



# GLM 5 System Operating Manual

Genelec Loudspeaker Manager GLM

## Table of Contents

1	Introduction.....	6
2	Glossary .....	7
3	System Components .....	9
3.1	UNIO Concept .....	9
3.2	Genelec Loudspeaker Manager Software .....	9
3.3	Genelec 9320 SAM Reference Controller .....	9
3.4	Genelec Network Adapter .....	10
3.5	SAM Monitors .....	10
3.6	SAM Subwoofers.....	10
3.7	Adaptive Woofer System.....	10
3.8	Aural ID Technology integration .....	10
4	Getting Started .....	11
4.1	Placing SAM Monitors and Subwoofers in the monitoring room .....	11
4.2	Cabling for Audio Signals .....	12
4.2.1	Analogue Stereo .....	12
4.2.2	Analogue Stereo - Woofer System.....	13
4.2.3	Analogue Stereo with a Subwoofer .....	14
4.2.4	Analogue 5.1 Surround .....	14
4.2.5	Digital Audio, Stereo with a Subwoofer .....	16
4.2.6	Digital Stereo – Adaptive Woofer System .....	16
4.2.7	Adaptive Woofer System in a multichannel setup.....	17
4.2.8	Digital Audio 5.1 with a 7300 Series Subwoofer with 9301 .....	18
4.2.9	Digital Audio 5.1 with 7200 Series Subwoofer .....	19
4.2.10	Digital Audio, Stereo with a SE7261 Subwoofer .....	21
4.2.11	Digital Audio 5.1 with a SE7261 Subwoofer.....	22
4.3	Cabling the GLM Management Network .....	25
4.4	Downloading and Installing GLM Software .....	27
4.5	Selecting the GLM theme and language .....	27
4.6	Downloading and Installing Local AutoCal calibration.....	28
4.6.1	Install GLM software .....	28
4.6.2	Update ‘Mic Serial’ Measurement Microphone calibration data .....	28
4.6.3	Using Local GLM AutoCal.....	29
5	Creating a System Layout and Calibrating a System .....	30
5.1	Creating a SAM Monitor Layout .....	30
5.2	Creating a SAM Monitor Group .....	33
5.3	Automatic Calibration Using GLM AutoCal .....	34
5.4	Automatic Calibration of the Adaptive Woofer System GLM WooferCal .....	37
5.5	Aligning Subwoofer Phase with GLM AutoPhase .....	41
6	Basic Use of GLM.....	43
6.1	Selecting monitoring situations using Group Preset buttons.....	44
6.2	System Level Control .....	44

6.3	System level indications .....	45
6.4	System Mute and Dim .....	45
6.5	Standardised Level Presets .....	45
6.6	Calibrated Level Selection.....	46
6.7	By-passing Bass Management.....	47
6.8	Calibrated/Not Calibrated button .....	47
6.9	Drop-down selection for solo, mute, info and edit .....	47
6.10	GLM Adapter icon .....	48
6.11	'Play All' button .....	48
6.12	Status indications .....	48
6.13	Keyboard shortcuts .....	48
7	Advanced Use of GLM .....	50
7.1	Importing GLM 4 Setups .....	50
7.2	Calibration of SPL to Loudness Standards .....	51
7.3	Test Controls .....	54
7.4	Maximum Number of Group Presets.....	55
7.5	Creating a New System Setup File .....	55
7.6	Solo and Mute Pop-Up Window Controls.....	56
7.7	'Bass Man' Button .....	56
7.8	Menu Commands .....	56
7.9	Cloud Account Login .....	60
7.10	Standalone Startup Level .....	61
7.11	Displaying monitor and subwoofer data in GLM.....	61
7.12	Access to Monitor and Subwoofer Acoustic Settings .....	63
7.13	GRADE™ Automatic Room Acoustic Report .....	63
7.14	Level-Aligning Multiple Subwoofers Reproducing the Same Signal.....	64
7.15	Rerunning AutoCal Automatic Calibration.....	65
7.16	Rerunning AutoPhase Automatic Phase Calibration.....	66
7.17	Group Settings, Advanced Use .....	66
7.17.1	Access to Group Preset Settings .....	67
7.17.2	Group Name.....	68
7.17.3	System Delay .....	68
7.17.4	Bass Management .....	68
7.17.5	Input Mode .....	69
7.17.6	Group Sensitivity .....	69
7.17.7	Extended Phase Linearity .....	69
7.17.8	Monitor Settings .....	70
7.17.8.1	Monitor name .....	71
7.17.8.2	Group Status.....	71
7.17.8.3	Calibration Group ID .....	71
7.17.8.4	Subwoofer Group ID .....	71
7.17.8.5	'Analog Input'.....	72
7.17.8.6	'Digital Input'.....	72

7.17.8.7	Digital Input using 9301 and 9401 interface devices .....	72
7.17.8.8	Bass Management .....	73
7.17.8.9	Phase Align .....	73
7.17.8.10	Woofers System Align .....	73
7.17.8.11	LFE Channel .....	74
7.18	Advanced use of AutoCal .....	74
7.18.1.1	MultiPoint calibration .....	74
7.18.2	Reviewing the AutoCal result .....	75
7.19	Advanced use of AutoPhase .....	76
7.19.1	Acoustical reasons for selecting the crossover frequency .....	76
7.19.2	The steps to run AutoPhase .....	76
8	Editing Acoustic Calibrations .....	78
8.1	Acoustic Editors .....	78
8.2	Descriptions of the Acoustical Settings .....	79
8.2.1	Level and time-of-flight correction Controls in Monitors and Subwoofers .....	79
8.2.2	Room Response Equalizer Controls .....	80
8.2.3	Acoustic editor and scoring system for woofer systems .....	81
8.3	Sound Character Profiler .....	83
8.4	Level Panel .....	83
8.5	Optional Gain .....	84
8.6	GLM Control with MIDI .....	85
9	Stand-Alone Operation .....	87
9.1	Storing values permanently in monitors and subwoofers .....	87
9.2	Using a USB power supply .....	89
9.3	Level Control with GLM Cabled Volume Controller .....	89
9.4	Connecting the GLM Volume Controller .....	89
9.5	Wireless Volume Controllers .....	90
10	Additional Information .....	91
10.1	GLM display indications summary .....	91
10.2	Monitor and subwoofer LED light indications summary .....	93
10.3	Griffin Powermate USB Controller .....	93
10.4	Product Registration from GLM .....	95
10.5	Factory Reset from GLM .....	96
10.6	Uninstalling GLM .....	97
11	Frequently Asked Questions .....	98
11.1	Why do ID tones vary in different system configurations? .....	98
11.2	How do I duplicate a Group? .....	98
11.3	How can I update firmware? .....	99
11.4	How do I compare a calibrated and uncalibrated SAM system? .....	100
11.5	How so I calibrate SAM systems for different listening positions? .....	101
11.6	Can analogue and digital signal sources be mixed? .....	101
11.7	How do I switch between analogue and digital signal? .....	101

11.8	What does ISS mean? .....	101
11.9	Can I power up and shut down the SAM system with GLM? .....	101
11.10	Why are my monitors not going into ISS state? .....	102
11.11	What is the “Not used in this setup” bin in the Layout page? .....	103
11.12	How I replace a monitor with a new one? .....	103
11.13	How do I edit the System Layout?.....	103
11.14	Can I use 73xx subwoofers with non-SAM monitors?.....	103
11.15	Can I use SAM monitors in 3D Immersive Audio Systems? .....	104

# 1 Introduction

Congratulations and thank you for purchasing Genelec Smart Active Monitoring (SAM™). This manual describes the setup, calibration and use of SAM Monitoring with Genelec Loudspeaker Manager (GLM) software.

Please take a moment to familiarise yourself with the contents of this manual. While the use of SAM Monitoring and GLM software is intuitive, there are many possibilities and options, and we give suggestions in this manual for different types of installations and application scenarios.

We are also ready to help you at any time. GLM software provides the link to Genelec, in case you have specific questions, or you need support. For support, first contact your local dealer, who will be well trained to help and support you. You can also contact Genelec directly at [support@genelec.com](mailto:support@genelec.com)

Happy monitoring!

## 2 Glossary

Abbreviation or term	Explanation
12xx (xx is two numbers)	Family of three-way SAM Main Monitors.
72xx	Family of digital audio input SAM Subwoofers.
73xx	Family of analog and digital audio input SAM Subwoofers.
82xx	Family of two-way and three-way SAM Monitors.
83xx	Family of two-way and three-way SAM Monitors with extended room compensation capability.
8381A	SAM Adaptive Point Source Main Monitor.
9301A	Multichannel AES/EBU Interface device for 73xx subwoofers. This device supports up to 8 channels of AES/EBU input for the 73xx subwoofers.
9301B	Multichannel AES/EBU Interface device for 73xx subwoofers. This device supports up to 16 channels of AES/EBU input for the 73xx subwoofers.
9320A	Reference Controller supporting management of all forms of loudspeaker-based monitoring as well as headphone-based monitoring. 9320A supports UNIO Audio Monitoring and requires GLM 5 or newer.
9401A	Multichannel AES67 Interface device for SAM Monitors and 73xx subwoofers. This device supports up to 16 channels of AES67 input for the SAM Monitors and 73xx subwoofers.
Adapter (8300-416)	Genelec Network Adapter.  The GLM Adapter is a device interfacing the GLM Network to a computer USB port. The GLM Adapter also acts as a stand-alone volume control master and Genelec measurement microphone interface.
Analog IN	XLR analogue line input.
Analog OUT	XLR analogue line output.
AutoCal™	Genelec automatic room response calibration method.
AutoPhase™	Genelec automatic subwoofer phase alignment method.
Bass Management	The Bass Management system directs low frequencies of monitor input channels to subwoofer(s) and higher frequencies to monitors.
Calibration Group ID	When monitors are assigned a Calibration Group ID number, all monitors sharing the same ID number are calibrated as a symmetric group.
Digital IN	AES/EBU digital audio input on an XLR input.
Digital OUT	AES/EBU digital audio output on an XLR output.
Genelec Cloud	Genelec services accessible over the Internet. The services are available at the MyGenelec account ( <a href="https://my.genelec.com/">https://my.genelec.com/</a> ).

Abbreviation or term	Explanation
GLM™	Genelec Loudspeaker Manager. Software for setup, automatic system calibration and management of a Genelec SAM Monitoring system, described in this manual.
GLM Network	Genelec's proprietary monitoring system management network, enabling automatic system setup, calibration, and control.
GRADE™	GRADE™ (Genelec Room Acoustic Data Evaluation) report is a service in the Genelec Cloud that uses all the information collected automatically during GLM AutoCal to create a report that analyses the key acoustic features of your monitoring system and listening room performance, reporting on the system calibration success and monitoring room acoustic effects, and suggesting improvements if necessary.
Group Preset	Collection of monitors and subwoofers playing as a system at one time. Each group has its own settings, including the GLM AutoCal calibration.
Layout grid	A hexagonal grid on the GLM user interface, where monitor and subwoofer icons are placed. It automatically creates friendly names and, with digital audio selected, automatically assigns digital audio subframe settings.
Layout	Graphically presents a number of monitors and subwoofers on the GLM network, typically configured to resemble the physical monitor layout in the room.
Level Info Panel	A popup info panel that shows GLM status when the GLM window is not active and when any monitoring functions are changed.
Phase Align pair	The Phase Align pair for a subwoofer defines the monitor the subwoofer's phase is calibrated with.
SAM™	Smart Active Monitoring technology by Genelec.
SE7261	Genelec SAM Subwoofer that includes a separate centralised signal processing unit for 8130 digital input monitors (which are non-SAM monitors by Genelec).
Stack	Software window displaying the collection of icons for the currently unassigned monitors. All monitors are initially in this stack. They are moved during the layout creation onto the Layout Grid.
Subwoofer Group ID	Subwoofer Group ID is a method to enable compensation of multiple subwoofers working on the same set of input channels of audio; all subwoofers sharing the same ID number are calibrated as a Subwoofer Group.
W371	Adaptive Woofer System, used with The Ones three-way coaxial monitors.
WooferCal™	Genelec automatic room response calibration method for Adaptive Woofer Systems.
Woofer System Align pair	Woofer System align pair is a setting for W371 Woofer Systems. It defines which 'The Ones' monitor the W371 is calibrated with.

## 3 System Components

### 3.1 UNIO Concept

The Genelec UNIO concept unifies loudspeaker-based and headphone-based methods of monitoring into one reliable and precise workflow, enabling reliable bridging when switching from loudspeaker-based monitoring to headphone-based monitoring. This manual describes the use of **Genelec Loudspeaker Management (GLM)** software. The other main software component of UNIO is the **Aural ID Plug-in** for headphone-based monitoring.

### 3.2 Genelec Loudspeaker Manager Software

Genelec Loudspeaker Manager (GLM) software enables monitoring system setup, automatic acoustic calibration and continuous management of all monitors and subwoofers in the control room. GLM software enables:

- Calibration and alignment of Genelec Smart Active Monitoring loudspeakers and subwoofers.
- Management of daily monitoring processes across one or more monitoring systems.
- Standardising of monitoring levels and system alignments.
- Integration with headphone-based monitoring under the UNIO Concept.
- Support for health and safety in daily monitoring work.

Download GLM software on the Genelec website at <https://my.genelec.com/>.

For more details on SAM Monitors and Subwoofers, their installation and the setting up of systems, see the section [Getting Started](#).

**NOTE:** GLM software installation packages are updated regularly to include the latest improvements in the calibration technology. To make sure that you have the newest methods and measurement microphone correction data in use, use the **Genelec Cloud** based AutoCal (preferable method) or, alternatively, after setting up the GLM Calibration Kit or 9320 SAM Reference Controller and installing GLM software, download and install the **Local AutoCal Package** software. For more information, visit the Genelec website.

### 3.3 Genelec 9320 SAM Reference Controller

The 9320A is a key device for UNIO, unifying the use of both loudspeaker-based and headphone-based monitoring technologies and enabling equal access to loudspeaker-based and headphone-based monitoring. The 9320A integrates completely with GLM software and Aural ID software, to empower fully integrated and efficient monitoring setups for all applications. Genelec warmly recommends the 9320A SAM Reference Controller as the basic building block for a monitoring system build.

The Genelec 9320A SAM Reference Controller connects to a USB interface on a computer, enables GLM software to manage SAM Monitoring systems, offers physical volume control for the complete monitoring system, operates as the audio interface for analogue and AES/EBU monitors, and offers a measurement microphone interface for system measurements and calibration.

### **3.4 Genelec Network Adapter**

The Genelec GLM Network Adapter (8300-416) connects SAM Monitoring systems to a USB interface on a computer, operates as the audio interface for the measurement microphone and as the master for the stand-alone volume control function. When the 9320A SAM Reference Controller is used, the GLM Network Adapter is not needed.

### **3.5 SAM Monitors**

Genelec Smart Active Monitoring (SAM) systems provide a wide selection of output capacity levels, suited for all room sizes and applications, to implement loudspeaker-based monitoring layouts. With GLM software, precise calibration and bass management alignment can be done automatically and efficiently, supported by the extensive GRADE Room Acoustic Reporting feature for complete information about the resulting system performance.

Smart Active Monitors (SAM) are supported on Genelec's GLM Management Network. Genelec has an extensive selection of SAM Monitors, ranging from compact two-ways to large three-way main monitors.

### **3.6 SAM Subwoofers**

Smart Active Subwoofers are supported on Genelec's GLM Management Network. Genelec has a wide selection of subwoofers supporting multichannel analogue inputs and multichannel digital audio inputs, for all monitoring applications.

### **3.7 Adaptive Woofer System**

The W371 Adaptive Woofer System is fully supported on Genelec's GLM Management Network. Adaptive Woofer Systems support analogue and digital audio inputs and offer neutral bass response, even in acoustically challenging monitor placements, for example in free-standing placements.

### **3.8 Aural ID Technology integration**

In the area of headphone-based monitoring, Genelec Aural ID Technology enables you to access your personal directional hearing characteristics in the form of your own Head-Related Transfer Function (HRTF) and to use this with the Aural ID Plug-In and Aural ID Stand-Alone processing methods. This includes head tracking to ensure the layout of virtual monitoring loudspeakers on your headphones remain stationary in space as you move and rotate your head while wearing the headphones. Aural ID technology provides a reliable and precise method of personally calibrating the virtual audio monitoring setup for your specific headphones and your HRTF information, making it possible to use headphones to access many of the details available in loudspeaker-based monitoring.

## 4 Getting Started

To take full advantage of your Smart Active Monitoring (SAM) system, it is important to become familiar with all the components in the system.

To set up a monitoring system you will need your monitors and subwoofers, audio signal cables, GLM Management Network cables, a GLM Network Adapter or 9320 SAM Reference Controller, a GLM measurement microphone and GLM software.

To set up a Genelec SAM system,

- Place SAM Subwoofers and Monitors in the monitoring room.
- Run audio cables to the SAM Subwoofers and Monitors.
- Run GLM network cables from the 9320 Reference Controller or GLM adapter to all SAM Subwoofers and Monitors.
- Most SAM Monitors have physical DIP switches on the units for certain local control functions. **Check DIP switch controls of the SAM Subwoofers and Monitors. When the 'Stored' switch is available, turn it ON to enable the use of stored settings in stand-alone use. When you store settings in monitors, these settings come to force after the devices are re-powered (power down, then power up) while the 'Stored' DIP is set to the ON position.**
- Create a personal account at <https://my.genelec.com>. If you already have a personal MyGenelec account, log into your account to download software, get support, and register your products.
- Download and install GLM software from <https://my.genelec.com>.
- Create a system setup using GLM software.

### 4.1 Placing SAM Monitors and Subwoofers in the monitoring room

Try to place monitors and subwoofers in optimal locations in relation to surfaces reflecting audio. Aim each SAM Monitor towards the listening position. This becomes your System Layout.

1. Select the listening position so the distances from the side walls (B) are equal.
2. Place monitors so the distances to the listening position are equal and the distances to the monitors are equal from the side walls (A).
3. Place a subwoofer by the front wall and slightly left or right of the room's centre axis.
4. Aim monitors towards the listening position.

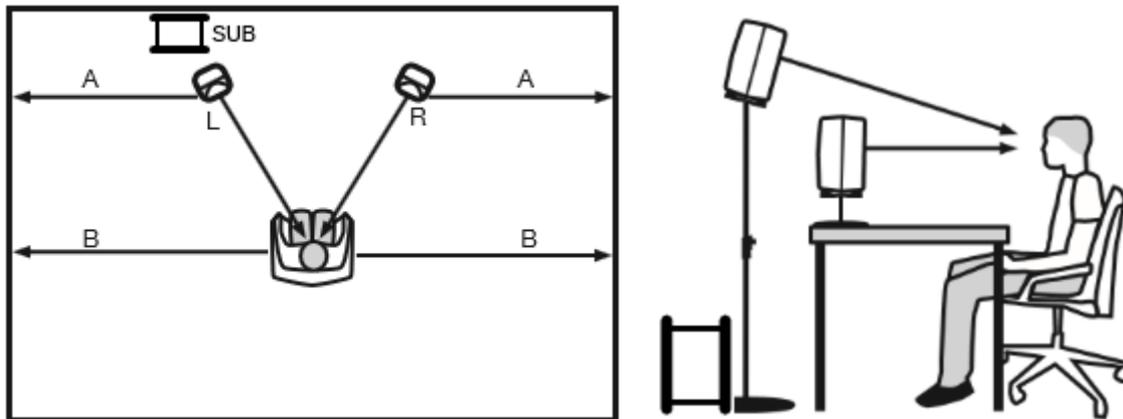


Figure 1. Place monitors symmetrically relative to the walls. Point each monitor's acoustical axis towards the listening position.

## 4.2 Cabling for Audio Signals

Run all audio cables from the audio source to the monitors. When a subwoofer is used, run the same signal to the monitor and the subwoofer. We recommend running the signal to the subwoofer first. The subwoofer has output connectors to facilitate onward connection to the monitors.

Bass management means using a subwoofer to reproduce low frequencies for any or all of the audio channels. Audio channels for monitors that are not bass managed can be run directly to the monitors – and do not need to run to the subwoofer.

When you need both analogue and digital audio cabling, it is possible to populate both analogue and digital inputs and outputs on SAM Monitors and Subwoofers. GLM allows the Group Configuration to select either analogue or digital audio. Note that the 8320 monitor features only an analogue input.

The most common audio cabling configurations are introduced next.

### 4.2.1 Analogue Stereo

Before cabling, turn off the power on all monitors.

- Connect audio cables from the audio source to the monitor 'ANALOG IN'.

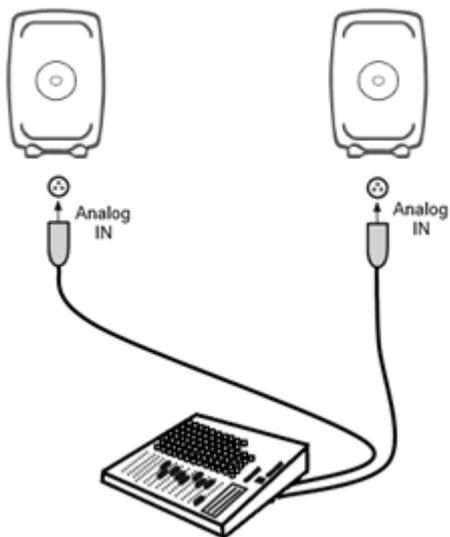


Figure 2. Analogue stereo cabling.

#### 4.2.2 Analogue Stereo - Woofer System

Before cabling, turn off the power on all monitors.

- Connect a cable from the source (left channel) to the left Woofer System 'ANALOG IN'.
- Connect a cable from the left Woofer System 'ANALOG THRU' to the left monitor 'ANALOG IN'.
- Connect a cable from the source (right channel) to the right Woofer System 'ANALOG IN'.
- Connect a cable from the right Woofer System 'ANALOG THRU' to the right monitor 'ANALOG IN'.

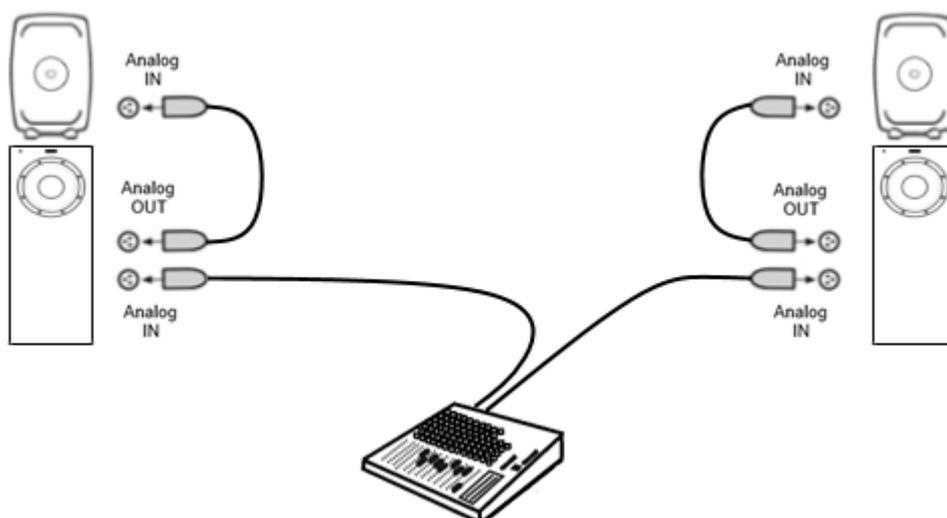


Figure 3. Analogue stereo Woofer System cabling.

### 4.2.3 Analogue Stereo with a Subwoofer

Before cabling, turn off the power on all monitors and subwoofers.

- Connect (Left) audio cable from the source to the subwoofer connector 'ANALOG IN 1'.
- Connect a cable from subwoofer 'ANALOG OUT 1' to left monitor 'ANALOG IN'.
- Connect (Right) audio cable from audio source to subwoofer 'ANALOG IN 2'.
- Connect (Right) audio cable from subwoofer 'ANALOG OUT 2' to right monitor 'ANALOG IN'.

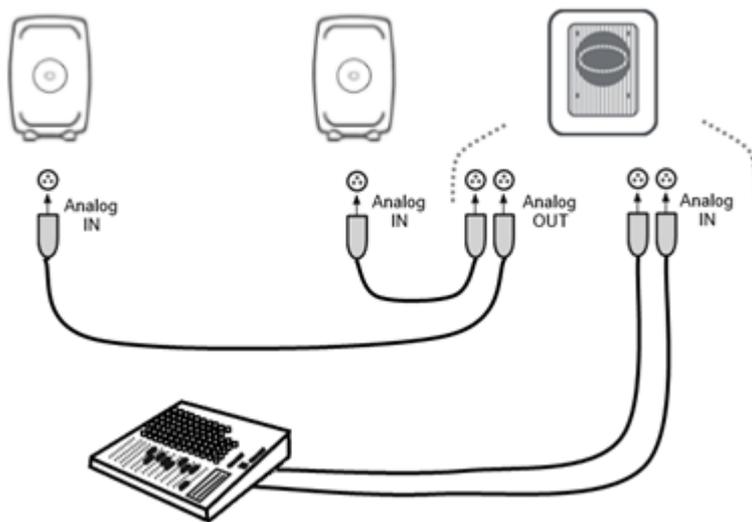


Figure 4. Analogue stereo cabling with a subwoofer.

