or build into the speakers on the main positions in the system (front, surround and rear surround). These extra speakers fire sound upwards toward the ceiling. The sound is then reflected to give the listener the sound from above without having actual top speakers installed.

To add Dolby Enabled Speakers to your system, add them to the speakers, they are placed on top of. So, if you have Dolby Enabled Speakers on top of your front and surround speakers, go to the settings for these speakers and activate the Dolby Enabled Speaker option. This will then give you the option to select the size of the Dolby Enabled Speaker. Once this is done, the system will find out which signal is to be routed for this speaker and will add an output for it.

Notice that playback of Auro-3D material will not make use of Dolby Enabled Speakers.

Mixed Extra Channels

The decoder in some devices will decode 16 discrete channels, while other decoders are limited to only 12 discrete channels. In these devices however, for Atmos setups it is possible to use up to four additional speaker positions which will then be generated by mixing other channels.

Using the 12 discrete channels, the largest possible setups are either 5.1.6, 7.1.4 or 9.1.2. With the 4 extra positions, setups up to 9.1.6 are possible.

When creating larger setups, the processor can create Wide positions by mixing Front channels with Surround channels and it can create Top Middle positions by mixing Top Front and Top Rear channels.

So, in the maximum possible example of 9.1.6, the decoder will use the 12 discrete channels for L, R, LS, RS, C, LFE, LRS, RRS, LTF, RTF, LTR and RTR. LW will then be generated as a mix of L and LS, RW as a mix of R and RS, LTM as a mix of LTF and LTR and RTM will be a mix of RTF and RTR.

When creating the setup in the speaker setup, the outputs and the speaker positions will get a different color than the normal speakers to indicate, that they will be created by mixing other channels. In the output-indicator, the text will become black instead of white while the speaker positions will get grey text instead of white.