### 4.2.4 Analogue 5.1 Surround

Before cabling, turn off the power on all monitors and subwoofers.

- Connect an audio cable from the audio source to the subwoofer 'ANALOG IN 1'.
- Continue from the subwoofer 'ANALOG OUT 1' to the monitor 'ANALOG IN'.
- Continue connecting all remaining audio input cables to the subwoofer inputs 'ANALOG IN' 2 through to 'ANALOG IN 5', and from the respective analogue outputs to the relevant monitors.
- Finally, connect the LFE channel from the audio source to the subwoofer 'LFE IN'.

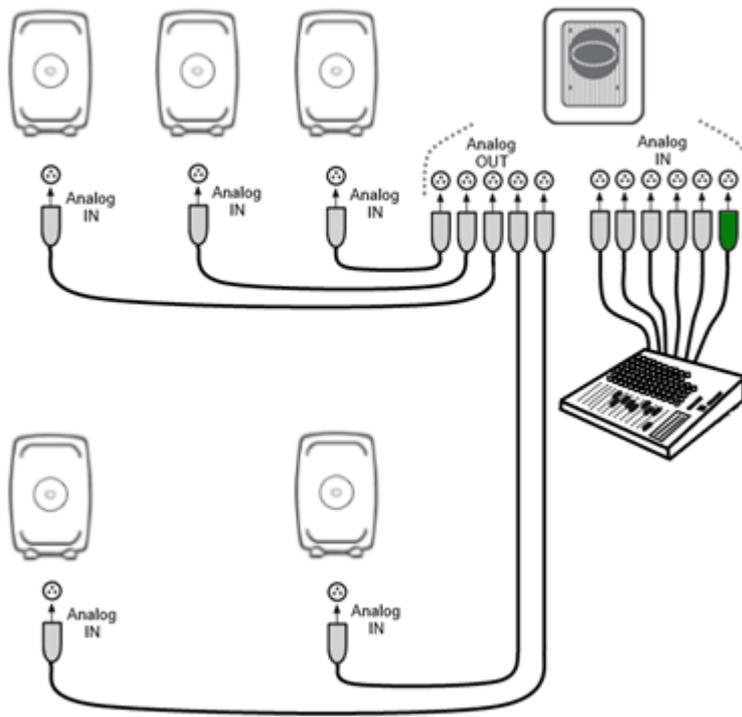


Figure 5. An example of analogue 5.1 system cabling.

#### 4.2.5 Digital Audio, Stereo with a Subwoofer

Before cabling, turn off the power on all monitors and subwoofers. An example of the audio cabling for AES/EBU digital audio is shown in Figure 6.

Connect the following XLR digital audio cables:

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL IN' input connector.
- From the subwoofer 'DIGITAL OUT' to the right monitor 'DIGITAL IN'.
- From the right monitor 'DIGITAL OUT' to left monitor 'DIGITAL IN'.

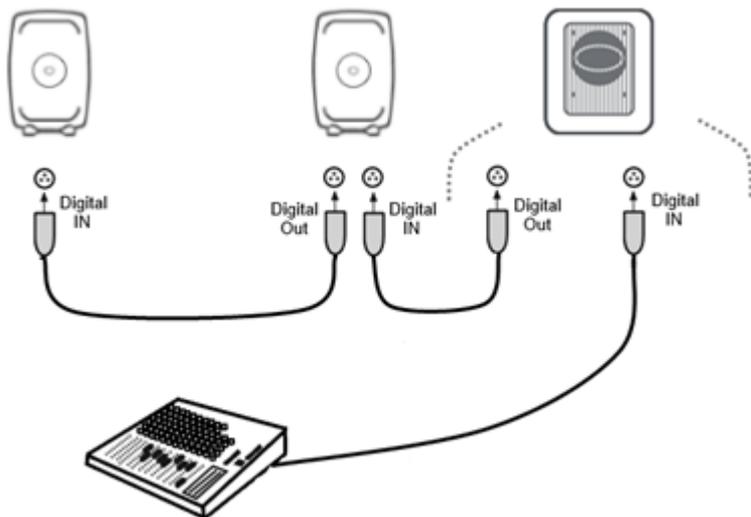


Figure 6. An example of AES/EBU digital audio stereo cabling.

#### 4.2.6 Digital Stereo – Adaptive Woofer System

Before cabling, turn off the power on all monitors.

- From the AES/EBU output of the audio source to the left Woofer System 'DIGITAL IN' input connector.
- From the left Woofer System 'DIGITAL THRU' to the left monitor 'DIGITAL IN'.
- From the left monitor 'DIGITAL THRU' to the right Woofer System 'DIGITAL IN'.
- From the right Woofer System 'DIGITAL THRU' to the right monitor 'DIGITAL IN'.

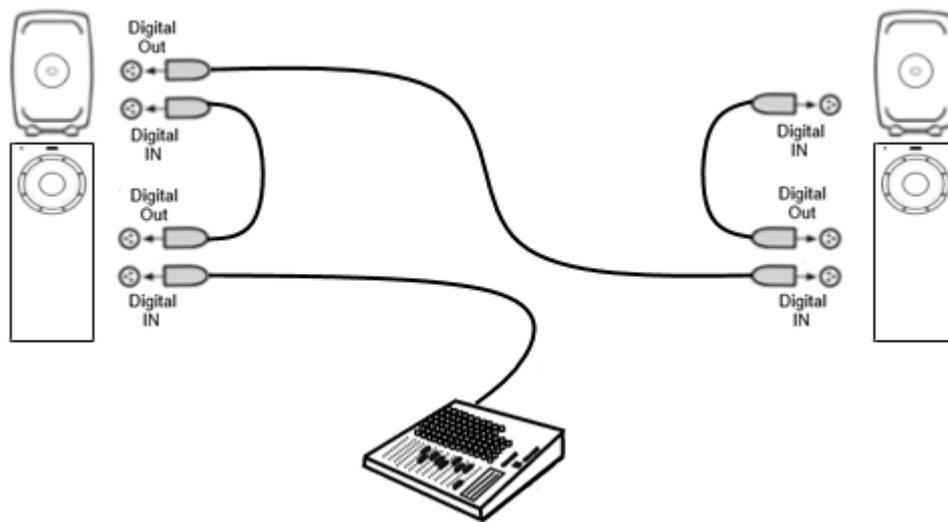


Figure 7. Digital stereo Adaptive Woofer System cabling.

#### 4.2.7 Adaptive Woofer System in a multichannel setup

The Adaptive Woofer System can be used in any multichannel setup, but there are some considerations. The Adaptive Woofer System only is intended to be used with one main monitor, only.

Connect signals to any additional subwoofer(s) to utilise bass management and help reproduction of the LFE channel.

The full calibration of the Adaptive Woofer System is in three steps:

1. Run **AutoCal** for all the main monitors and subwoofer(s). The Woofer Systems will not reproduce any sound in this first procedure.
2. Run **AutoPhase** for the subwoofer(s) against a selected monitor. This monitor is not to be a monitor connected to an Adaptive Woofer System. Typically, a subwoofer is phase aligned with the Centre channel monitor. When a second subwoofer is used for the overhead (top-layer) monitors, this subwoofer is paired with one of the overhead monitors.
3. The Adaptive Woofer System calibration **WooferCal** is done last. To calibrate, pair the Adaptive Woofer System to a monitor, select the calibration mode and set the crossover frequencies, and then click the 'Start Calibration' button to start calibration.

#### **4.2.8 Digital Audio 5.1 with a 7300 Series Subwoofer with 9301**

Before cabling, turn off the power on all monitors and subwoofers. 7300 series subwoofers have one (stereo) input for AES/EBU digital audio, so a 9301 Multichannel AES/EBU Interface is needed to expand the AES/EBU connectivity of the subwoofer. An example of the audio cabling for AES/EBU digital audio is shown in Figure 8. An example of an AES/EBU digital audio surround cabling with 7300 series subwoofer and 9301.

Connect the following XLR digital audio cables:

Left/Right channel pair

- From the AES/EBU output of the audio source to the 9301's 'AES IN 1' connector.
- From the 9301's 'AES OUT 1' to the right monitor 'DIGITAL IN'.
- From the right monitor 'DIGITAL OUT' to left monitor 'DIGITAL IN'.

Surround Left/Right channel pair

- From the AES/EBU output of the audio source to the 9301's 'AES IN 2' connector.
- From the 9301's 'AES OUT 2' to the surround right monitor 'DIGITAL IN'.
- From the surround right monitor 'DIGITAL OUT' to surround left monitor 'DIGITAL IN'.

Centre/LFE channel pair

- From the AES/EBU output of the audio source to the 9301's 'AES IN 4' connector.
- From the 9301's 'AES OUT 4' to the centre monitor 'DIGITAL IN'.

Sum signal

- From the 9301's 'SUBWOOFER LINK' output to the 7300 series subwoofer 'DIGITAL IN' connector.

**NOTE: The AES/EBU digital input mode on the 73xx subwoofer must be set to 'Used with 9301' mode on GLM's Group page. See 'Digital Input chapter for more details.**

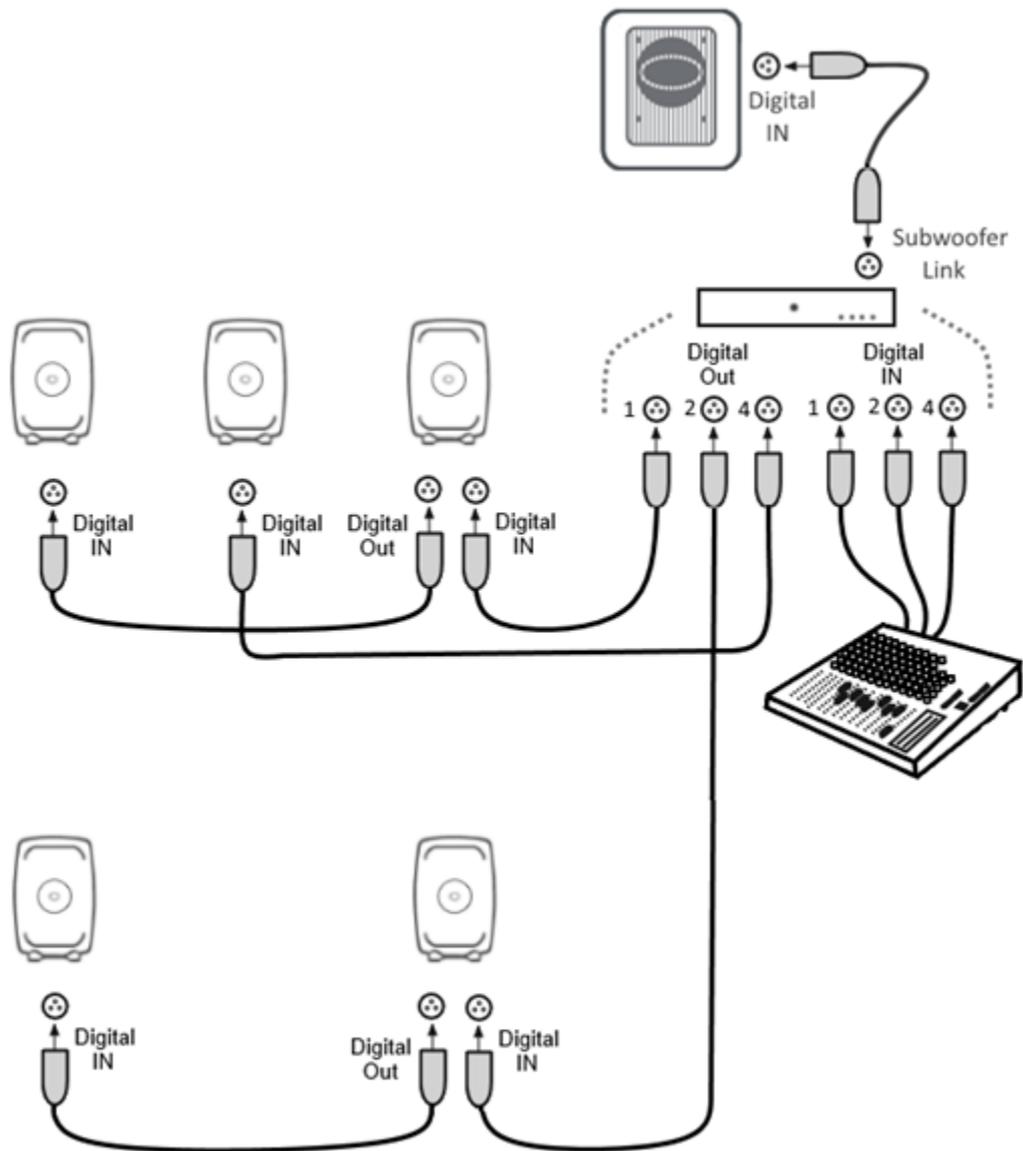


Figure 8. An example of an AES/EBU digital audio surround cabling with 7300 series subwoofer and 9301.

#### 4.2.9 Digital Audio 5.1 with 7200 Series Subwoofer

Before cabling, turn off the power on all monitors and subwoofers. An example of the audio cabling for AES/EBU digital audio is shown in *Figure 9*. Any cable carrying the LFE channel can only be connected to the subwoofer input 4.

Connect the following XLR digital audio cables:

Left/Right channel pair

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT1' connector.
- From the subwoofer 'DIGITAL OUTPUT1' to the right monitor 'DIGITAL IN'.

- From the right monitor 'DIGITAL OUT' to left monitor 'DIGITAL IN'.

#### Surround Left/Right channel pair

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT 2' connector.
- From the subwoofer 'DIGITAL OUTPUT 2' to the surround right monitor 'DIGITAL IN'.
- From the surround right monitor 'DIGITAL OUT' to surround left monitor 'DIGITAL IN'.

#### Centre/LFE channel pair

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT 4' connector.
- From the subwoofer 'DIGITAL OUTPUT 4' to the centre monitor 'DIGITAL IN'.

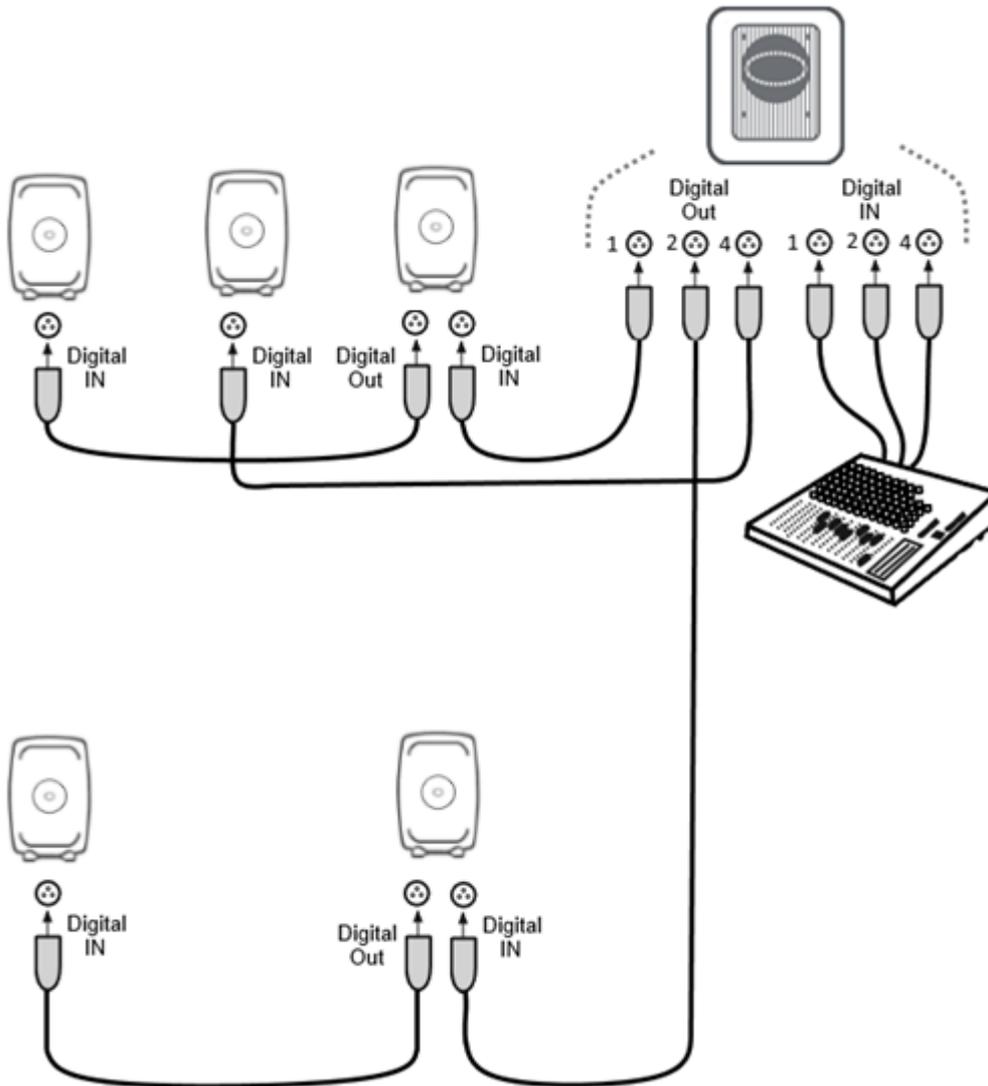


Figure 9. An example of an AES/EBU digital audio surround cabling with 7200 Series subwoofer.

#### 4.2.10 Digital Audio, Stereo with a SE7261 Subwoofer

Before cabling, turn off the power on all monitors and subwoofers. An example of the audio cabling for AES/EBU digital audio is shown in Figure 10. Note that the AES/EBU digital audio channels reproduced must be selected on each monitor. The figure below also shows the DIP switch positions for the required A or B channel selection.

Connect the following XLR digital audio cables:

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT 1' input connector.
- From the subwoofer 'DIGITAL OUTPUT' to the right monitor 'DIGITAL IN'.
- From the right monitor 'DIGITAL OUT' to left monitor 'DIGITAL IN'.

Select the following digital audio channels for the monitor:

- On the left monitor turn ON digital audio channel A.
- On the right monitor turn ON digital audio channel B.

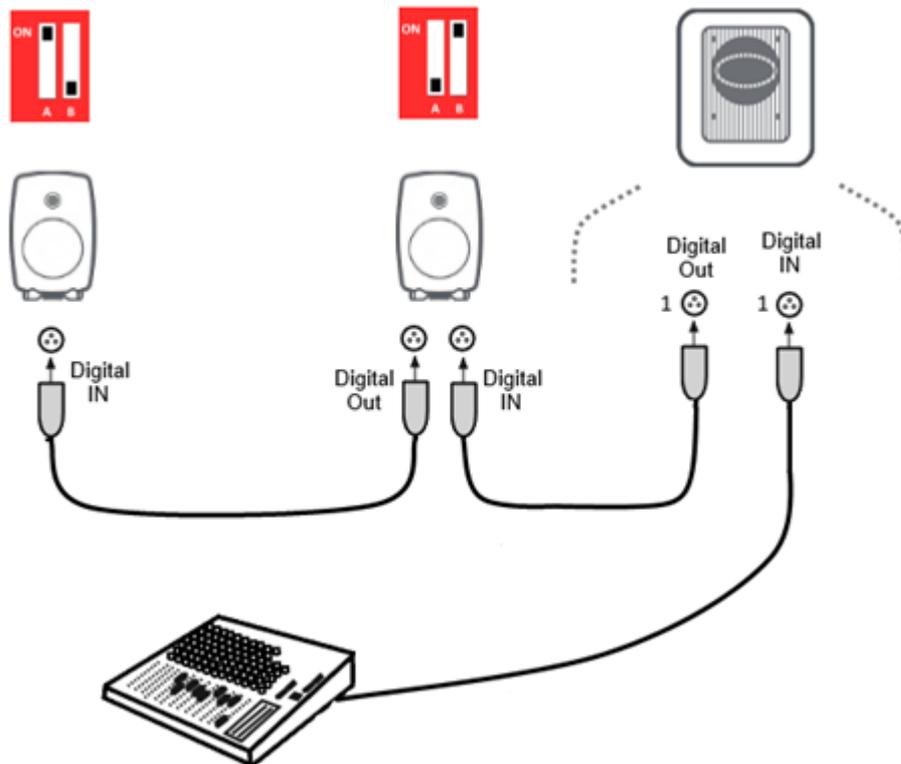


Figure 10. An example of an AES/EBU digital audio stereo cabling with SE7261 and digital channel selections for each monitor.

#### 4.2.11 Digital Audio 5.1 with a SE7261 Subwoofer

Before cabling, turn off the power on all monitors and subwoofers. An example of the audio cabling for AES/EBU digital audio is shown in Figure 11.

Connect the following XLR digital audio cables:

Left/Right channel pair

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT 1' connector.
- From the subwoofer 'DIGITAL OUTPUT 1' to the right monitor 'DIGITAL IN'.
- From the right monitor 'DIGITAL OUT' to left monitor 'DIGITAL IN'.

Surround Left/Right channel pair

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT 2' connector.
- From the subwoofer 'DIGITAL OUTPUT 2' to the surround right monitor 'DIGITAL IN'.
- From the surround right monitor 'DIGITAL OUT' to surround left monitor 'DIGITAL IN'.

#### Center/LFE channel pair

- From the AES/EBU output of the audio source to the subwoofer 'DIGITAL INPUT 4' connector.
- From the subwoofer 'DIGITAL OUTPUT 4' to the center monitor 'DIGITAL IN'.

Select the following digital audio channels for the monitor:

- On the left monitor turn ON digital audio channel A.
- On the right monitor turn ON digital audio channel B.
- On the surround left monitor turn ON digital audio channel A.
- On the surround right monitor turn ON digital audio channel B.
- On the centre monitor turn ON digital audio channel A.

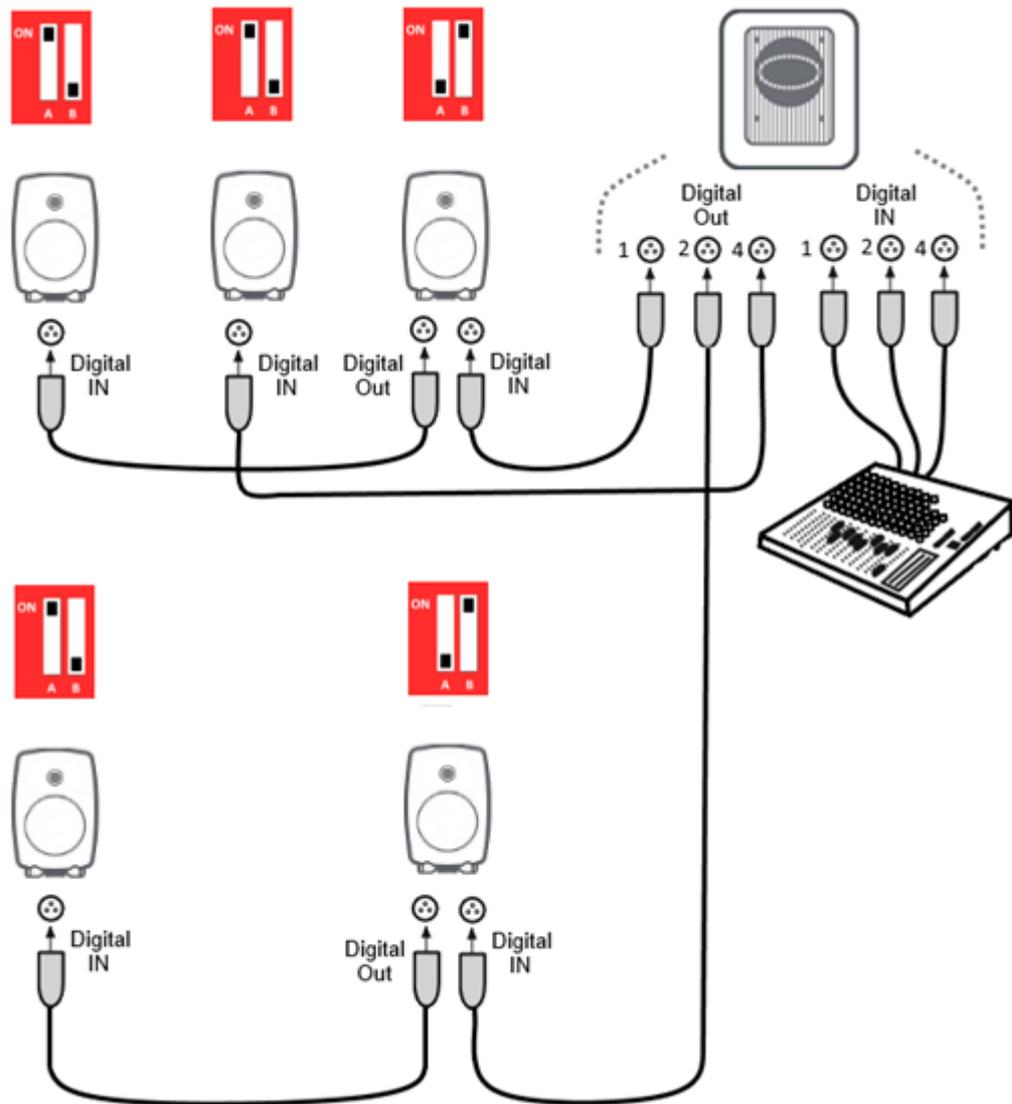


Figure 11. An example of an AES/EBU digital audio surround cabling with SE7261 and digital channel selections for each monitor.

### 4.3 Cabling the GLM Management Network

The GLM Management Network cabling gives GLM software visibility of and access to all the monitors and subwoofers in your setup. Genelec recommends having the GLM Management Network always connected.

Connect the 9320A SAM Reference Controller or GLM Adapter (8300-416) to the computer USB port using the supplied USB cable. Avoid having to go through a USB hub, if possible.

**NOTE: Only one 9320A SAM Reference Controller or GLM Adapter can be connected to any single GLM Management Network.**

Connect the network cable – starting from the 9320A SAM Reference Controller or GLM Adapter – to all SAM Monitors and Subwoofers in a daisy-chain fashion (Figure 12). A network cable is packaged with each monitor and subwoofer. You can connect the cables in any order, just be sure to make a connection to all monitors and subwoofers.

**NOTE: Connect a network cable from the last monitor to the GLM Adapter/9320A SAM Reference Controller 'Terminator' connection when the total management network cabling length is greater than 100 m (300 ft) and you have more than 10 monitors and subwoofers on the network, or if you experience communication problems.**

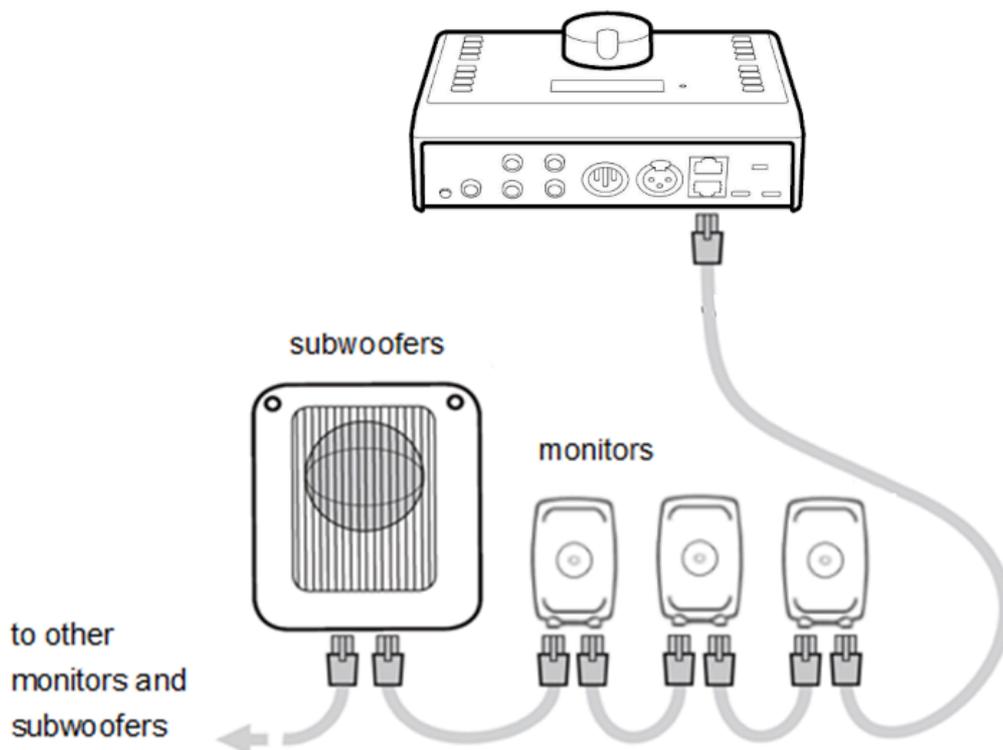


Figure 12. 9320A SAM Reference Controller with GLM network connectors.

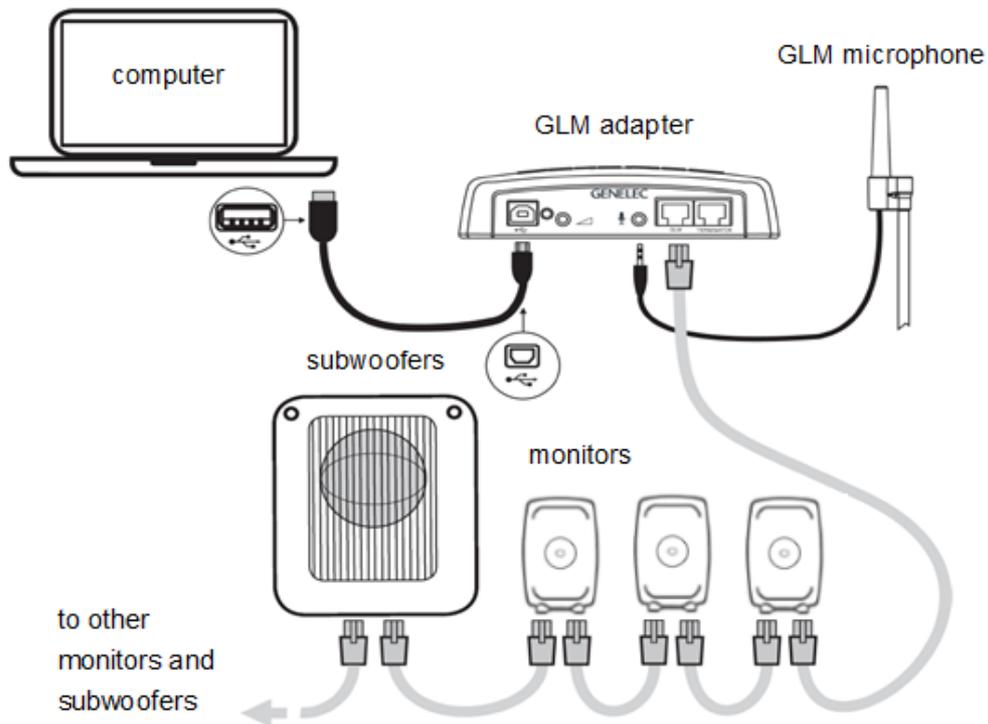


Figure 12. Connections of GLM Management Network, measurement microphone and computer.

Table 1. Connections on the GLM Network Adapter (from left to right).

Connector	Use
USB (type B)	Connects the GLM Network Adapter to a computer USB interface on your computer or to a USB power supply for stand-alone volume control applications.
Volume (3.5 mm jack)	Connection for Genelec Volume Controller.
Microphone (3.5 mm jack)	Connection for Genelec Measurement/Reference Microphone.
GLM Network (RJ45)	GLM Management Network connection to monitors and subwoofers.
Terminator (RJ45)	Return termination of the GLM Management Network. Connect from the last monitor when the total network cabling length is greater than 100 metres.

## 4.4 Downloading and Installing GLM Software

The GLM software is needed to set up, calibrate and manage Genelec SAM Monitoring systems. The software can be downloaded at <https://my.genelec.com/>.

Once logged in to MyGenelec, look for GLM under the 'Software' section.

To download GLM software, you must register an account on the MyGenelec customer portal. You will be asked to give your email address and some contact information. The MyGenelec portal helps you take full advantage of your Genelec system, unifies product registration and helps you get software services, documentation and support in a single location – providing a simple-to-use central point for accessing all our customer services.

You need the rights to install the GLM software on your computer. Follow the instructions given during the installation process. We recommend that you install the software on your local computer hard drive instead of, for example, on cloud-based storage. The default installation process of GLM does this automatically.



Figure 13. GLM software download.

GLM requires an Internet connection.

- The Internet connection is used for automatic system calibration calculations (GLM AutoCal and WooferCal) on the Genelec Cloud.
- Checking for updates to GLM software, including updates to firmware for any of your Genelec SAM Monitors, Subwoofers or other devices.
- Access to the Measurement Microphone calibration and other system calibrations.

GLM AutoCal has been continually improving since its introduction in 2006. Using the Genelec Cloud service ensures you always have access to the newest, most up-to-date algorithms and tools for calibrating your SAM Monitoring system.

## 4.5 Selecting the GLM theme and language

GLM offers a light theme and a dark theme. This is selected on the top menu item 'Settings'.

GLM offers multiple GUI language options. These are selected on the top menu item 'Settings'. At the time of writing, these language options are available:

- English (default)
- Chinese
- Finnish
- French
- German
- Italian
- Japanese
- Korean
- Portuguese
- Spanish

## 4.6 Downloading and Installing Local AutoCal calibration

Genelec Cloud is the default calibration method in GLM software. Genelec recommends using the Genelec Cloud for AutoCal as this offers the most accurate calibration.

If you run a computer that is never connected to the Internet, it is possible to install a local version of GLM AutoCal system calibration – with reduced performance – on your computer. However, Genelec discourages this because calibration installed on a local computer does not get regular improvements automatically in the same way as the Genelec-Cloud-based GLM AutoCal calibration does.

### 4.6.1 Install GLM software

Firstly, install GLM software – as the Local AutoCal package does not work without GLM.

GLM software calibrates and controls Genelec SAM Monitoring systems. The software can be downloaded from <http://my.genelec.com/>. Look for the 'Software' section and find GLM.

In order to access MyGenelec and download GLM, you will need to create a MyGenelec account and provide a small amount of personal information. This is very useful as it enables Genelec to support you later.

You must have sufficient rights to install the software on your computer. Install the package using the defaults in the installation package. Do not modify the install directory as this will prevent correct operation. Install the software following the instructions given by the software during the installation process. We recommend you install the software on the local hard drive. There is no need to make any special destination folders, GLM creates these automatically.

**NOTE: WooferCal will only work on the Genelec Cloud.** WooferCal is the method of calibrating Adaptive Woofer Systems.

### 4.6.2 Update 'Mic Serial' Measurement Microphone calibration data

The Local AutoCal needs a Measurement Microphone calibration file for the most accurate calibration result. To obtain the microphone calibration file for your microphone, take the following steps:

- Enter the microphone serial number in 'Mic Serial' field. Normally this is factory-installed in the 9320 SAM Reference Controller or GLM Network Adapter.
- Ensure that the 'Local AutoCal' mode is selected in GLM.
- Ensure that the computer is connected to the internet for the next step: run AutoCal **once** by clicking on 'Start Calibration'. For this step, have at least one SAM Monitor on the GLM Network and have the GLM Measurement Microphone connected to the 9320A SAM Reference Controller or GLM Network Adapter. This primes the local calibration process, accessing the correct microphone calibration data on your computer.

After having done this, you can continue running Local AutoCal without an internet connection.

If your computer cannot be connected to the Internet even temporarily, please contact Genelec customer service (<https://support.genelec.com/hc/en-us/requests/new>) and request your GLM measurement microphone calibration file for local installation of GLM. We will email the file to you. Then, replace the field <your\_username> with your actual username.

Copy the microphone calibration file into this folder on a Mac OS computer:

/Users/<your\_username>/Documents/Genelec/GLM4/DSP/Microphone

Copy the microphone calibration file into this folder on a Windows computer:

C:\Users\<your\_username>\Documents\Genelec\GLM4\DSP\Microphones

After this you can run the Local AutoCal calibration without a connection to the internet.

### **4.6.3 Using Local GLM AutoCal**

Once the local AutoCal Package has been installed, the 'Local AutoCal' option becomes selectable. When you enter the AutoCal calibration, look for the 'Local AutoCal' selection. Once the Local AutoCal has been selected, continue creating the Layout normally.

Only select the Local AutoCal option if the computer cannot ever be connected to the internet – even temporarily. When you run Local AutoCal there is no way for Genelec to offer you updates to the software, including the Local AutoCal calculation algorithms. This may cause issues if you later install new devices or loudspeakers that are not supported by your GLM version. Also note that not all capabilities are available using the Local AutoCal method.

## 5 Creating a System Layout and Calibrating a System

Before launching the GLM software after installation, stop or mute the audio source and ensure that all monitors and subwoofers are connected to the GLM network and powered on.

The steps to create a GLM System Setup with a system layout and calibration are

1. Create a SAM monitoring system layout.
2. Define SAM monitoring group.
3. Run GLM AutoCal / WooferCal automatic calibration (WooferCal is only available when an Adaptive Woofer System is included in a group).
4. Run GLM AutoPhase automatic phase calibration for subwoofers (AutoPhase is only available when a subwoofer is included in a group).

For additional groups, repeat steps 2 - 4.

### 5.1 Creating a SAM Monitor Layout

To create a layout, all monitors, subwoofers and woofer systems must be powered on and GLM network connections must be made.

A layout defines your monitors and their locations in the room. An example in Figure 14 shows a stereo system with a subwoofer.

A new system layout is created when the GLM user interface starts for the first time. You can always create a new layout by selecting the 'File | New' menu item.

When creating a new layout, all monitors, subwoofers and woofer systems are initially stacked in the '**UnPlaced**' cell on the left side of the page.

Select a large enough layout grid to place all your monitors. Use '**Layout Style**' to change and select a placement template. If you do not find a template suiting your system, select a grid size that has a place for all monitors, subwoofers and woofer systems.

The '**Reset Layout**' button clears the layout grid and sends all the monitors and subwoofers back to the 'UnPlaced' cell. This allows you to do the placement again from the start.

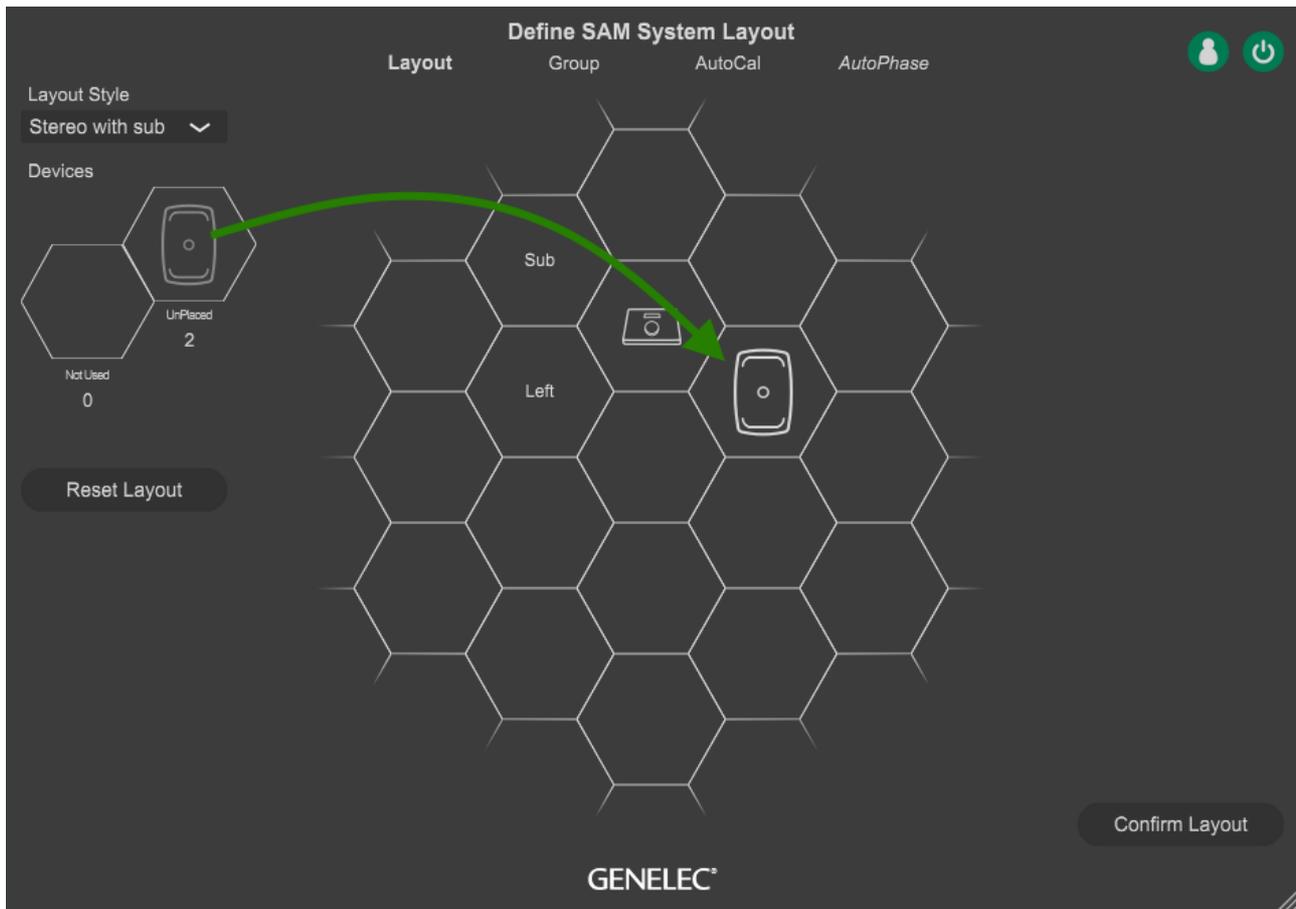


Figure 14. Drag and drop the monitor icons onto the layout grid to build a system layout.

To make a placement, drag a monitor or subwoofer icon from the stack to the layout grid on the right and drop it to the position that matches its position in the room. If you know that a certain monitor or subwoofer is not intended to be a part of the current layout, drag and drop this monitor or subwoofer to the **'NotUsed'** cell.

Continue dragging and dropping until the **'UnPlaced'** cell is empty.

**Note:** Monitors and subwoofers are automatically named when you place them, by their location information. For example, when the monitor is dropped on the left side, it is named as 'Left 8330A'. If a monitor has AES/EBU digital input it will also be assigned the default AES/EBU subframe to be reproduced in the digital group, for example, when the monitor is dropped to the left side, it is assigned to subframe A.

When you place monitors at symmetrical positions in the grid, the acoustic calibration of these monitors is done assuming acoustical symmetry. For example, when Left and Right monitors are placed symmetrically to the grid (see Figure 15) and the 'Symmetrical' calibration mode is set on the acoustic calibration page, the Left/Right monitor pairs are set to the same Calibration Group ID and will then receive the same room compensation filter designs at mid and high frequencies.



Figure 15. An example of completed placement showing an empty 'UnPlaced' monitor stack.

When dragging the icon with the mouse, the monitor will play an identification tone and flash its front panel LED. These identification tones depend on the SAM device type, so the tones may vary between devices in the same setup.

After all monitors and subwoofers have been moved to the layout, click on 'Confirm Layout' to continue. The additional cell, 'Not Used', can be used as a placement for those monitors or subwoofers that are not used in the current Setup.

For example, an SE7261 subwoofer can support up to 8 x 8130 monitors. The system setup for the SE7381 starts with eight SE channels on the Stack. They are labelled 1A, 1B, all the way through to 4B. However, if your SE system only has two actual channels being used, for example in input/outputs 1 for stereo (1A and 1 B), you would take the remaining six (2A through 4B) off the 'UnPlaced' cell stack and place them into the 'Not Used' cell bin.

Any SAM Monitor that you place into the 'Not Used' cell bin (Figure 16) is not a part of the current Setup and is not available for creating other Groups. To start using these, create a new Setup using the 'File | New' menu item, making all monitors available in the 'UnPlaced' cell.

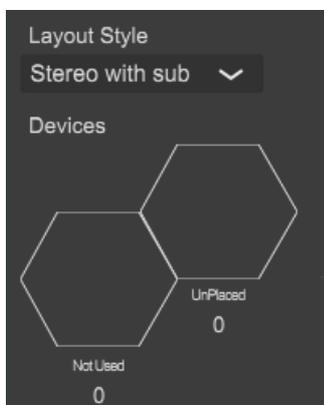


Figure 16. Location of the 'Not Used' bin.

## 5.2 Creating a SAM Monitor Group

A Group Preset is a set of monitors and subwoofers that reproduce audio together. A Group Preset contains input and acoustic settings to optimise all monitors and subwoofers active within the Group. More Group Presets can be created to fulfil any need, for example, to calibrate the system to another listening position.

To define a monitoring Group:

1. Give the Group a name that describes it (e.g. Analogue Stereo).
2. Optionally, you can set the System delay. It will be applied to all monitors and subwoofers in the Group.
3. Select and check the used Bass Management crossover frequency. This setting can be global, in which case all monitors follow the crossover selection from below. If the setting is applied individually, then crossover selections will be done separately for each monitor via a settings popup.
4. Select the input mode (The digital channel can be changed from the Settings popup by clicking a monitor icon).
5. Set the Group sensitivity to match levels between Group Presets or to reduce system sensitivity.
6. Select the optional Extended Phase Linearity setting – available for The Ones monitors (8331A, 8341A, 8351B and 8361A).
7. The Settings popup will pop up when the monitor icon is clicked.
8. Name the monitor.
9. Make a monitor active or inactive within the group. Inactive monitors are indicated visually in the software by a light grey colouration.
10. Select an input to be used.
11. Monitors at symmetric left-right positions in the grid receive the same Calibration Group ID. Monitors sharing the same ID number are calibrated as a symmetric group.
12. A light grey icon indicates the monitor is inactive within the Group state (fully inactive monitors will be hidden on other pages).
13. A normal icon indicates the monitor is active within the Group state.
14. Confirm the Group settings by clicking on the 'Confirm Group' button.

For more detailed information on using and setting up Groups, see the section 'GLM Advanced Use'.

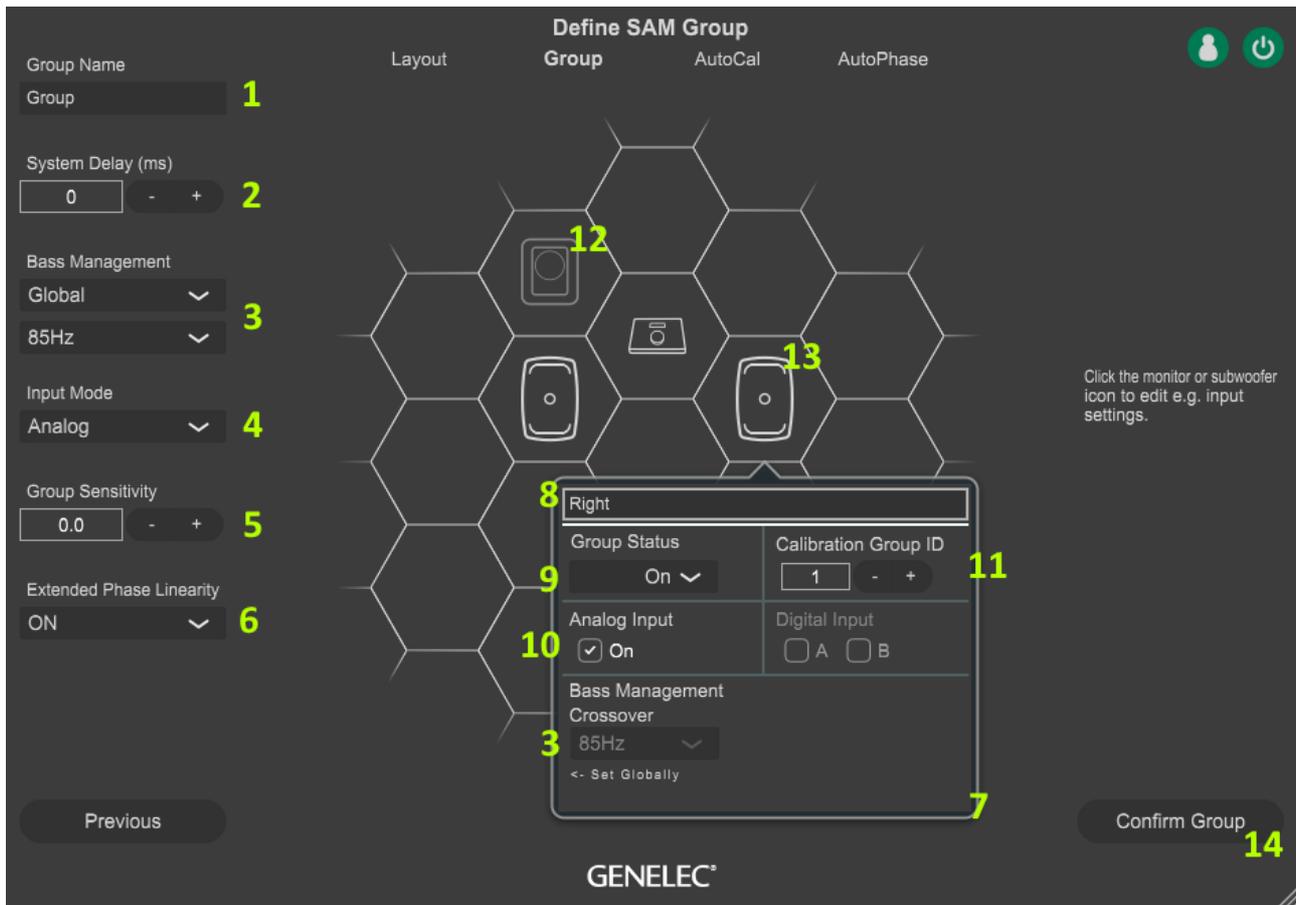


Figure 17. Steps to define group settings.

### 5.3 Automatic Calibration Using GLM AutoCal

GLM AutoCal is a powerful SAM Monitoring system calibration algorithm running on the Genelec Cloud. Sweeps are generated by each monitor in a group. Responses are recorded into your computer with the GLM Measurement Microphone.

**NOTE:** Calibrating Adaptive Woofer Systems requires some additional steps, please see next chapter.

The algorithm analyses the sweeps and calculates the frequency responses for all monitors and subwoofers, then optimises level and delay to compensate for differences between monitors and sets equalisation for the individual room responses to remove colourations caused by the room and the monitor placements within it. The result is to have the sound from all monitors arriving at the listening position at the same time, same level, and compensated for the effects of the room acoustics, for very accurate imaging and reliable monitoring.

Each monitor Group has its own acoustic settings. This is one of the important features of GLM.

Each setup file can contain several preset definitions. Each monitoring Group can have different AutoCal calibrations.

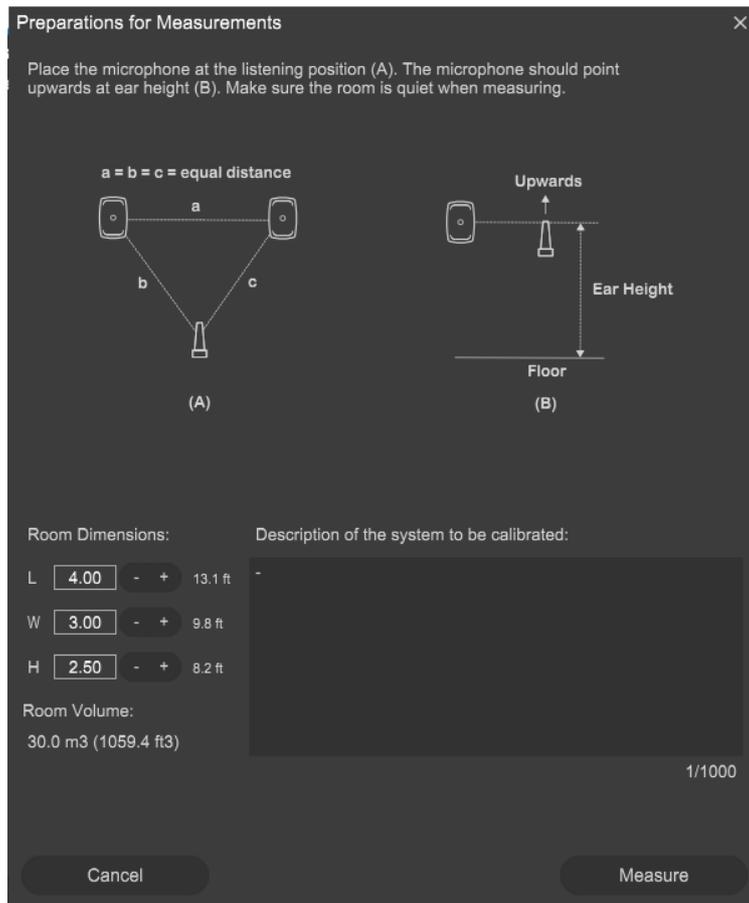
Even for the same set of monitors you can have several calibrated listening positions. To do this, define each position as a new Group Preset and then calibrate each preset separately. For

example, one group could be 'Engineer Position' and another 'Producer Position' – each having its own calibration. Then, to quickly load settings for each position, select a Group in GLM and this will load all the acoustic settings specific to this calibrated position.

To calibrate a monitoring group:

1. Check the serial number of the Measurement Microphone. Each specific Measurement Microphone calibration file is stored in the software.
2. Select the calibration mode. The calibration mode can be either single-location measurement (SinglePoint™) or measurements at multiple locations (MultiPoint™). Select the Symmetrical EQ when a Left/Right pair of monitors should receive the same calibration filters. The Individual EQ is useful for asymmetric setups – an extreme example of this could be when one monitor is in a corner and the other is free-standing. For the symmetric filter to be applied, monitors must share the same Calibration Group ID. The monitors that have the Calibration Group ID set to 'None' or are not sharing the same ID with any other monitor, will be handled as individual monitors and will get individual calibration.
3. Select the AutoCal algorithm you want to use to optimise. Cloud AutoCal 2 is the default method, and it is also the fastest and most accurate method. Cloud AutoCal 2 uploads your measurement data to the Genelec Cloud for optimisation, and the calculations are always done on Genelec Cloud using the newest AutoCal algorithm. Local AutoCal selection is available after the Local AutoCal calculation package has been installed. That is a separate download available on MyGenelec. **Please note that the cloud-based AutoCal 2 is highly recommended as it always uses the latest and most advanced algorithms.**
4. Click on the 'Start Calibration' button to start the measurement and follow the instructions in the dialogue windows.
5. Connect the Measurement Microphone to the GLM Network Adapter and place the microphone at the listening position. The microphone must point upwards. Adjust the top of the microphone to be at the listener's ear height. Enter the dimensions of your room and a description of the system to be calibrated. If you want a GRADE™ Report to be generated after the calibration (available for logged-in users), check the 'Generate GRADE Report' checkbox. If you cannot select the GRADE Report, go to the main window of GLM and log

in to Genelec Cloud using your credentials, then return to calibration. Click the 'Measure' button to start the measurement.



- All monitors and subwoofers will be measured.
  - When MultiPoint™ is selected, additional measurements are taken for each additional position. Move the microphone to each position and start a measurement.
  - Once all measurements are completed, the optimisation starts.
  - Wait until the optimisation has finished.
  - After this, the calibration results of each monitor can be viewed by clicking on any monitor icon.
6. Click 'Confirm Calibration' button to save these settings into a setup file.

If you also have a subwoofer in the group, the next step of the setup process is the automatic adjustment of the subwoofer phase (AutoPhase™ page). If you have W371 Woofer Systems in your group these will be calibrated in a separate stage, on the WooferCal™ page.

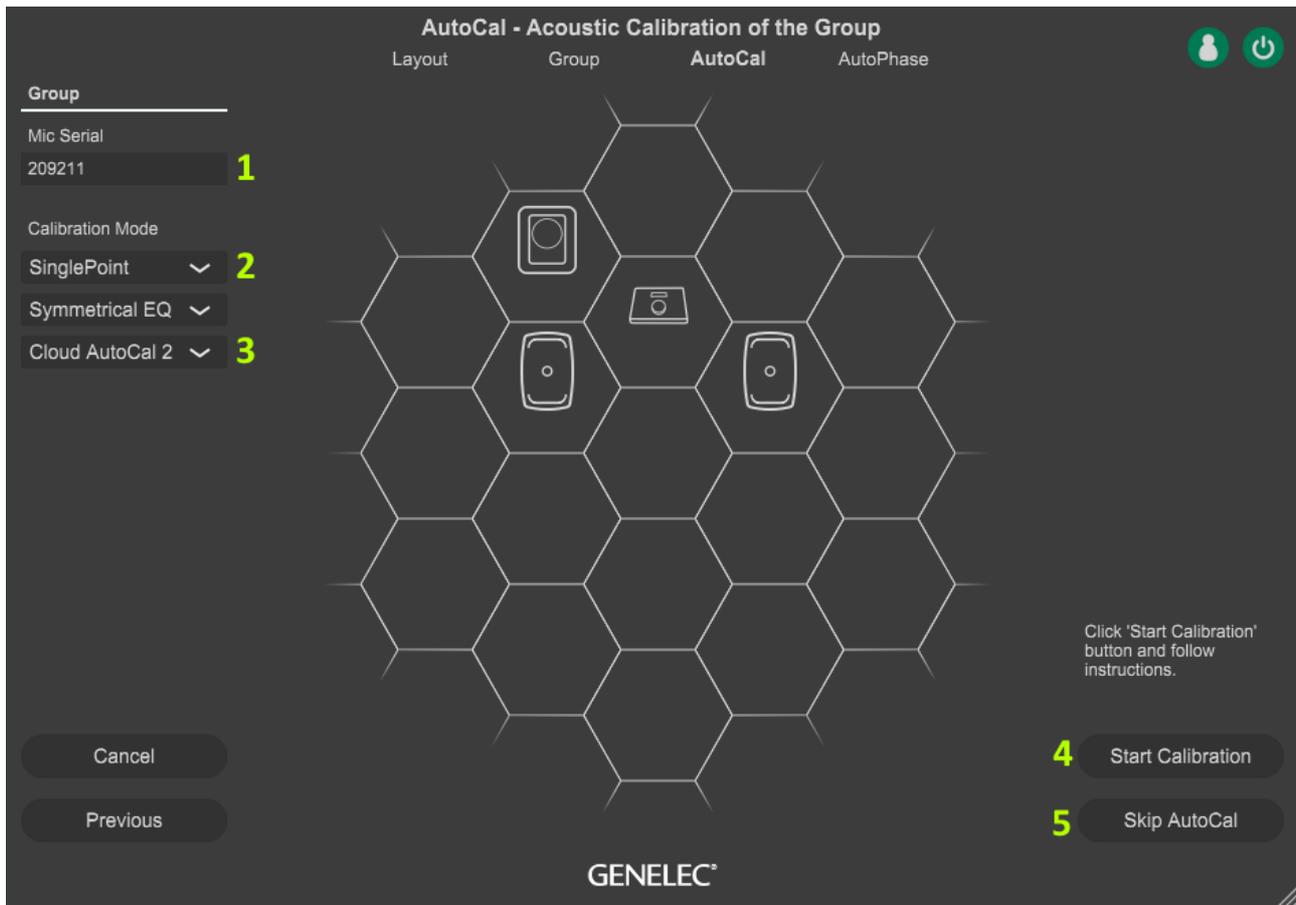


Figure 18. Steps in running the AutoCal automatic system calibration process.

See section [Advanced use of AutoCal](#) for more detailed information on the calibration process.

## 5.4 Automatic Calibration of the Adaptive Woofer System GLM WooferCal

For a system containing Adaptive Woofer Systems (WS), the first part of the calibration (calibrating the main monitor) is the same as that shown in 'Automatic Calibration Using GLM

Once that process has finished (providing WS are active in the group), you will be directed to the Adaptive Woofer System calibration page.

1. The first step is to pair the monitors to the respective stands. This is done by first single-clicking on the stand and then single-clicking on the monitor it should be paired with. This process is repeated for all Woofer-System-plus-monitor pairs in the Group. Once paired, the pairing will continue to other Groups.
2. Check the serial number of the Measurement Microphone. Each specific Measurement Microphone calibration file is stored in the software.
3. Select the calibration mode. The calibration mode can be either single-location measurement (SinglePoint™) or measurements at multiple locations (MultiPoint™). Select the Symmetrical EQ when a Left/Right pair of monitors should receive the same calibration filters. The Individual EQ is useful for asymmetric setups. An extreme example could be when one monitor is in a corner and the other is free-standing. For the symmetric filter to be

applied, monitors must share the same Calibration Group ID. The monitors that have the Calibration Group ID set to 'None' or are not sharing the same ID with any other monitor, will be handled as individual monitors and will get individual calibration.

4. The adaptive woofer calibration mode is selected by using the drop-down menu. This selects between Complementary, Continued Directivity or one of the three null direction modes. One calibration mode can be selected for a Group. The calibration modes available may vary depending on the monitor design.
5. Select the AutoCal algorithm you want to use to optimise. Cloud AutoCal 2 is the default method. It is also the fastest and most accurate method. Cloud AutoCal 2 uploads your measurement data to Genelec Cloud for optimisation and the calculations are always done on Genelec Cloud using the newest AutoCal algorithm. **Please note that The WooferCal algorithm is only available on the Genelec Cloud.**
6. The parameters for setting the search limits for the crossover to the main monitor should then be set. These controls are available for all modes except the Continued Directivity mode, where the crossover value is fixed based on the main monitor connected in the pairing. This crossover has been set to where the main monitor and Adaptive Woofer System have the closest matched directivity.

The default setting (150Hz to 250Hz) should be suitable in most conditions, however, when listening at particularly short distances, if the monitor is separated from the Adaptive Woofer System (i.e. not mounted directly on top) or the WS is visually blocked by obstruction (such as a large mixing desk), it may be beneficial to reduce the upper crossover limit. Listening should be used to determine if this is needed.

The crossover setting used will apply to all Adaptive Woofer Systems and main monitor pairs active within the Group.

7. Connect the Measurement Microphone to the GLM Network Adapter, place the microphone at the listening position – at ear height – and click on the 'Start Calibration' button to start the measurement, then follow the dialogue instructions.
  - All Adaptive Woofer Systems and monitors will be measured.
  - Optimisation starts.
  - Wait until optimisation is finished.
  - The calibration results can be viewed by clicking any monitor icon.
8. Click 'Confirm Calibration' button to accept and save the calibration into the setup file.

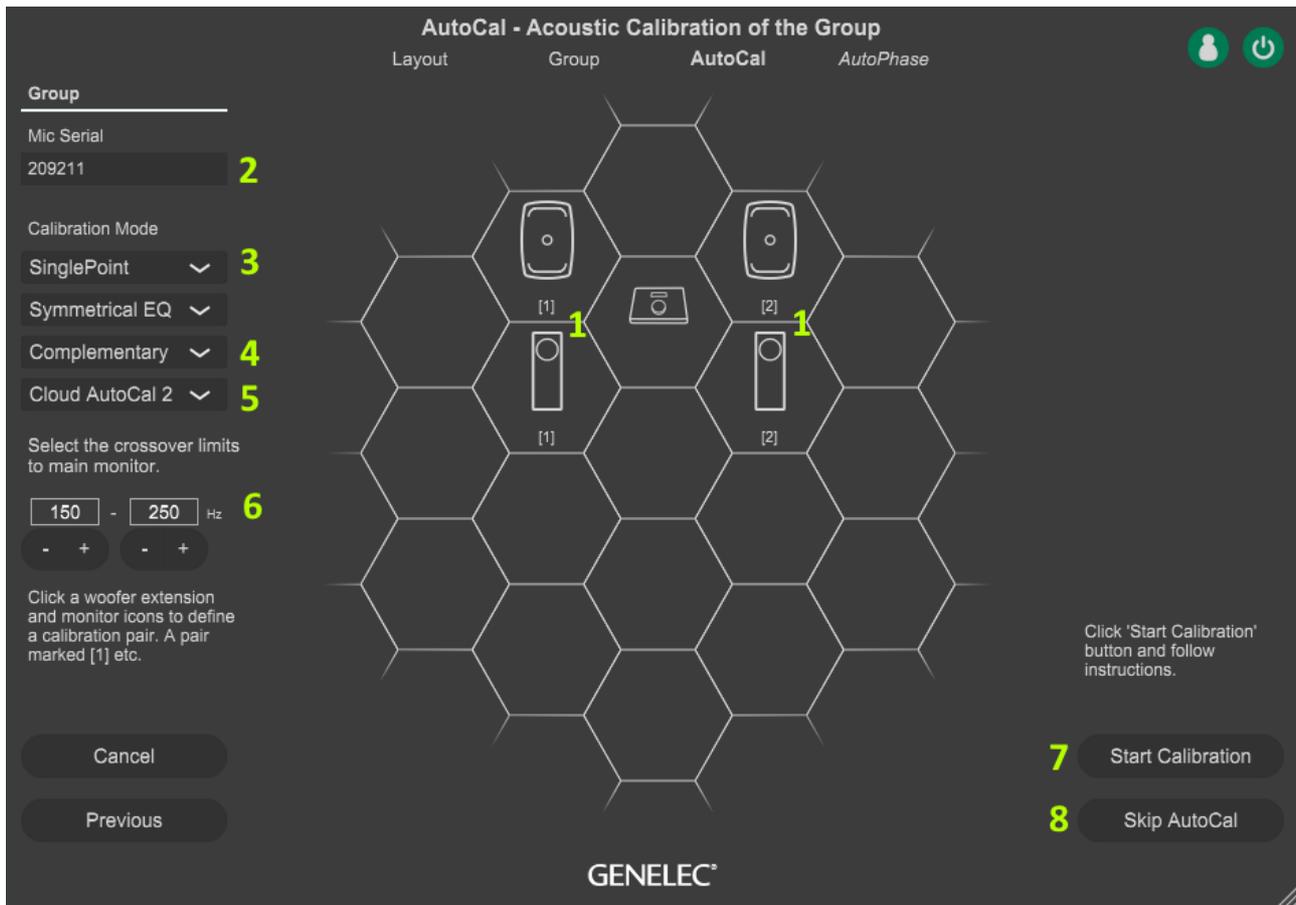


Figure 19. Adaptive Woofer System calibration.

### Description of the different operating modes:

The Woofer System has 5 different calibration modes: Complementary, Continued Directivity and three null modes.

#### Complementary:

In this mode, the two drivers within the W371 unit are measured individually, and the operating range of each individual unit determined by evaluating the quality of the responses – with the driver having the best response quality chosen to operate in that range.

The other modes of operation are directivity control modes, where pre-determined filter sets are recalled that have been designed to make set directivity patterns based on phase and amplitude manipulation of the individual units.

#### Continued Directivity mode:

In this mode, a constant horizontal directivity pattern is held as far down in frequency as possible (in this case to 50Hz). The x-over frequency to the monitor is selected based on the monitor paired, to ensure a matched directivity pattern.

### Back, side and floor reduction modes.

The 3 remaining modes of operation locate a null in the woofer system response to a certain direction. In these modes, individual filter sets are recalled to provide directivity patterns that have been optimised to provide reduced output (i.e. null) in the direction of primary reflections from the floor, back wall (behind the speaker) or side wall.

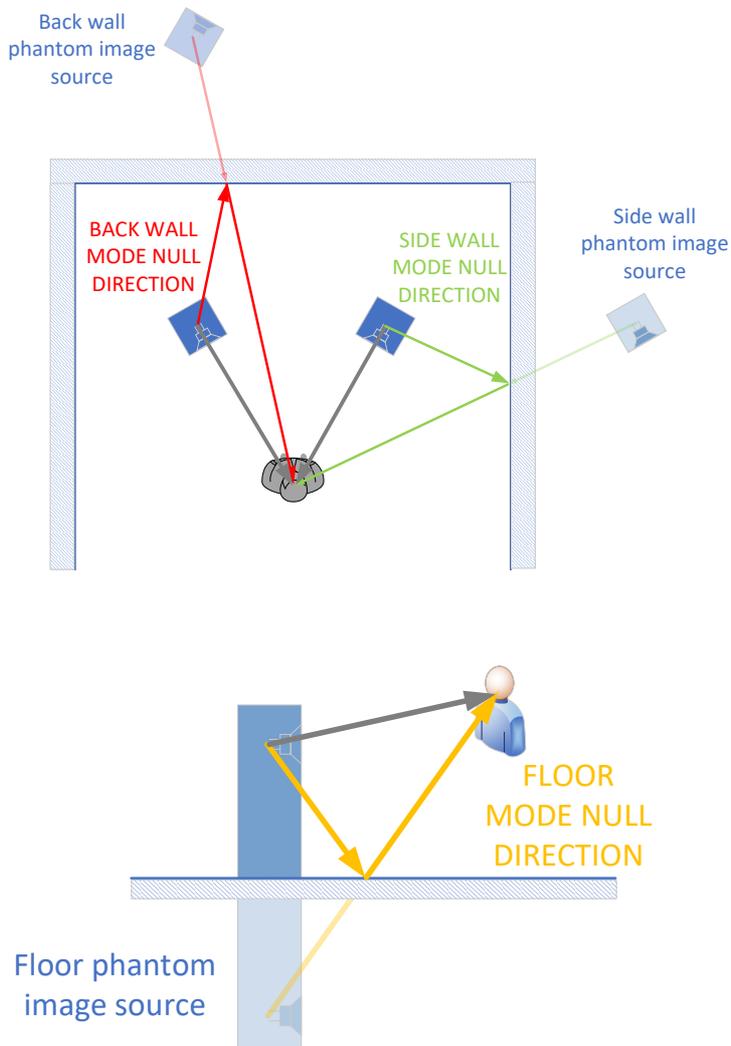


Figure 20. Diagram showing the maximum null location angles for the individual modes\*.

\* Diagram only shows the angle of maximum attenuation, however attenuation outside of these angles is also given in the contour plots in the Woofer System operating manual.

Contour directivity plots for all the directivity modes can be found in the Woofer System operating manual.

## 5.5 Aligning Subwoofer Phase with GLM AutoPhase

The purpose of GLM AutoPhase is to set the subwoofer phase correctly at the crossover frequency in relation to a selected monitor so that the combined response of the subwoofer-monitor system is flat across the crossover frequency region.

When Bass Management is set to 'Full band', you have no crossover to a subwoofer and AutoPhase cannot calibrate phase. Then, manual calibration or some other calibration method must be used. Even then, AutoCal sets the subwoofer frequency response flat and aligns the subwoofer gain.

The steps to run AutoPhase automatic subwoofer phase calibration include the following:

1. Define the monitor to be aligned with the subwoofer by single clicking on the subwoofer icon first and then the monitor icon. This is done for each subwoofer in the group. If there are several subwoofers in the group, associate every subwoofer with a monitor before proceeding to the AutoPhase calibration. The 'Pair' text with number will show the paired subwoofer and monitor.
2. Connect the Measurement Microphone to the GLM Adapter, place the microphone at the listening position, at ear height, and start the AutoPhase measurement process by clicking on the 'Start Calibration' button. Wait until the AutoPhase calibration is completed.
3. Click 'Confirm Calibration' button to accept and save the calibration into the setup file.

If there are several subwoofers in the group, AutoPhase will move to the next subwoofer automatically and continue until all subwoofers have been aligned for phase.

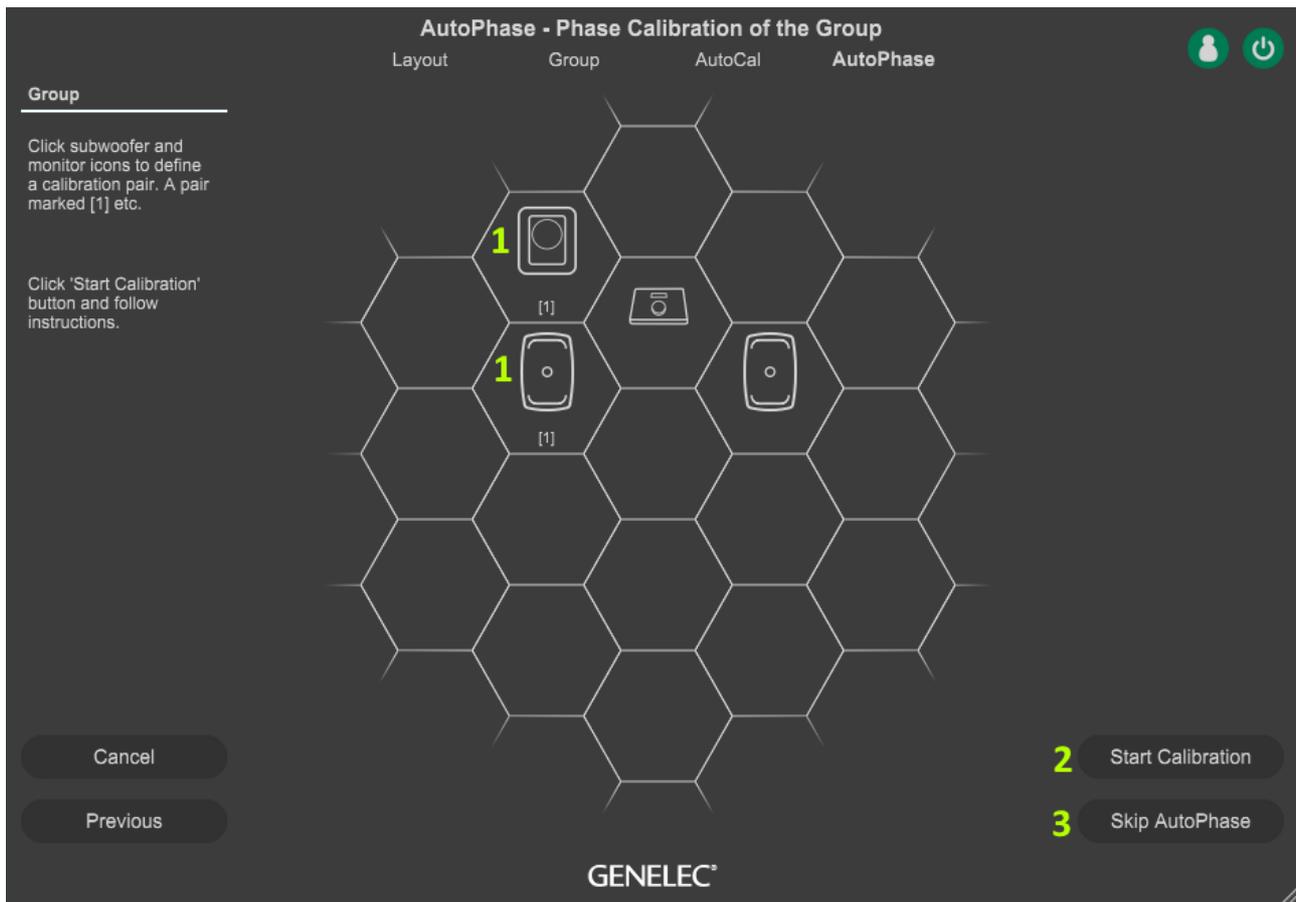


Figure 21. Steps in running the AutoPhase automatic phase calibration process.

For more detailed information, see the section on [Advanced use of AutoPhase](#).

## 6 Basic Use of GLM

The main page of GLM software offers the basic monitoring system controls (Figure 22):

1. System level.
2. Mute, mute all.
3. Dim (-20 dB).
4. Standard loudness SPL level (calibration from 'Group Preset : Standard Loudness SPL Calibration' menu item).
5. Level preset selections. To set, adjust the system level at desired level and click 'Group Preset : Set Preset Levels : Set Current Level to Preset 1.
6. 'Bass Man' will bypass the Bass Management crossover filter. Subwoofers will mute and monitors will play full band.
7. The GLM AutoCal status is indicated on the 'Calibrated' button. This button also allows temporary disabling or bypass of the system acoustic calibration settings by pressing the 'Calibrated' button.
8. Monitor click mode. Select what happens when the monitor icon (10) is clicked on the main page.
  - Solo* – The monitor plays and all other monitors mute. Clicking a muted monitor will solo the monitor and any previously soloed monitors mute. Only one monitor is playing at any one time. With Ctrl button down (or CMD button on Mac), multiple monitors can be soloed. To clear the solo state, click on a monitor, click on an empty cell or use the right-click and select 'Play all'.
  - Mute* – The clicked monitor will mute and other monitors will continue playing. Clicking a playing monitor will mute the monitor and any previously muted monitors will play. You only have one monitor muted at any one time. With Ctrl button down (or CMD button on Mac) multiple monitors can be muted. To clear the mute state, click on a monitor, click on an empty cell or use the right-click and select 'Play all'.
  - Info* – The information popup of the clicked monitor will be shown.
  - Edit* – The acoustic editor for the clicked monitor will be shown.
9. The microphone SPL level (Z weighted SPL value) is shown when the measurement microphone is connected. Z weighting means that all frequencies receive the same weight. Note that these values are different from the A weighting and C weighting that are also frequently used. Z weighting is much more sensitive to very low and very high frequencies.
10. The SAM Subwoofer and Monitor icons. Use the monitor click mode drop-down menu (9) to select what happens when a monitor is clicked using a left-click. The right-click will open a popup where actions can be selected.
11. 'Play all' is clicked to remove all solo/mute states.
12. Selection and activation of Group Presets.

13. 9320A Reference Controller output selection buttons. Not visible when using GLM Adapter.

14. The network connection and system power status. To login to MyGenelec, click the networks status icon and to shutdown/power-up the system, click the power button.

Also see: System management menu commands ([Chapter 7.8](#)).

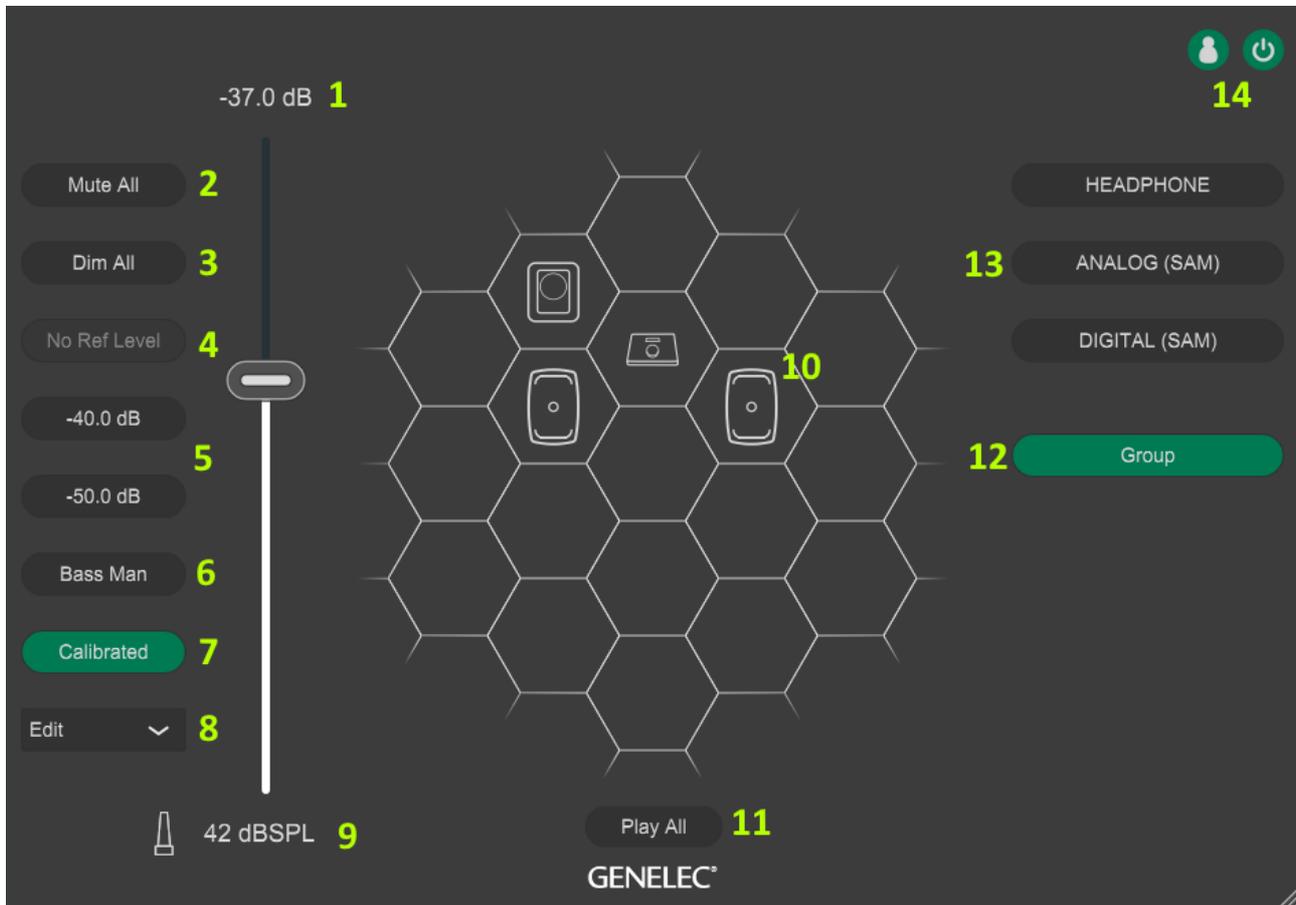


Figure 22. GLM software main page.

## 6.1 Selecting monitoring situations using Group Preset buttons

A Group Preset is activated by clicking on the Group Preset button. When the group is selected,

- Monitors and subwoofers belonging to the Group Preset are activated.
- All the acoustic settings defined in this Group Preset for monitors and subwoofers are loaded.
- The audio input (analogue, AES/EBU) defined for this Group Preset is selected.
- The Bass Management settings defined for the Group Preset are activated, determining if a subwoofer is used and what Bass Management settings are set in the subwoofer.

## 6.2 System Level Control

System Level is controlled with the master level fader.

The system level setting is shared across all Group Presets. To compensate level differences between the Group Presets, the group sensitivity on the Group Settings page can be adjusted. The Group sensitivity can also be used to limit the maximum level of the system, enabling the whole master level fader range to be used. The system level is stored in the system Setup file so that the level set before saving the system Setup file resumes when the system Setup file is opened.

The Level Preset buttons will set the system level fader to a preset level. The Level Preset button state will be unselected when you move the master level fader.

### 6.3 System level indications

The system level is indicated at the top of the system level fader. The level can be set by editing the figure shown and by adjusting the volume fader.

The volume can be adjusted by using the mouse and by up and down arrow buttons.

If the GLM Volume Controller is connected to the Adapter, the volume is only set by the Controller and the GUI volume control is disabled.

By default, the display shows the level relative to the digital full-scale output, on the dBFS scale. The scale on the fader reads from the maximum output level of 0 dBFS to -130 dBFS and then to full system mute.

After the setup of the 'Calibrated Level' has been completed, the output level displays the sound level at the listening position in dB SPL. The 'Calibrated Level' selection button selects the data format being shown, as either dBFS relative scale or dB SPL absolute sound pressure scale.

The GLM Microphone can continually measure the SPL level at the microphone (Z weighted). Normally, the microphone can be placed at or close to the listening location and will then show the SPL at the listening location. This microphone SPL level is shown below the volume setting.

### 6.4 System Mute and Dim

The states of these buttons are retained for each Group.

The 'Mute' button mutes the entire monitoring system.

When the 'Dim' button is active, the current volume setting of the system level is lowered by 20 dB.

### 6.5 Standardised Level Presets

Standardised level presets allow systematic subjective evaluation of the spectral content in audio and audibility of details always in the same way.

Level Preset buttons activate the Level Presets and are quick way to recall a calibrated system level. When these buttons are active, the system level fader is overridden. Releasing the preset resumes the system level at the value set in the fader.

A level preset can be set to a desired value by first adjusting the system level at the desired level and then using the menu item 'Group Preset | Set Preset Levels | Set Current Level to Preset1'.

## 6.6 Calibrated Level Selection

This control can be set to allow quick access to a standardised SPL level guided by one of the existing loudness standards, allowing accurate subjective evaluation of the audio content for that use case.

The default is set to 'No Ref Level' and the Calibrated Level button is not selectable.

To set Calibrated Level, select the loudness standard you want to follow or a 'user specified' loudness target using the 'Group Preset | Standard Loudness SPL Calibration' menu item. After the selection, you will need to run an SPL calibration step with the GLM Measurement Microphone.

The drop-down menu selects the standard to be used, and this also automatically selects the digital audio channel headroom defined as the 'Standard Loudness Level (LUFS)' value. This sets the nominal 0 dB level value of an audio channel relative to the digital audio full scale signal. The 'SPL at Standard Level (dB SPL)' is also automatically set based on the standards selected, and this is the sound level at the listening location when a signal at the standard loudness LUFS level is played. These values depend on the standard and are summarized in the Table below. In the table the words 'Standard Loudness Level' is abbreviated to SLL, sound pressure level is abbreviated as SPL.

Standard	SLL (LUFS)	SPL at SLL (dB SPL)
EBU R128	-23	73
ATSC A/85 (<1500 ft3)	-20	76
ATSC A/85 (<5000 ft3)	-20	78
ATSC A/85 (<10000 ft3)	-20	80
ATSC A/85 (<20000 ft3)	-20	83
ATSC A/85 (>20000 ft3)	-20	85

More information on the loudness mapping to sound level for monitoring can be found in the following sources.

**EBU R128.** For the overall Recommendation, see <https://tech.ebu.ch/docs/r/r128.pdf>. Specifically, SPL related instruction is in <https://tech.ebu.ch/docs/tech/tech3343.pdf> section 8.2. where the goal and methods for setting the specific sound level in the monitoring room is detailed.

**ATSC A/85.** For the overall standard, see <https://www.atsc.org/atsc-documents/a85-techniques-for-establishing-and-maintaining-audio-loudness-for-digital-television/>. Specifically, SPL related instruction is in document ATSC A/85:2013 section 10.4. titled 'Reference Level Calibration'. ATSC defines five monitoring categories, four for different types of rooms and one for headphone monitoring. The specific sound pressure levels to be set are given in Table 10.2. in that document, with the essential data reproduced here for your reference:

Category and purpose	Room Volume (1000 cubic feet)	dB SPL
I, II, III Main monitoring rooms	> 20	85
	10 < 20	82
	5 < 10	80
	1.5 < 5	78
	< 1.5	76
IV Editing	<1.5	76
V Headphones	(2 cc couple, 400 Hz)	74

The **user specified** option in the 'standard' drop-down allows the LEFS level and the SPL to be freely specified. This option can implement any local standard for loudness-calibrated listening level.

## 6.7 By-passing Bass Management

The Bass Management system directs the low frequencies to any system subwoofer, enabling more flexible monitor placement and improved low frequency consistency in the room.

In some cases, we want to temporarily bypass the Bass Management processing and direct all frequencies to the monitors, including the low bass frequencies. When the 'Bass Man' button is active, all frequencies are directed to the monitors. The subwoofer(s) will only output the LFE channel content in that situation.

## 6.8 Calibrated/Not Calibrated button

The GLM AutoCal status is indicated on the 'Calibrated' button. This button also allows temporary disabling or bypass of the system acoustic calibration settings, by pressing the 'Calibrated' button. When bypassed the text on this button changes to say "Cal bypassed". Pressing the button again resumes normal operation.

This control becomes available once GLM AutoCal has been completed for a Group. When a Group has not been calibrated, this button reads 'Not calibrated'.

If calibration has been manually modified or edited after an AutoCal, the calibration button indicates this with an asterisk, "**Calibrated\***". The asterisk indicates that you may need to check the calibration, as manual editing can invalidate the calibration. If you know the reason for the manual edits, no recalibration is needed.

## 6.9 Drop-down selection for solo, mute, info and edit

This drop-down selection allows actions on individual monitors and subwoofers in the central hexagonal hive, showing all the monitors and subwoofers in the current Group.

The functions for individual monitors and subwoofers include:

- Solo – This monitor plays alone. Only one monitor can be soloed at a time.
- Mute – This monitor mutes. Only one monitor can be muted at a time.
- Info – This monitor shows settings and status in an info box; the box allows monitor/subwoofer firmware updates.

- Edit – All acoustic calibration settings inside a monitor or subwoofer are opened into an editor window. Multiple settings windows can be opened. Editing the settings affects the selected monitor only.

These functions can be also accessed with a right-click on the mouse.

## 6.10 GLM Adapter icon

The main page shows an icon for the GLM Adapter. Right-click accesses a 'show info' function and this can open all settings and the status of the GLM Adapter. Also, the Adapter firmware can be updated using this window.

## 6.11 'Play All' button

Pressing this button resumes normal operation for the currently selected group. This removes all mute and solo settings set for the individual monitors and subwoofers.

## 6.12 Status indications

On the main page top-right corner, the status of the network connection to the Genelec Cloud and GLM power management are indicated.

The network status can be indicated as:

- Green with a white silhouette – Network connection exists and logged in.
- Green with a black silhouette – Network connection exists and not logged in.
- Dark grey with a white silhouette – No network connection and logged in.
- Dark grey with a black silhouette – No network connection and not logged in.

The power status can be indicated as:

- Green – System is powered up.
- Dark grey – System is powered down.

Each individual device displays its status using a series of indications, details of which can be found in the GLM display indications summary chapter.

## 6.13 Keyboard shortcuts

Keyboard shortcuts are shown in the table below. To use the keyboard shortcuts, the GLM window must be on the top and selected. The shortcuts can be enabled/disabled in the 'Settings' menu.

When the keyboard shortcuts appear to be inactive, click to some other window or outside the GLM window, and then return to GLM to activate the short-cut keys.

GLM Function	Windows Shortcut	Mac Shortcut
Volume+ increment up	CTRL + ↑	CMD + ↑
Volume- increment down	CTRL + ↓	CMD + ↓
Mute on/off	CTRL + M	CMD + M
Dim on/off	CTRL + D	CMD + D
Bass Management bypass on/off	CTRL + B	CMD + B
Preset Level 1 on/off	CTRL + P	CMD + P
Preset Level 2 on/off	CTRL + L	CMD + L
Group1 ... 10 on (0 selects Group 10)	CTRL + 1 ...9, 0	CMD + 1 ...9, 0
Previous Group on	CTRL + ←	CMD + ←
Next Group on	CTRL + →	CMD + →

## 7 Advanced Use of GLM

GLM is the most powerful tool available to calibrate and control a Genelec SAM Monitoring system. The following chapters introduce advanced use of GLM.

### 7.1 Importing GLM 4 Setups

GLM 4 Setup files can be imported into GLM 5. The import function will import the selected GLM 4 Setup file so that the original GLM 4 Setup file remains unchanged and can be still used with GLM 4. The import can also be repeated later, if needed.

The imported file content defaults to be saved in the GLM 5 working space.

NOTE: The imported GLM 5 formatted Setup file cannot be opened in GLM 4. Retain the original GLM 4 setup file for that purpose.

Follow these steps:

1. Click the 'File' menu and select the item 'Import Setup...'

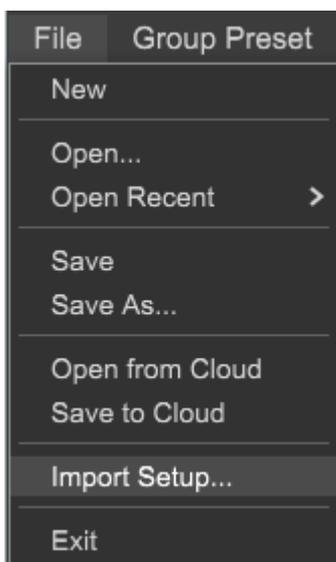


Figure 23. Selecting the 'Import Setup' menu item.

2. This will open a new window with a view into the default GLM 4 setup file location. Select the GLM Setup file to be imported and click 'Open'. This runs the import process.

The imported Setup will be stored using the same file name but into the GLM 5 Setup file working space, so the original GLM Setup file is not over-written.

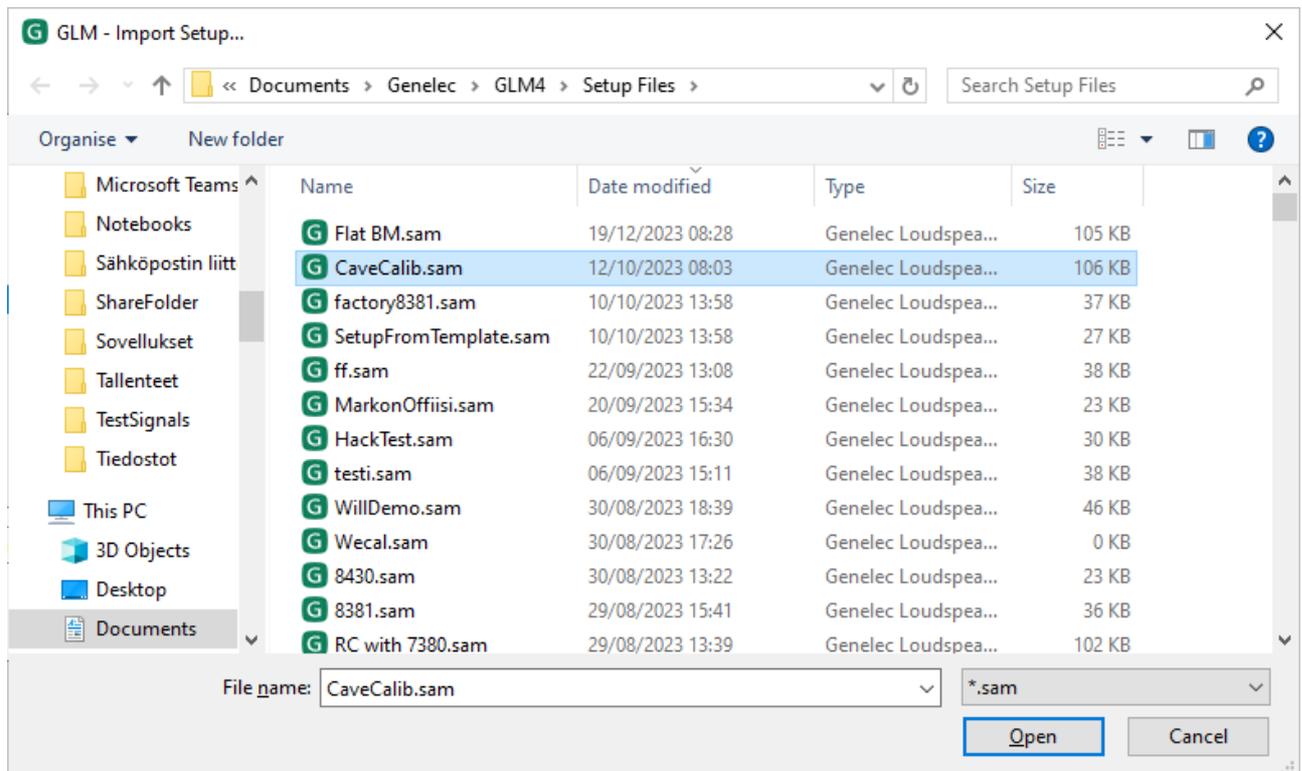


Figure 24. Selecting a Setup to be imported from the GLM 4 Setup folder.

- The GLM 4 Setup has now been imported into GLM 5. All settings except the layout remain the same in the imported file. This includes the acoustic settings, groups etc. If importing a GLM 3 Setup, then the monitors and subwoofers in the layout are placed automatically into the new hive format in GLM 5. You may feel like rearranging this automatic layout. If there is a need to edit the layout, do this by selecting the 'Setup' menu and clicking the 'Edit Layout' menu item.

## 7.2 Calibration of SPL to Loudness Standards

The 'Standard Loudness SPL Calibration' feature allows calibrating the listening level in accordance with digital audio loudness standards, such as ATSC A/85 and EBU R128. The calibrated listening level is important for correctly judging aspects of audio quality, such as speech intelligibility, spectral balance, platform compatibility, etc.

Before running the absolute SPL listening level calibration, the in-room frequency response compensation for each monitor and subwoofer and alignment of the playback levels and times of flight for audio between monitors in the system should be completed first by running GLM AutoCal.

Note: We recommend the use of digital audio inputs to reduce uncertainty and tolerances in setting the signal levels.

- Before SPL calibration, first run GLM AutoCal calibration to compensate the frequency responses, times of flight for audio and level difference between channels and to align the

subwoofer phase. You typically do this when creating a new 'Group', using the 'Group Preset' menu item, 'Add' Group command, or by re-calibrating an existing Group using the 'Group Preset' menu item, 'Calibrate'.

- If you require a frequency response other than flat, for instance a HF roll-off such as x-curve, make those adjustments now. To edit all channels at once, consider using the Sound Character Profiler. For editing per channel, select and edit individual monitor settings.
- SPL calibration should be the final item. Click the 'Group Preset' menu item 'Standard SPL Calibration' on the main page. The Standard Loudness SPL Calibration window opens.

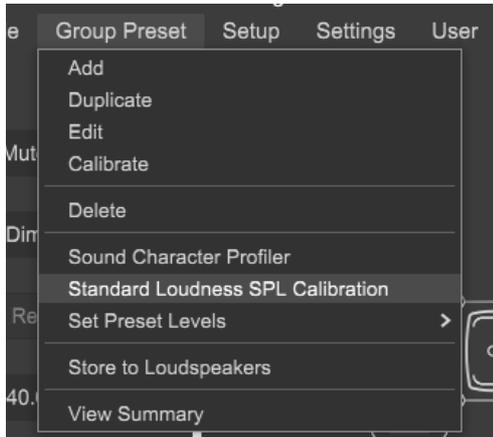


Figure 25. Entering the Standard Loudness SPL Calibration page.

- Select in the dropdown list the loudness standard used for the level calibration.
- Place the Genelec calibration microphone at the listening position.
- Click 'Start Calibration' to start the calibration process. Note that the test signal may be loud. If the background noise in the room is higher than 65 dB SPL, the loudness preset cannot be calibrated. Reduce the background noise and calibrate again.

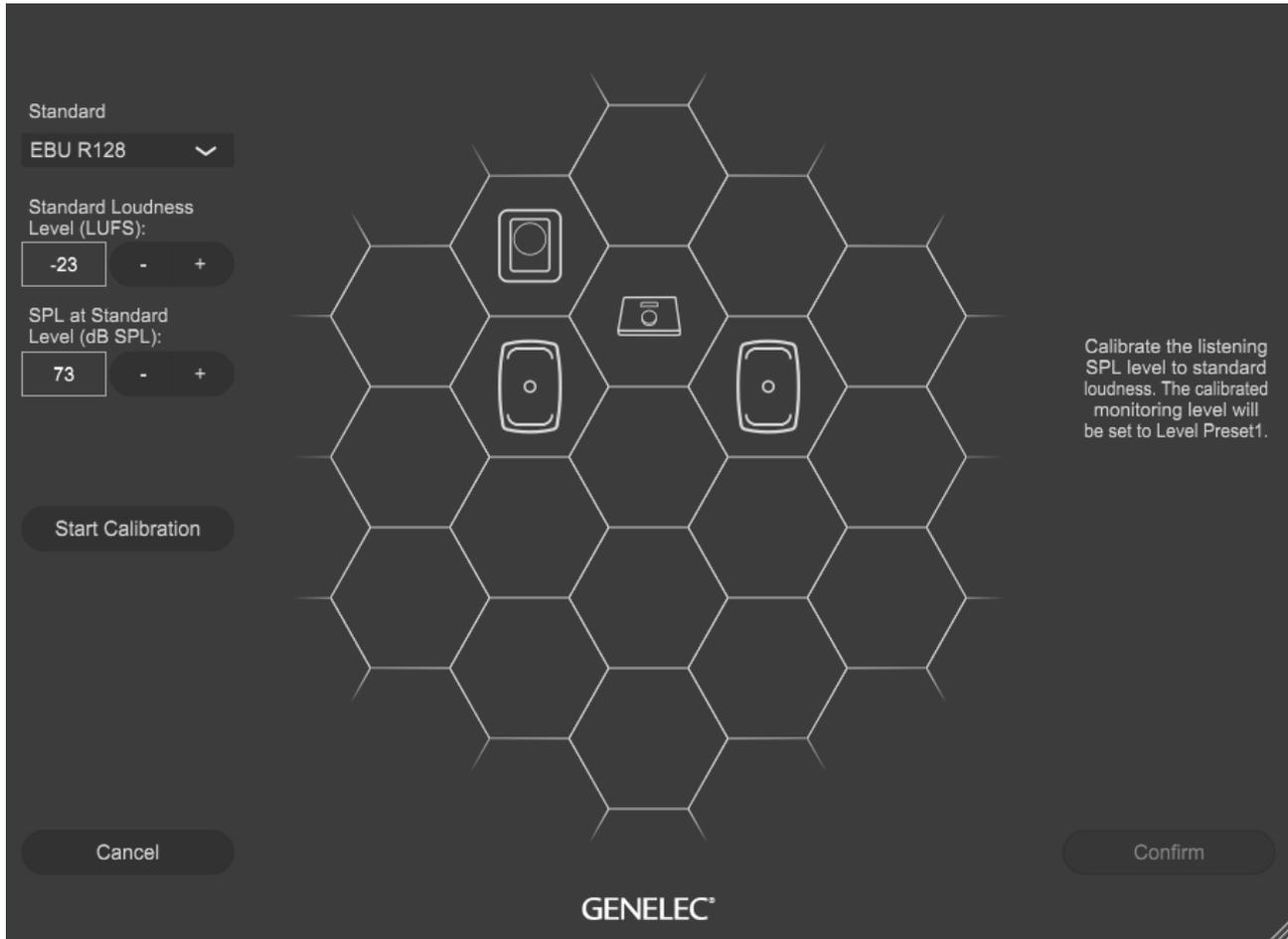


Figure 26. The standard loudness SPL calibration.

- After calibration, click the 'Confirm' button to save the results and return to the main page.

After SPL calibration, the main page level control starts displaying the level on the dB SPL scale and the preset levels change to show dB SPL units. The Level Preset 1 is set at the level given in the Loudness Standard, for example 73 dB SPL for EBU R128. Also notice the graphical link-line between the Cal. Level 'SPL' indication and Level Preset 1 keys.

After an SPL calibration, you can use the Cal. Level key to toggle between displaying levels in dB SPL (absolute) scale or in dB relative to the full scale.

Note: If you want to verify the absolute SPL level display later, the same input level and reference signal should be used as indicated by the standard used. Otherwise, the dB SPL level indication can erroneously set lower or higher, meaning that the SPL level of, for example, music material is not consistent with the SPL reading indicated by the master fader.

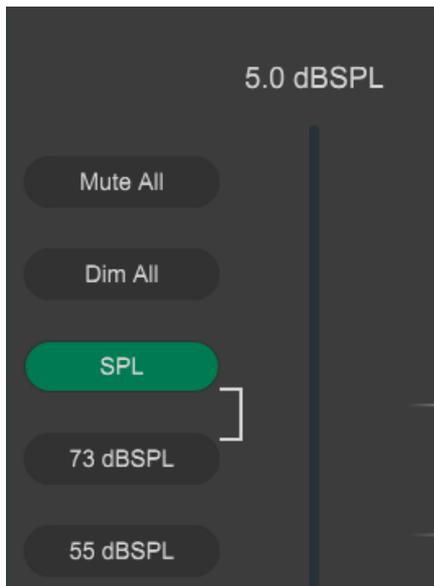
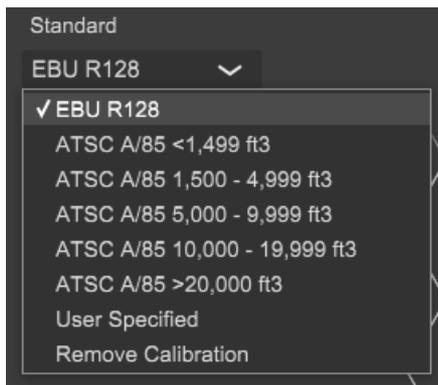


Figure 27. Calibrated SPL level set to the Preset 1 and absolute dB SPL scale enabled.

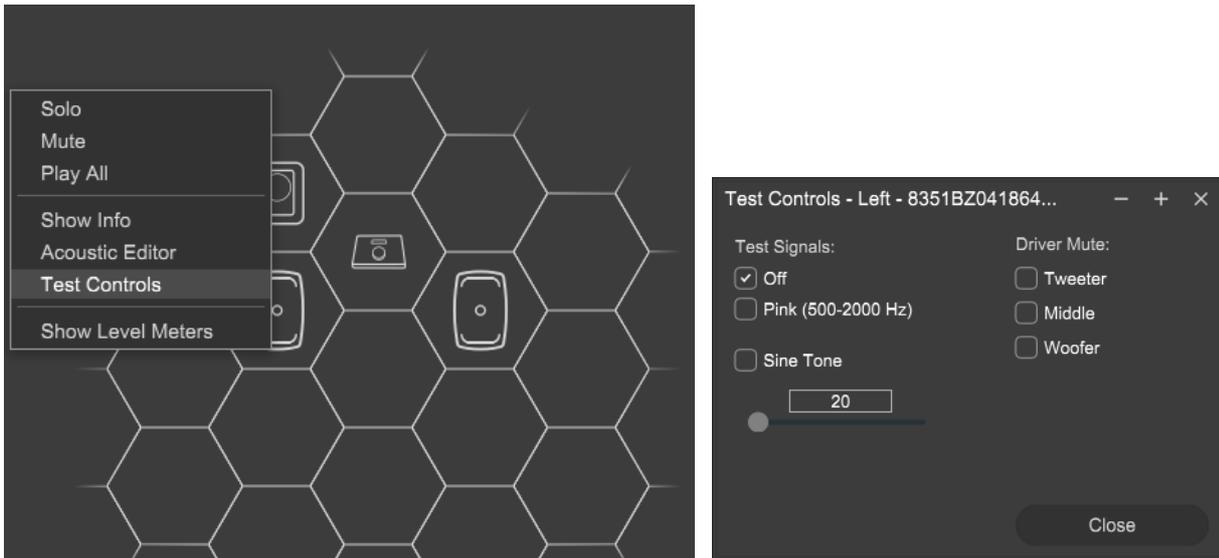
To remove a Standard SPL calibration, open the calibration page and select the 'Remove Calibration' option in the drop-down menu at the bottom of the Standards list, and finally click the 'Confirm' button.



### 7.3 Test Controls

System test controls improve the flexibility and speed of checking individual monitors and subwoofers and speed up system health checking. The test controls for each monitor and subwoofer are accessible on the GLM main page, in the right-click (or CMD-click) pop-up windows. The controls include:

- Test audio tone generator with selectable frequency.
- Midrange two-octave wide pink noise generator.
- Muting of individual drivers in a monitor or subwoofer.

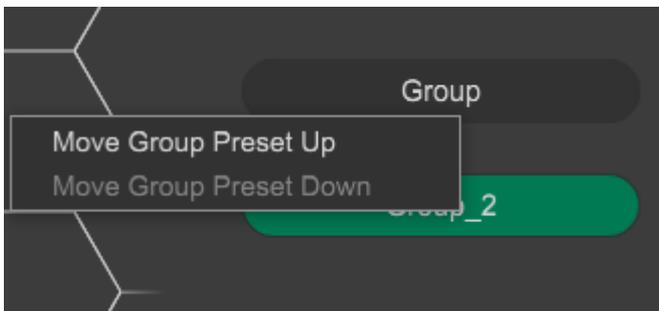


## 7.4 Maximum Number of Group Presets

Each system setup file can contain up to ten (10) Group Presets. You can create a new Group Preset with the 'Group Preset | Add' menu command or the 'Group Preset | Duplicate' menu command.

If you need more than ten Group Preset definitions, we recommend creating a second system setup file for more Groups. You can move between system setup files using the 'File | Open' menu command.

Group Presets can be re-ordered by using the CTRL + Click (Windows) or CMD + Click (Mac) and choosing 'Move Group Preset Up' or 'Move Group Preset Down' from popup.



## 7.5 Creating a New System Setup File

A new system Setup file is created by selecting the 'File | New' menu command. This starts the system definition process where you create new groups and then run the AutoCal calibration for the new Groups. Finally, you can store the new system setup file on your computer hard drive with any suitable name.

Alternatively, you can create a new system Setup file by saving a copy of the current system Setup file with the 'File | Save as...' command and then edit this new copy as needed.

## 7.6 Solo and Mute Pop-Up Window Controls

Solo means that only the soloed monitors reproduce audio while others are muted. Mute means that the selected monitors are muted and do not play audio.

Solo and mute can be activated for each monitor and subwoofer. A pop-up menu for these controls opens when right-clicking a monitor or subwoofer icon. Solo and Mute states can be cleared in the menu by selecting 'Play all'. Solo and Mute states are also cleared when the group is changed.

## 7.7 'Bass Man' Button

The 'Bass Man' button bypasses Bass Management. When 'Bass Man' is active, the low frequencies are driven to monitors instead of being sent to a subwoofer. This enables you to understand the impact of using Bass Management and driving the low frequencies to the subwoofer. Bass Management bypass can be used to check how mixes behave when the subwoofer is bypassed.

The Bass Management Bypass button is visible if there is a subwoofer in the group and Bass Management is set. The 'Full band' setting means that Bass Management is OFF and bass management will be processed elsewhere.

Regardless of the state of the Bass Management Bypass button, the LFE channel will be reproduced by the subwoofer.

## 7.8 Menu Commands

The GLM main window contains a set of menu commands enabling system management. The GLM main window enables you to manage the monitoring system.

### File

The File menu saves and opens system Setup files.

'**New**' creates a system Setup including the system layout definition.

'**Open**' loads an existing system setup file.

'**Open Recent**' loads one of the recently opened system Setup files.

'**Save**' saves the settings into the current system Setup file.

'**Save As...**' saves the current system Setup with a new Setup file.

'**Open from Cloud**' loads a system Setup file from Genelec Cloud. To do this, you must be logged in to Genelec Cloud.

'**Save to Cloud**' saves the current system Setup onto the Genelec Cloud. To do this, you must be logged in to Genelec Cloud.

'**Import Setup...**' opens and imports a GLM 4/ GLM 3 system Setup file. You may need to adjust the GLM layout monitor locations after this if importing GLM 3 system Setup file.

'**Exit**' closes the GLM application.

## **Group Preset**

The Group Preset menu is used to control settings at the group level.

'**Add**' creates a new Group Preset to the system Setup and opens the Group definition page.

'**Duplicate**' copies settings of the currently active Group and creates a new Group.

'**Edit**' opens the Group Preset definition page of the currently active Group for editing the Group settings.

'**Calibrate**' re-calibrates the currently active Group.

'**Delete**' deletes the currently active Group.

'**Sound Character Profiler**' allows you to tune the currently active Group.

'**Standard Loudness SPL Calibration**' calibrates the listening level in accordance with digital loudness standards such as ATSC A/85 and EBU R128.

'**Set Preset Levels**' assigns the current level to the selected preset level. If Standard Loudness SPL calibration is active, Preset Level 1 is reserved and cannot be set.

'**Store to Loudspeakers**' stores acoustic settings, ISS selection and other settings into all monitors and subwoofers in the currently active Group. The factory reset of monitors and subwoofers can also be done via this menu.

'**View Summary**' displays Group preset information including the input audio signal type and the Group calibration status. Group description information can be also edited here if needed, for example to document any adjustments to the Group preset.

## **Setup**

The Setup menu is used to control settings of the whole system.

'**SAM System Power**' controls the power-up and shutdown of the SAM system. By default, GLM sends a wake-up command. 'Automatically Wake Up System with GLM' starts up the GLM Network when GLM software starts. When the GLM application closes, all SAM Monitors and Subwoofers continue to play audio. It is possible to have GLM turn OFF the whole system when GLM closes by checking the 'Automatically Shut Down System with GLM' menu item. These two menu items are stored to GLM Setup.

The 'ISS with GLM online' feature. When this feature is enabled, GLM monitors the SAM system input signal levels and powers down the system when no audio signal is present during a selected period. ISS sensitivity and delay can be set in the Setup 'menu'. Once the system is powered down using 'ISS with GLM Online', the system is powered up again with the 'Power' button.

The 'Shut Down Group Off Monitors' feature. Enabling this feature in GLM automatically turns all monitors ON that are active and also turns OFF all monitors that are not active in the currently selected Group preset. This is a very useful feature, for example, when controlling a large

multichannel system while working only with stereo content.

**'Enable USB Controller'** enables the Griffin USB Powermate for control of level and mute.

**'Enable RF Remote'** enables the Genelec 9101 RF Remote Controller for control of level and mute. 9101 will work with GLM Network Adapter or 9320A Reference Controller.

**'System Startup Level'** sets the system level to be used at the start-up (default -60dB).

**'Max Level Restriction'** restricts the system level, e.g., when using wired/wireless volume controllers.

**'LED State'** LED in the monitors and subwoofers can be turned OFF and ON. This is functional when GLM is running and works with all monitors and subwoofers.

**'Edit Layout'** enables editing of the existing system layout. Used also to replace/remove a monitor or subwoofer from the system.

## **Settings**

The Settings menu controls the GLM UI settings. These settings are common for all GLM Setups.

**'MIDI Settings'** activates and configures a MIDI controller for use with GLM.

**'Theme'** item, 'Use Dark Theme', selects the GLM dark mode, and 'Use Light Theme' selects the GLM light mode.

**'Level Panel'** activates and configures the GLM level panel that pops up when, e.g., the level is changed with a wired or wireless volume controller.

**'Keyboard Shortcuts'** enables/disables GLM shortcuts.

**'Language'** menu changes the UI language in GLM. When a language is selected, GLM changes the user interface language and will remember this setting for the next time GLM opens.

**'Tooltips'** enables/disables GLM tooltips. GLM tooltips pop up when the mouse cursor is over a control.

**'Show Level Meter'** enables/disables the output level meter indicator in the monitor cell.

## **Services**

The User menu is used to access the cloud related functions.

**'Login to MyGenelec'** opens a window to log in to Genelec Cloud using MyGenelec credentials.

**'GRADE Report Order'** generates the room acoustic report, GRADE, for the last calibrated monitoring group. Only available if logged in to MyGenelec.

**'Product Registration'** provides easy access to product registration for the monitors. Only available if logged in to MyGenelec.

**'Get Support'** provides easy access to Genelec Support. Only available if logged in to MyGenelec.

## **Help**

**'GLM Manual'** opens GLM PDF operating manual.

**'Export Setup to Desktop'** creates a ZIP file on your computer desktop. This is useful when communicating with Genelec in case you have any issues using GLM or your monitoring system.

**'About'** shows information about GLM, including software version information.

## 7.9 Cloud Account Login

The standard AutoCal calibration method uses the Genelec Cloud calculation service. Using this requires a user account on MyGenelec.

A user account can be created at <https://my.genelec.com/>. Please note that the username can only be selected once and cannot be changed after this.

With the valid user account, log in using the 'Services' menu by selecting the 'Login to MyGenelec' menu item.

### Logging in

To log in to the Genelec Cloud, type your username and password for MyGenelec.

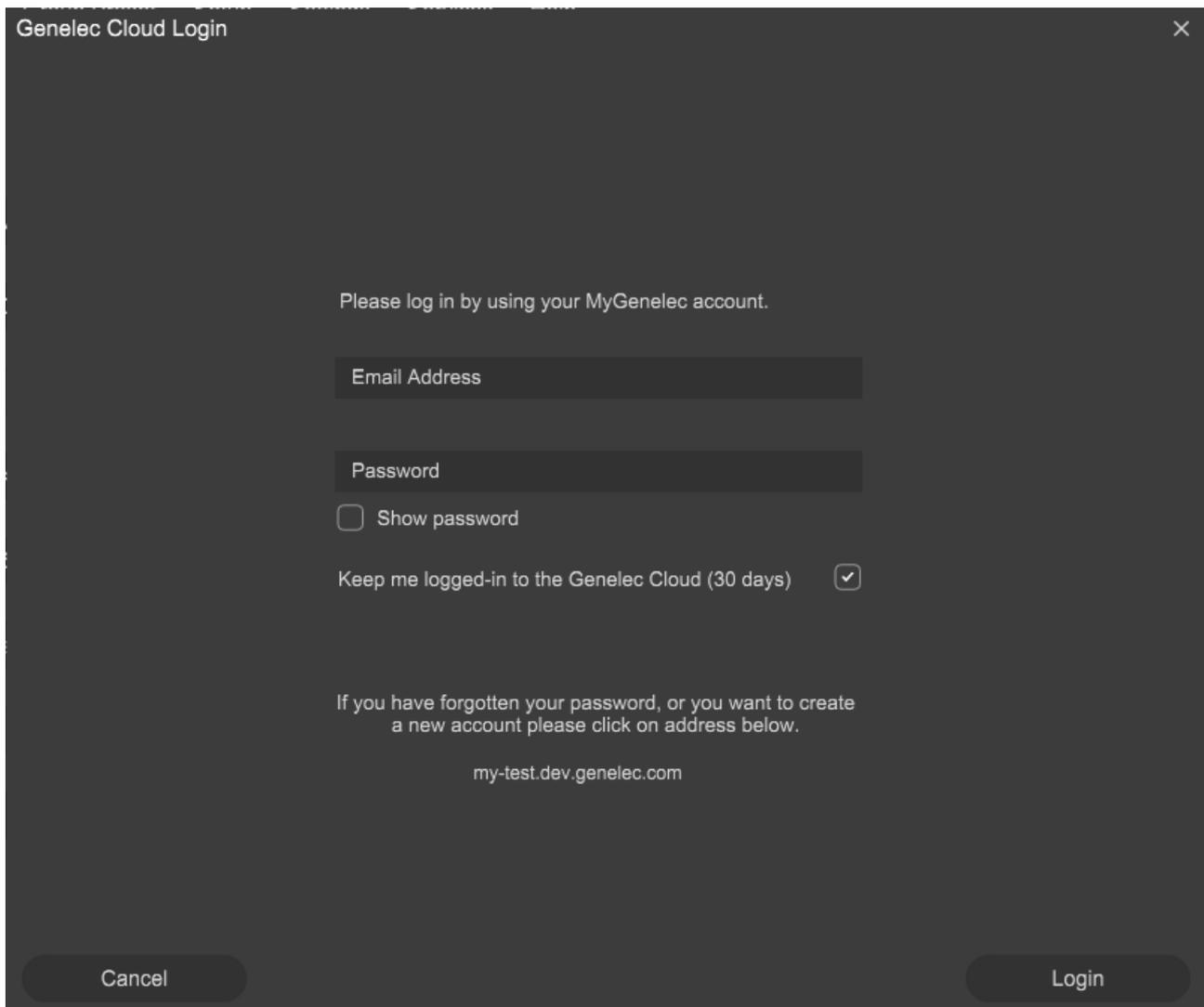


Figure 28. Login to MyGenelec window.

### User information and logout

Selecting the 'Services' menu by selecting the 'MeGenelec (emailaddress)' menu item will display your MyGenelec information page when you are logged in. To log out from the Genelec Cloud, click the 'Logout' button on the MyGenelec information page.

## 7.10 Standalone Startup Level

By default, SAM Subwoofers and Monitors start up at the maximum output level. This is the output level achieved when the master level is adjusted to its maximum (0 dB) setting in the GLM user interface. It is possible to set the Startup Level to a lower value. To do this,

- Set the master level fader to the level you want to have at start-up.
- Store this level permanently into the monitors and subwoofer with the other acoustic settings, using the 'Group Preset' menu item 'Store to Loudspeakers' menu item.

Early SAM models (like 8240A, 8250A etc.) need a firmware update before the Startup Level can be stored.

GLM software will override the Startup Level, so, when GLM is running – and the SAM Monitor or Subwoofer is connected to the GLM Management Network – the Startup Level will be set by GLM. If the GLM Adapter is used without a computer, for example as a standalone volume controller for the SAM system, the Adapter will also override the Startup Level. The Startup Level stored in SAM Monitors or Subwoofers will therefore come into effect when the monitors or subwoofers are no longer connected to the GLM Management Network.

Setting Startup Level (to set a specified output level for all online devices):

1. Select a Group that has the desired acoustic settings and adjust the master level fader to the desired value.
2. Store this level as the Startup Level with other Group Settings by clicking 'Group Preset: Store to Loudspeakers' menu command, adjusting the 'Startup Level (dB)' in the 'Store Group Settings' page and clicking 'Store' button.

To clear the Startup Level (which sets the level to full output level for all online devices):

1. Select a Group that has the desired acoustic settings.
2. Store this level as the Startup Level with other Group Settings by clicking 'Group Preset : Store to Loudspeakers' menu command, setting 'Startup Level' value to 0.0dB in the 'Store Group Settings' page and clicking 'Store' button.

**NOTE:** The monitor or subwoofer can become very quiet if the 'Startup Level' is set to a low value.

## 7.11 Displaying monitor and subwoofer data in GLM

Several types of information for each monitor and subwoofer can be displayed in the GLM main window by using the right click and selecting Show Info. These include:

- *Name*: Monitor and subwoofer name.
- *Barcode*: Barcode (serial number) of the monitor or subwoofer.
- *Serial*: Unique identifier of the monitor or subwoofer.
- *Status*: Shows current status of the monitor or subwoofer.
- *Stored -switch position*: To view a switch state easily. <sup>1)</sup>
- *I/O Levels*: Input and output signal levels for each monitor and subwoofer. <sup>1)</sup>
- *Temp*: To view a temperature inside a monitor or subwoofer. <sup>1) 2)</sup>

- *Bass Management*: Subwoofer crossover frequency.
- *WS Crossover*: W371 woofer system to monitors crossover frequency.

*Mode*: to view the woofer system mode.

- Acoustic editor and scoring system for woofer systems chapter) <sup>1)</sup>
- *Input(s) In use*: Analog input or the digital audio subframe selected for reproduction.
- *Firmware Version*: View the firmware version for each monitor and subwoofer. A firmware update button is enabled if an update is available. Your confirmation for the firmware update will be asked after you click this button.
- *Solo/Mute buttons*: To view solo and mute buttons for each monitor and subwoofer.
- *Test button*: Opens the test control page for each monitor and subwoofer.
- *Firmware button*: Opens the firmware update page where firmware updates can be done.
- *Settings button*: Opens the acoustic editor where viewing the room responses and edits can be done.

The following are additional details for the points above marked with "1)" and "2)":

- 1) Not all models support the feature, showing 'Info N/A' if the information type is not supported.
- 2) The temperature shown is the temperature of the microcontroller in the monitor loudspeaker, as reported by the microcontroller itself. This information is useful for comparison between monitor loudspeakers, for example in a fault situation. The microcontroller temperature does not fully reflect all the temperatures inside transducers. Safe microcontroller temperature is up to about 80 °C, although in normal use the temperature should never reach such a high temperature.

Monitor data display can be useful in many ways. To give an example, when you have the digital audio input selected and want to know how much signal is seen by the monitor input.



Figure 29. Monitor data display.

## 7.12 Access to Monitor and Subwoofer Acoustic Settings

Access to monitor and subwoofer acoustical calibration and settings is available by right-clicking on the monitor and subwoofer icons on the GLM Main page.

## 7.13 GRADE™ Automatic Room Acoustic Report

The Genelec Room Acoustic Data Evaluation (GRADE™) Report is a service on the Genelec Cloud that enables you to use all the information collected during GLM AutoCal measurements.

The GRADE Report provides complete and deep data to understand exactly how well your entire monitoring system performs. The GRADE Report is a detailed PDF document showing all the key parameters of your monitoring system performance, system calibration success and an in-depth analysis of your monitoring room's acoustic effects.

The report also gives specific advice and warnings, if necessary, to guide your work in improving monitoring system accuracy and performance in relation to your space. The report discusses:

- System frequency response at the listening location.
- Sound decay in the room across audible frequencies and if this affects your ability to hear details in audio.
- Reasons for inaccuracies of sound colour and narrow-band colorations, including early reflections and room resonances.
- Wideband sound colour balance.
- Precision of stereo imaging and reasons for stereo imaging problems.
- Subwoofer performance.
- Bass Management alignment and performance.
- How well your room conforms with recommended performance.

The GRADE™ Report is not limited to two-channel stereophony, working for any size of monitoring layout, including the largest ITU immersive layout, Dolby 9.1.6 or NHK 22.2 – also covering systems with multiple subwoofers and bass management.

GRADE Reports are extremely useful for gaining total understanding of monitoring room and monitoring system performance within the room and for iterative improvement of the room with acoustic treatment, monitor placement and bass management optimisation.

The GRADE Report is a Genelec Cloud service. It is available after you have logged in to the Genelec Cloud prior to starting a GLM AutoCal calibration. You will need a MyGenelec account. To create your account, go to <https://my.genelec.com/>.

To order the room acoustic report, check the 'Generate GRADE Report' box in the 'Measurement Preparation' view. After the calibration process has completed, the GRADE Report is sent to your email address.

Also note that when you add a description of your system in the Measurement Preparation view, this description will also appear in the report, making the report easier to read.

## 7.14 Level-Aligning Multiple Subwoofers Reproducing the Same Signal

When several subwoofers reproduce the **same audio channels**, the low frequency output by those subwoofers will sum and elevate the total output level. An example of this situation is when subwoofers are daisy-chained to reproduce the same **sum** signal or LFE signal. After AutoCal and AutoPhase, the output levels of all the subwoofers reproducing the same signal must be adjusted down. This can happen automatically when you set the same Subwoofer Group ID to the subwoofers reproducing same signals. To setup a daisy-chain of subwoofers, perform the following steps:

- Set the same Subwoofer Group ID to the subwoofers in the Group definition page (see 7.17.8.4 chapter).
- Run AutoCal and AutoPhase. This will then automatically calibrate and level compensate the system of subwoofers to work in line with the monitors.

Table 2. Subwoofer level correction needed for subwoofers reproducing the same signal (daisy-chained subwoofers).

Number of subwoofers in the daisy-chain	Correction (dB)
1	0
2	-6
3	-9
4	-12
5	-14
6	-16

Level correction for subwoofers is only required if they are reproducing the same audio channels. Audio connections for analogue and for AES/EBU cabling are shown in the figures below. If subwoofers are used so that the left subwoofer is only reproducing the left channel and the right subwoofer is only reproducing the right channel, level corrections are not needed, and then the Subwoofer Group ID should be set to 'None'.

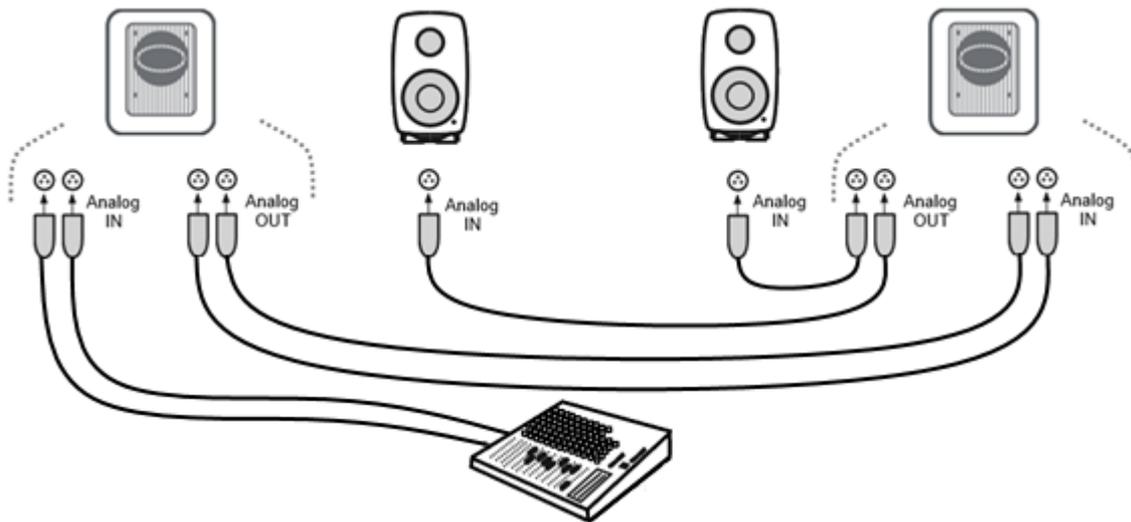


Figure 30. Dual subwoofers with an analogue signal.

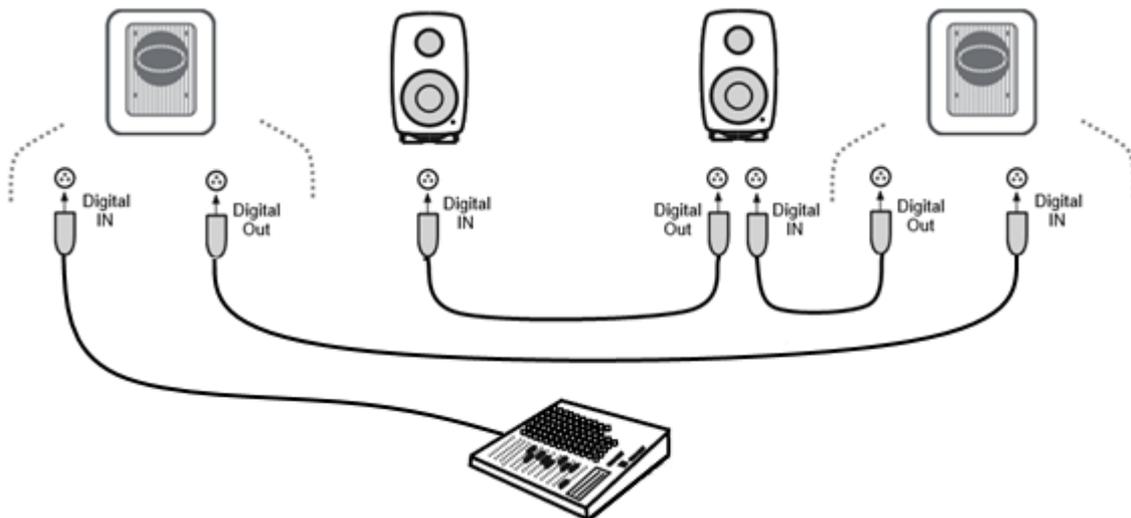


Figure 31. Dual subwoofers with an AES/EBU signal.

## 7.15 Rerunning AutoCal Automatic Calibration

The option to rerun AutoCal automatic calibration is available from the 'Group Preset : Calibrate' menu item. This brings up the AutoCal window and starts the calibration process again.

You can rerun the AutoCal automatic calibration,

- To ensure the calibration is still valid.
- When there have been significant structural changes in the room (tables or other furniture have been moved or there has been structural changes to the walls, ceiling or floor).
- When the listening position has changed.

- When the locations of items close to the monitors or close to the listening position have changed.

It is usually a good idea to take a copy of the current Setup file and perform the recalibration using the copy instead of doing it with the original Setup file. This retains both files and enables evaluation of the recalibration outcome. You can take a copy of your Setup file with the 'File | Save as...' menu command.

## 7.16 Rerunning AutoPhase Automatic Phase Calibration

The option to rerun AutoPhase automatic subwoofer phase calibration is available from the 'Group Preset : Calibrate' menu item. This brings up the AutoCal window, where you can confirm the AutoCal settings if AutoCal was already done for the Group preset. After AutoCal confirmation, the AutoPhase window opens and the calibration process can be done again.

You can rerun the AutoPhase automatic phase calibration,

- To ensure the calibration is still valid.
- When the bass management filter crossover frequency has changed.
- When there have been significant structural changes in the room (tables or other furniture have been moved or there has been structural changes to the walls, ceiling or floor).
- When the listening position has changed.
- When the locations of items close to the monitors or close to the listening position have changed.

## 7.17 Group Settings, Advanced Use

A SAM Group is a set of monitors and subwoofers reproducing the audio presentation together. Groups are presented as buttons on the GLM main window. You can start using a Group simply by clicking on the Group button. This sends all the settings for this Group to all monitors and subwoofers included in the Group.

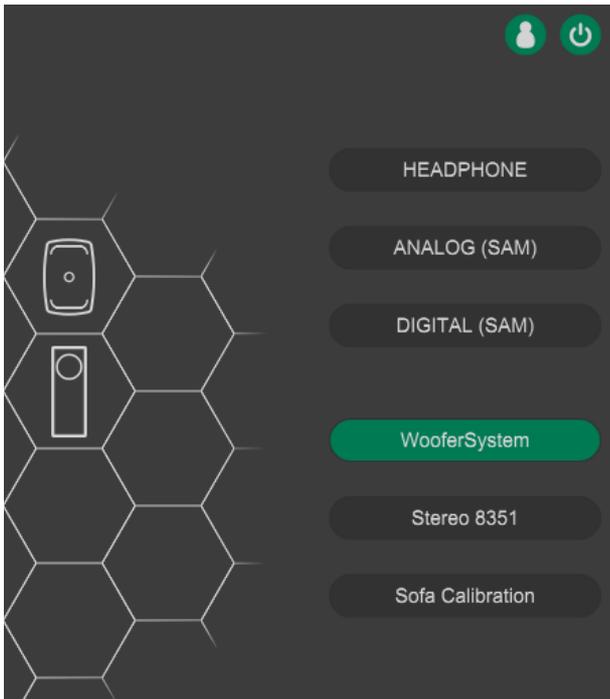


Figure 32. An example of a GLM system Setup having three monitoring Groups.

Each Group contains Group-specific settings. These settings can optimise the performance of SAM Monitors and Subwoofers for different situations and purposes. Settings unique for each Group include:

- Group name.
- Audio signal type, analogue or AES/EBU digital.
- Monitors and subwoofers in the group (playing when this Group is selected) and the ones that are not used in this Group.
- The acoustic calibrations that are applied when this Group is playing for all monitors and subwoofers.
- Monitoring level setting for the Group (this can be used e.g. as a monitoring level preset for the Group).
- System delay (this can delay the whole reproduction system, for example to synchronise the whole Group/audio system with a video presentation).

Group Preset information can be quickly reviewed by moving the mouse over the Group Preset button and waiting briefly to see a tooltip.

### **7.17.1 Access to Group Preset Settings**

To access or edit the settings common to a Group Preset, use the menu command 'Group Preset | Edit'. This displays an editing window where the Group settings and the settings for individual monitors and subwoofers can be edited. The Group settings are shown when you enter the editor. You will see the monitor and subwoofer settings once you single-click on any of the monitors and subwoofers in your layout.

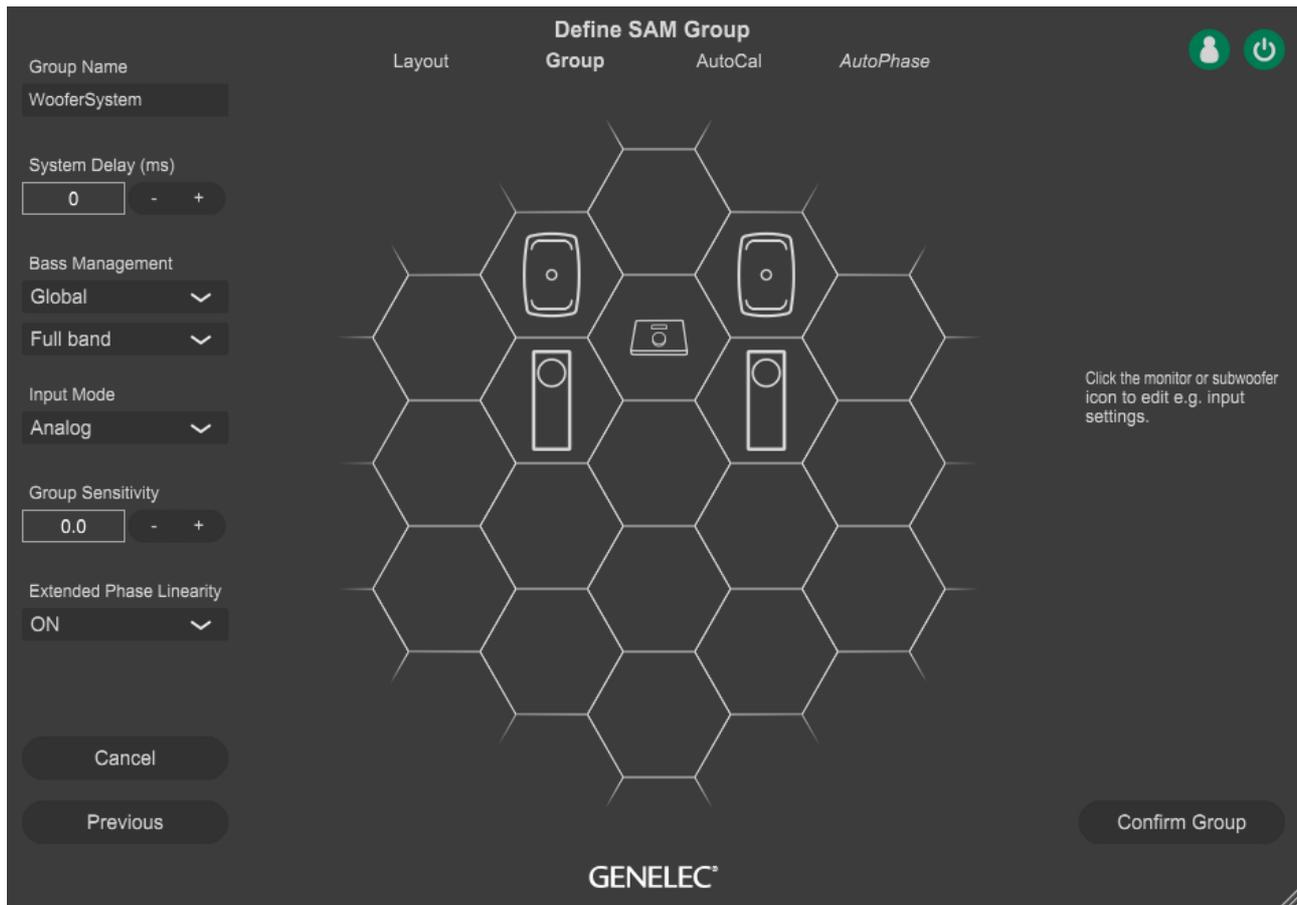


Figure 33. Common settings for a SAM Group are presented on the left side of the SAM Group definition display.

### 7.17.2 Group Name

A Group name describes the Group Preset. More detailed information can be given to describe the measurement and calibration in the Group Preset or in 'Group Preset : View Summary' menu.

### 7.17.3 System Delay

The System delay is applied to all monitors and subwoofers in the group. This can be used, e.g., to synchronise audio with video.

### 7.17.4 Bass Management

The Bass Management Filter (subwoofer crossover frequency) is normally set globally in the Group settings. When the Bass Management setting is marked 'global', the Bass Management Filter setting is applied to all monitors in the group.

In certain special cases you may want to turn off the Bass Management for certain monitors, for example, when you do not want to bass-manage rear monitors in a room having a subwoofer located at the front of the room.

To turn off the bass management for a specific monitor:

- Set 'Bass Management setting' to 'individual'.
- Select the monitor by clicking on its icon.
- Set 'Bass Management Filter' switch to 'Full Band'.

We recommend using the 'global' setting for all normal applications. In certain exceptional cases, there can be acoustical reasons for setting the Bass Management setting to 'Individual'. This enables the Bass Management Filter for each monitor and subwoofer to be set individually to a value that differs from the rest of the system. Using the 'individual' setting is an expert feature, as all monitors and subwoofers will then ignore the globally selected Bass Management Filter.

### 7.17.5 Input Mode

A Group is configured for analogue or AES/EBU digital audio. Certain devices only have analogue or AES/EBU digital inputs. You cannot include devices in a group reproducing a selected audio type (analogue or digital), if these specific products do not have the correct input type available. If a selected audio signal type is not supported by a monitor or subwoofer, it will be automatically marked as not belonging to the Group; we call this 'Group OFF' and indicate it with a yellow glow around the product in the GLM window and a yellow LED colour on the actual product. Note: When using SE7261 and 8130 monitors, the 8130 monitors indicate a valid digital signal with a yellow LED.

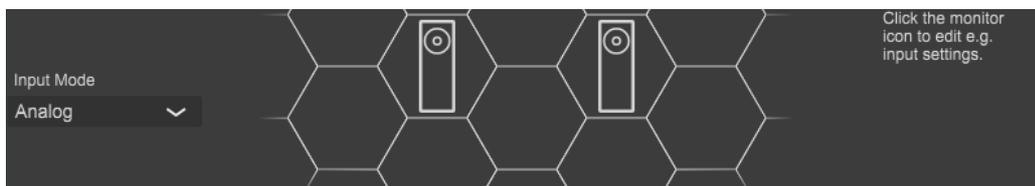


Figure 34. Group Input Mode selection.

### 7.17.6 Group Sensitivity

This setting is very useful for matching levels between different Group Presets or adjusting the system sensitivity lower, or to reduce the idle channel noise level generated by an audio source.

For example, to compensate a level difference of -24 dB between an analogue and a digital signal source, you would keep the Group Sensitivity for the analogue group preset at 0 dB and set the Group Sensitivity for the digital Group preset to -24 dB. Then, the playback levels will be matched while changing between the analogue and digital Group Presets.

### 7.17.7 Extended Phase Linearity

This option selects the Extended Phase Linearity 'ON' or 'OFF' and is effective when you are using The Ones monitors (8331A, 8341A, 8351B or 8361A) in the Group.

The 'ON' setting maintains the input-to-output delay constant down to about 100 Hz and has a slightly higher input-to-output latency. The 'ON' setting is a default setting for The Ones in GLM and will only affect The Ones models.

The 'OFF' setting keeps the input-to-output delay constant down to about 500 Hz and has a low input-to-output latency.

If using The Ones with other models that have wide linear phase characteristics, the Extended Phase Linearity (ON) is highly recommended.

Note: Firmware may have to be updated to enable this feature.

### 7.17.8 Monitor Settings

To edit specific Group Settings for an individual monitor or subwoofer, single-click on the monitor or subwoofer icon. A settings panel opens, and you can:

- Rename monitors to facilitate easy recognition, if needed.
- Include or exclude any monitor in the group using the 'Group Status' selection.
- Determine if you want the subwoofer crossover frequency to be globally the same for all the monitors in the whole Group (recommended) or if you want specific crossover frequencies for certain monitors or subwoofers.
- Set the Calibration Group ID to use symmetrical EQ's (recommended).

For subwoofers, you can also:

- Set the subwoofer crossover frequency.
- Set the LFE channel gain (0 or +10 dB). If your audio source or DAW does not offer +10 dB level increase in the LFE channel but you know it is needed, set the LFE channel gain to +10 dB.
- Set the Subwoofer Group ID to enable compensation of multiple subwoofers working on the same set of channels of audio.
- Set the Phase Align to select the monitor to align the subwoofer phase with.

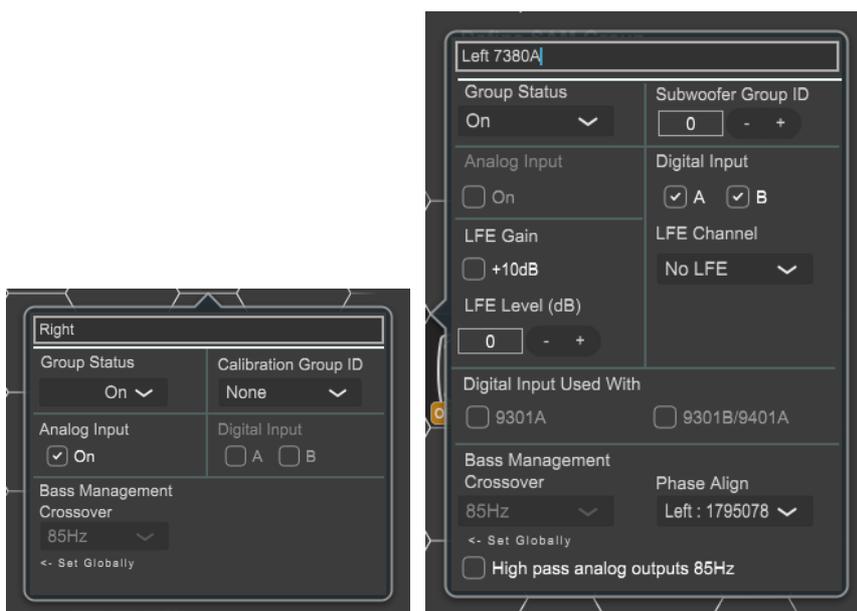


Figure 35. Monitor settings.

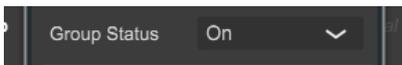
### 7.17.8.1 Monitor name

A name that helps you identify the monitor.



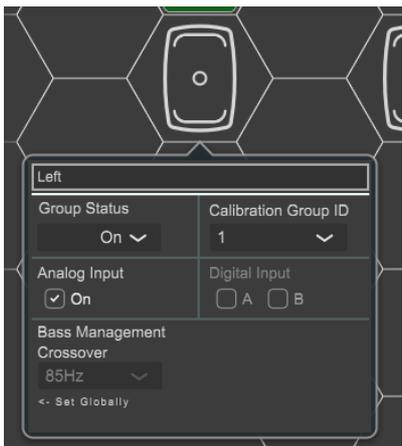
### 7.17.8.2 Group Status

When the setting is ON, this monitor belongs to the current group. When the setting is OFF, this monitor is not in the group and will not play audio. The group status can be quickly toggled using CTRL clicking (or CMD clicking on Mac) on the monitor icon.



### 7.17.8.3 Calibration Group ID

Calibration Group ID improves the control of assigning symmetrical settings. When monitors are assigned with the calibration Group ID number, all monitors sharing the same number are calibrated as a symmetric Group. A symmetric Group is evaluated for the shared frequency response features, and the shared features are compensated at mid and high frequencies. At low frequencies, where the room effects are not typically shared between the monitors, individual compensations to the monitors are applied. Symmetrical Group ID is a powerful tool for compensating the shared acoustic features, for example, for a set of three front monitors within an immersive setup, for a top layer monitor set, or for specific sets of rear and back side monitors within immersive monitoring systems. The calibration Group ID is assigned by the user in the GLM Group definition page pop-up for each monitor. Once this is done, run GLM AutoCal and the Calibration Groups will take effect.



### 7.17.8.4 Subwoofer Group ID

Subwoofer Group ID is a very powerful method of enabling the compensation of multiple subwoofers sharing the same set of input channels of audio. The Subwoofer Group ID is assigned by the user on the GLM Group Definition page pop-up for each subwoofer. Once this is done, run GLM AutoCal and the Subwoofer Groups will take effect. The Subwoofer Group concept supports

up to six subwoofers working together on one audio channel set, and this makes daisy-chaining of subwoofers to increase the low frequency output capacity easily and quickly.

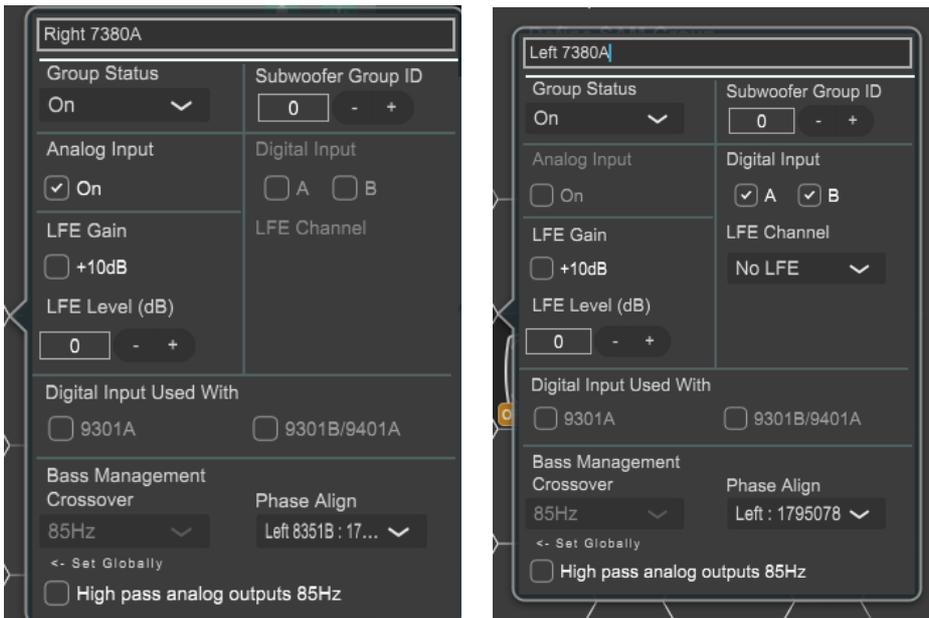


Figure 36. Examples of using the analogue inputs (left) and digital input (right) to a subwoofer, showing the subwoofer group ID setting, analogue input settings and digital input settings.

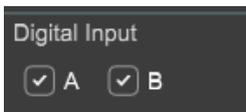
**7.17.8.5 'Analog Input'**

When the checkbox is checked, this monitor will play the analogue signal when its Group is active. This setting is not active when the input mode is digital.



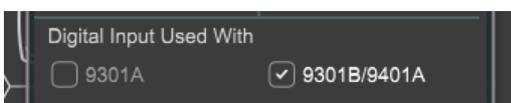
**7.17.8.6 'Digital Input'**

When either of the digital channel checkboxes is checked, this monitor will play the digital signal when its Group is active. This setting is not active when the input mode is 'Analog'.



**7.17.8.7 Digital Input using 9301 and 9401 interface devices**

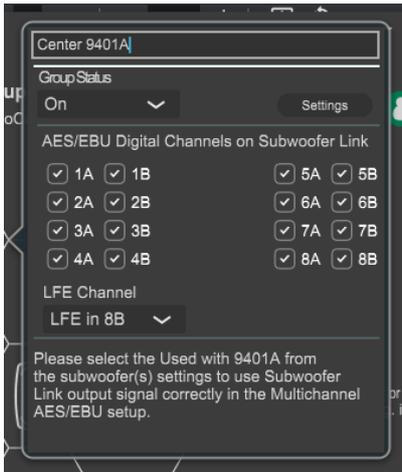
For 7350, 7360, 7370 and 7380 subwoofer models, there is also an option to use 9301 AES/EBU and 9401 audio-over-IP multichannel interface devices. The 9301 and 9401 are selectable when they are connected on the GLM network. This enables the reproduction of digital multichannel content with these models.



For AES/EBU digital audio, the channel assignment needs attention. Typically, AES/EBU cables carry two channels of audio, called subframes A and B. In a stereo system the subframe A is

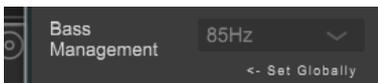
usually assigned to the left channel and the subframe B to the right channel. A multichannel audio presentation (using more than one digital audio cable) will split the channels into cables and subframes. The correct selection of channels to process is needed for each monitor and subwoofer. GLM defaults to the common AES/EBU channel assignment assuming that subframe A is carrying the left channel, and subframe B is carrying the right channel.

For multichannel audio, attention to how the subframes have been assigned (in DAW) needs attention. The example below shows subframes assigned to carry 16 channel audio in the 9401 interface device, where the channel 8 subframe B has been assigned to carry the LFE content.

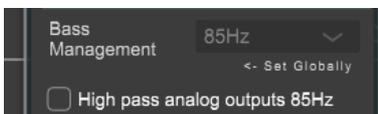


#### 7.17.8.8 Bass Management

This setting applies the Bass Management crossover frequency (global) or a customised crossover frequency (individual). When 'Bass Man' button is active on the main page, subwoofer frequencies are reproduced by the monitors. You can select the crossover frequency for your system here.



In addition, 7360, 7370 and 7380 subwoofer models offer an option to high-pass analogue outputs at 85 Hz. This enables the connection and use of analogue monitor models without bass management.



#### 7.17.8.9 Phase Align

The Phase Align control enables the selection of subwoofer-monitor pairs for aligning their phases.

#### 7.17.8.10 Woofer System Align

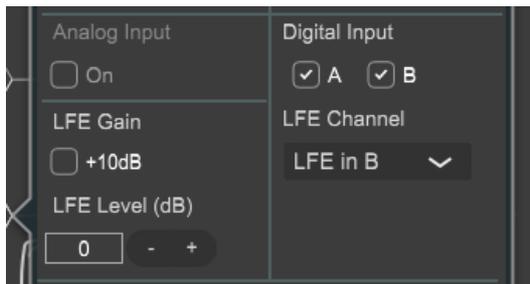
Woofer System Align control can be used to select the 'The Ones' monitor that a W371 Woofer System is calibrated with.

### 7.17.8.11 LFE Channel

The LFE input level can be boosted by +10 dB when 'LFE Gain' is applied. This is necessary when the +10 dB LFE gain is not applied in the audio source.

With an analogue signal, the connected LFE input is automatically reproduced. Analogue LFE channel has a dedicated input connector.

Subwoofers offer one digital audio input, typically carrying two channels of audio. There is an option in GLM to define if the digital audio input signal carries the LFE content. After the use of the Digital Input subframes is set active using the 'Digital Input' check boxes 'A' and 'B', the LFE content subframe can be selected from the 'LFE Channel' dropdown list to be input in either subframe A or B. If the Digital Input subframes are not set active, digital audio is not reproduced.



The 'LFE Level' can be individually set for any 73xx Series subwoofer. This feature is used to compensate the LFE levels when multiple subwoofers are reproducing the same LFE channel content but are associated with different main channels.

When using 9401, the digital output for the subwoofer assigns the sum of all main channels to subframe A and the LFE is assigned to subframe B.

## 7.18 Advanced use of AutoCal

AutoCal automatic calibration offers you the possibility of using multiple microphone positions (MultiPoint) in order to determine the system calibration instead of one microphone position located, for example, at the main listening position (SinglePoint).

MultiPoint calibration offers unlimited locations of spatially averaged microphone positions. The first microphone position is the primary position. Timing and level are calibrated to the primary microphone position. Put the microphone first to the primary position. You are free to choose the additional microphone locations, but generally you take additional microphone positions within about 0.5 to 1 metre from the primary microphone location.

### 7.18.1.1 MultiPoint calibration

GLM supports an unlimited number of microphone positions in the 'MultiPoint' mode.

The steps of a MultiPoint calibration are

- Select 'MultiPoint' in the AutoCal window (additional microphone positions can be measured after the primary position).
- Place the microphone in the primary listening position.

- Press the 'Start Calibration' button to start the measurement and follow the dialogue instructions. Keep on selecting new measurement positions as long as needed, following the dialogue instructions.
- Wait until all the measurement sweeps have been completed for all monitors and subwoofers, then press the 'Optimize' button to start the calculation process, and then wait until completed.
- Review the results by clicking on the monitor and subwoofer icons.
- Continue on to AutoPhase when there is a subwoofer in the system. Before running the AutoPhase, move the microphone to the primary (first) microphone position and follow the dialogue instructions.
- Continue on to WooferCal when there is a W371 Woofer in the system. Before running the WooferCal, move the microphone to the primary (first) microphone position and follow the dialogue instructions.
- Accept the calibration result with the 'Confirm Calibration' button.

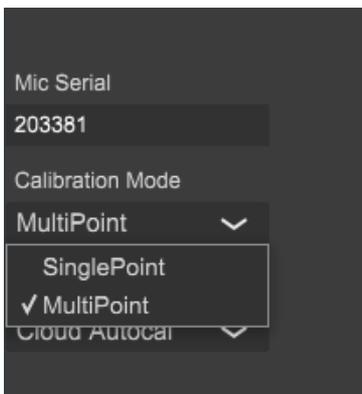


Figure 37. Selecting the MultiPoint calibration

### 7.18.2 Reviewing the AutoCal result

After the AutoCal measurement and calculation process has completed, you can review and evaluate the resulting frequency response compensations. Click on each monitor and subwoofer to review the measurements (red curve), corrections (blue curve), and compensated (green curve) responses in the graph window.

Note that for standard stereo setups placed in a symmetrical manner (equilateral triangle), it often makes sense to manually set to '0' the values for the time-of-flight correction and the level adjustments. Usually, a few small correction values appear simply because the measurement microphone is not perfectly and accurately positioned in relation to each monitor. In such cases, deleting such small correction values can improve the stereo imaging and its stability.

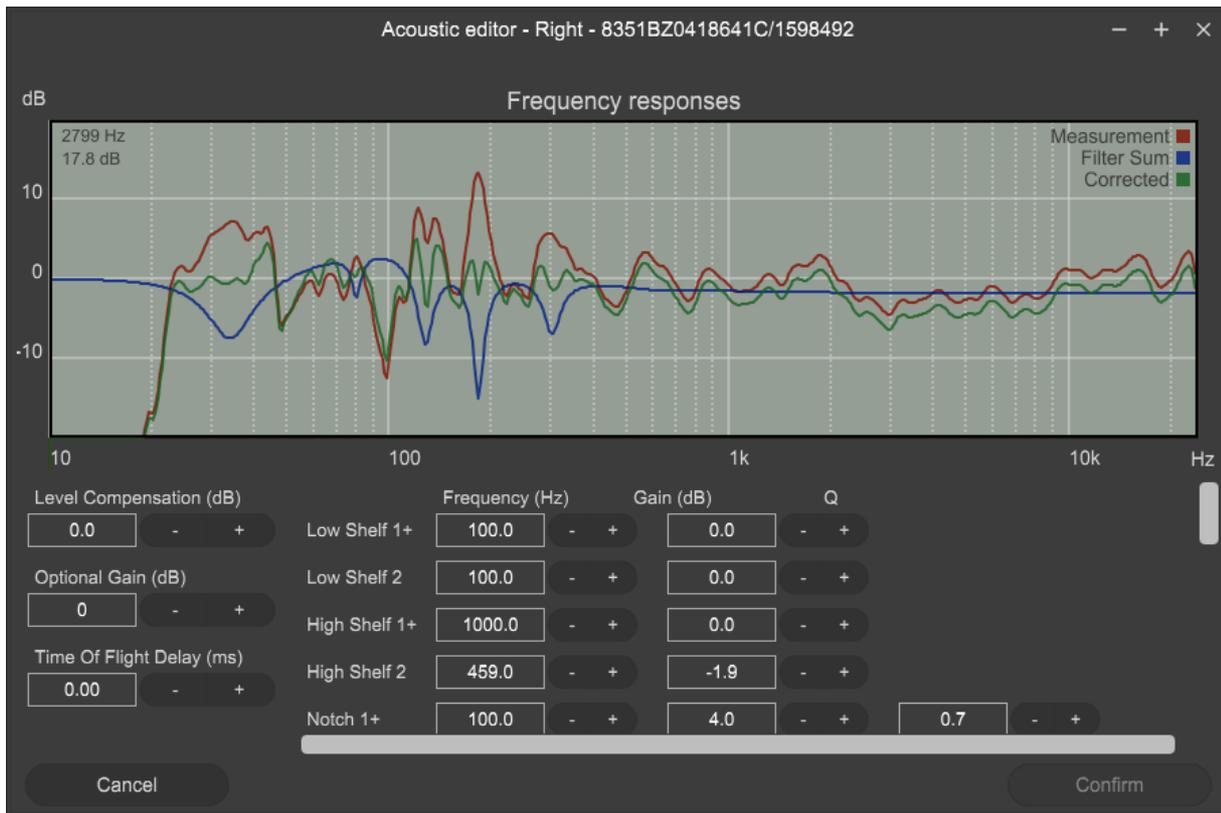


Figure 38. Reviewing the corrections by clicking on the monitor and subwoofer icons.

## 7.19 Advanced use of AutoPhase

AutoPhase uses the selected Bass Management Filter frequency setting together with the selected monitor. The purpose of AutoPhase is to align the subwoofer phase with the reference monitor so that the frequency response across the Bass Management crossover is flat.

### 7.19.1 Acoustical reasons for selecting the crossover frequency

Select a crossover frequency for the group that makes acoustical sense. A good crossover frequency is one that shows good output from at least the subwoofer and the reference monitor. Even better is when there is sufficient output from all monitors at the crossover frequency. The output is sufficient when the level in the equalised frequency response is similar to the midrange level and there is no notch in the frequency response close to the crossover frequency.

### 7.19.2 The steps to run AutoPhase

The steps to run AutoPhase are:

- Before you start, select the Bass Management Filter frequency (see Group Settings).
- Select the subwoofer to be AutoPhased by clicking on the subwoofer icon.
- Select the reference monitor by clicking on a monitor icon (the monitor will be highlighted, and the monitor's LED will flash).
- Click 'Start Calibration'.
- Wait until the measurement process completes.

- Accept the phase setting by clicking 'Confirm Calibration'.

## 8 Editing Acoustic Calibrations

### 8.1 Acoustic Editors

The Acoustic Settings Editor opens with a right-click on the monitor or subwoofer icon in the monitor Group hive view. Use the right click (Windows) or Control-Click (Mac) and select the 'Acoustic Editor' option. The measured frequency responses are shown once the Group has been calibrated. The data is colour coded. The **red curve** is the measured room response. The **blue curve** is the room equalisation filter response. The **green curve** is the equalised room response. You can move the mouse cursor over the frequency responses to see the exact values in the upper left corner of the graph area.

The equalised room response is recalculated and shown whenever room calibration filters are manually adjusted. The sound of the monitor or subwoofer changes immediately when the room calibration filters are manually adjusted. This enables audible evaluation of any changes. The settings are saved only after you click the 'Confirm' button. The acoustical editor has scroll bars to give access to all settings inside the monitors and subwoofers.

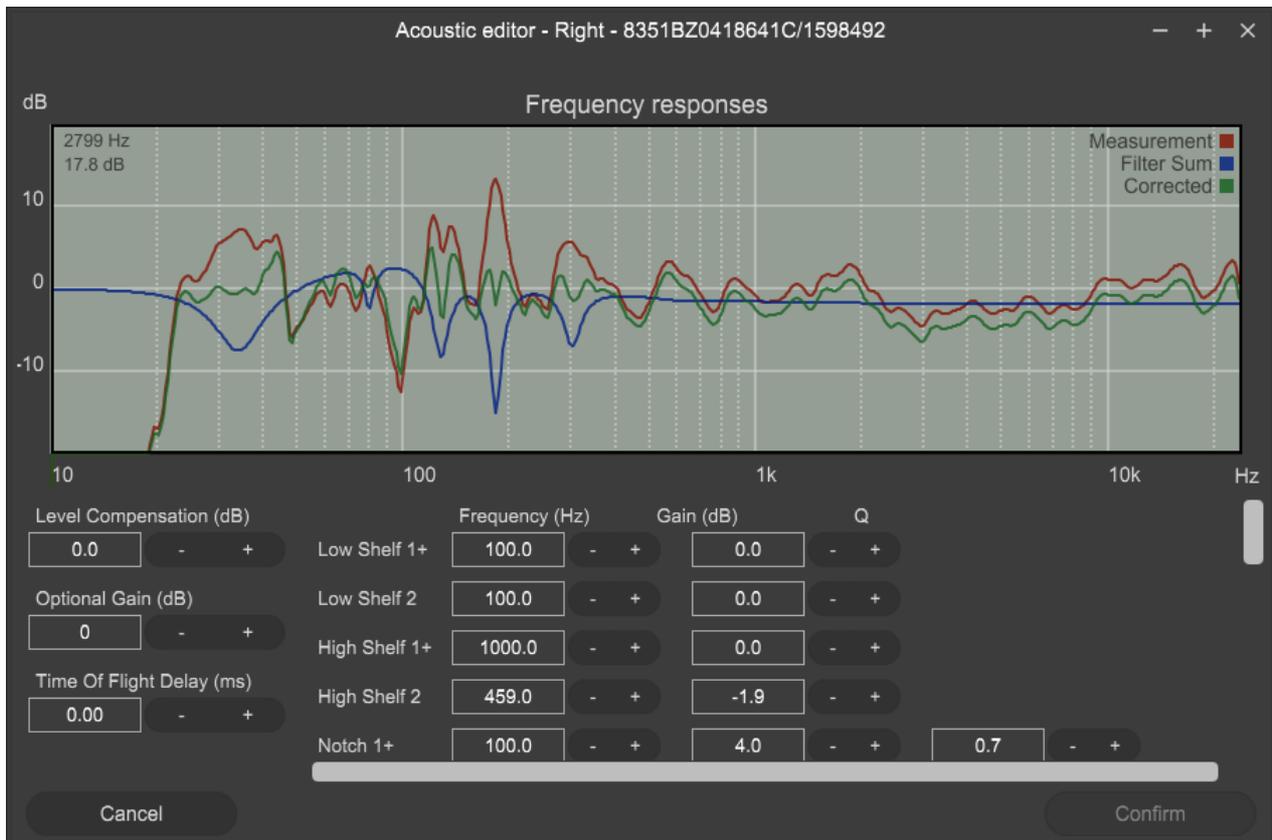
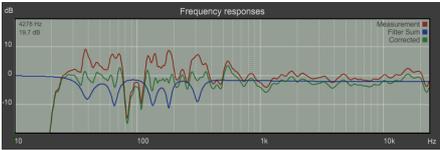
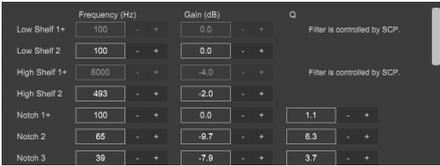


Figure 39. Example of the acoustical calibration editor window.

## 8.2 Descriptions of the Acoustical Settings

Table 3. Acoustical settings

Setting	Description	View
Frequency response graphs	<p>Click on the monitor/subwoofer in the monitor group hive view. Using the right click (Windows) or Control-Click (Mac) and select the 'Acoustic Editor' option.</p> <p>This brings up the frequency response and all settings for this monitor or subwoofer.</p> <p>The measured frequency response (red), room calibration filter (blue), compensated room frequency response (green) are shown.</p>	
Level and delay	<p>Sensitivity adjustment (level) for this monitor/subwoofer. Delay offers a time-of-flight compensation.</p> <p>The optional gain is also available and is used with monitors with very high SPL capability.</p>	
Room Response Equalizer Filters	<p>Low frequency shelving filters (1-2). High frequency shelving filters (3-4). Parametric notch filters (5-20).</p> <p>The number of filters depends on the product. For example, 82xx Series monitors have a different number of parametric filters (5-11).</p> <p><i>Filters 1 and 3 are shared with the Sound Character Profiler.</i></p> <p><i>When paired with a Woofer System, filters 17-20 are cleared and not available.</i></p>	

### 8.2.1 Level and time-of-flight correction Controls in Monitors and Subwoofers

SAM Monitors contain adjustment of the input sensitivity. This is called the level setting. The input sensitivity can be adjusted from the nominal maximum (0 dB) down to – 60 dB.

Time-of-flight compensation is needed when the monitors are at different distances from the listening position. The adjustment range for time-of-flight is from 0 ms (no additional delay) to

45...200 ms, depending on the device model. This range enables complex reproduction systems – with monitors at different distances from the listening position – to be calibrated for the same level and time-of-flight for audio at the listening position.



Figure 40. Level and time-of-flight correction controls.

### 8.2.2 Room Response Equalizer Controls

Each SAM Monitor and Subwoofer contains a set of tools to compensate for the acoustical influences of the room. These tools include high frequency Low Shelf filters 1 and 2, High Shelf filters 1 and 2, and parametric Notch filters 1 to 16. The number and type of room calibration filters depends on the SAM model. For example, subwoofers only contain parametric Notch filters.

The Room Response Equalization filters are automatically set by GLM AutoCal, but all settings are available for manual review, evaluation, and editing.

	Frequency (Hz)	Gain (dB)	Q	
Low Shelf 1+	100	0.0		Filter is controlled by SCP.
Low Shelf 2	100	0.0		
High Shelf 1+	6000	-4.0		Filter is controlled by SCP.
High Shelf 2	493	-2.0		
Notch 1+	100	0.0	1.1	
Notch 2	65	-9.7	6.3	
Notch 3	39	-7.9	3.7	

Figure 41. Room Response Equalizer controls.

In the above view, parameter values can be toggled up and down with the + and - buttons. A value can be directly written into the parameter value field. Press Enter to accept. Also, the keyboard up/down or left/right arrow buttons can adjust a parameter value once it has been selected by mouse.

When the room response calibrations are adjusted, the outcome is shown in the measurement graph window, and it also becomes immediately audible in the sound output of the monitor and subwoofer. Use the scroll bar to scroll up and down the control list to get to the control you want to see.

**NOTE:** *Filters Low Shelf 1 and High Shelf 1 are shared with the Sound Character Profiler. When a monitor is paired with the W371 Woofer System, filters 17-20 are cleared and are not available in the monitor.*

### 8.2.3 Acoustic editor and scoring system for woofer systems

The Woofer System W371 and 8381 also show additional information for the flatness index and the correlation index after AutoCal has run for the W371 and selected monitor or 8381. Click on the monitor/subwoofer in the monitor Group hive view. Use the right click (Windows) or Control-Click (Mac) and select the 'Show Info' option to access this data.

To see the total system response for the W371 and the associated monitor and 8381, bring up the Acoustic Editor. To do this, click on the monitor/woofer or 8381 icon in the monitor Group hive view. Using the right click (Windows) or Control-Click (Mac) and select the 'Acoustic Editor' option. This brings up the frequency response and all settings for this monitor and W371 Woofer or 8381.

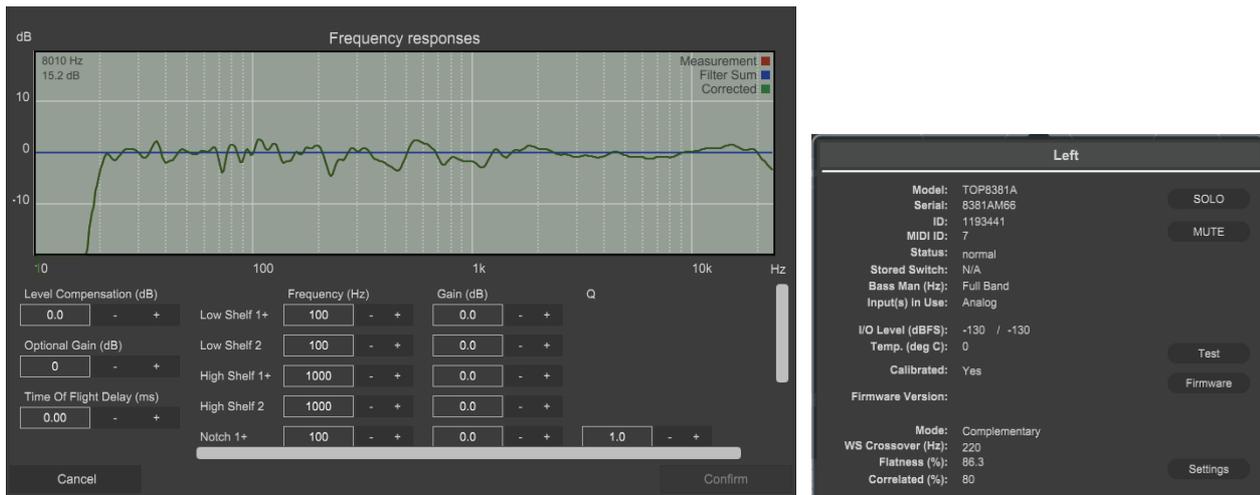


Figure 42. Acoustic editor for Woofer Systems and info on the Flatness and Correlation for Woofer Systems.

In the info panel of each W371 and 8381, the following information – exclusive to Adaptive Woofer Systems (WS) – can be found:

**WS Crossover:** The resulting crossover frequency between main monitor and WS.

**Mode:** The mode of operation chosen for the Adaptive Woofer System calibration.

**Flatness:** This is an indication of how flat the resulting calibrated system response is.

This figure is calculated using the system response from 25Hz to 500Hz. A score of 100% means that the system is perfectly flat in this range, with a lower score indicating there is some deviation. Values in the range of 85-95% can be expected for a good system setup. Values lower than this (in all modes) would indicate that a change in position of listener, main monitor or Adaptive Woofer System may be beneficial to produce a flatter response.

**Correlation:** This is an indication of how well the Left and Right signals of a stereo pair sum at the listener position. This figure is calculated comparing the complex sum (considering phase) of the stereo pair to the absolute sum (ignoring phase). A score of 100% means that (for a correlated signal) the summed response at the listener position has no destructive interference. Values in the range of 90-99% are typical in a setup with good symmetry. Values lower than this (in all modes) indicate that it may be beneficial to consider moving the listening position, main monitor positions or Adaptive Woofer System.

Both the system flatness and correlation scores are simple, quick objective measures to be able to compare the individual calibrations and provide indications if an adjustment of the system setup should be considered. However, subjective evaluation should also be done when making such decisions.

**User controls in the Acoustic Editor:** To preserve the complex interaction between units following calibration, the Woofer System and a main monitor are paired together as a single unit. This means that the Woofer System and the monitor cannot be controlled individually after pairing. However, the pair can be controlled as one unit, and parameters adjusted in the Acoustic Editor will apply to both units.

The Acoustic Editor offers the following controls:

- Delay.
- Gain.
- User EQs (4 shelving filters and 4 parametric equalisers).
- In addition to this, Sound Character Profiler settings are found under the Group Preset menu.

Detailed description of Sound Profiler and EQs can be found in the Sound Character Profiler and the Room Response Equalizer Controls sections respectively.

### 8.3 Sound Character Profiler

The Sound Character Profiler (SCP) can be accessed via the 'Group Presets' menu item 'Sound Character Profiler'. If you feel the *overall* spectral balance of your system needs adjustment, i.e. making the sound generally darker or brighter, the Sound Character Profiler found in the Group pull-down menu is a quick place to start. The settings in the Sound Character Profiler will affect all monitors and subwoofers in the current Group.

Presets include a Manual option, allowing adjustable frequency and gain parameters, for even more precise and personalised tonal balancing.

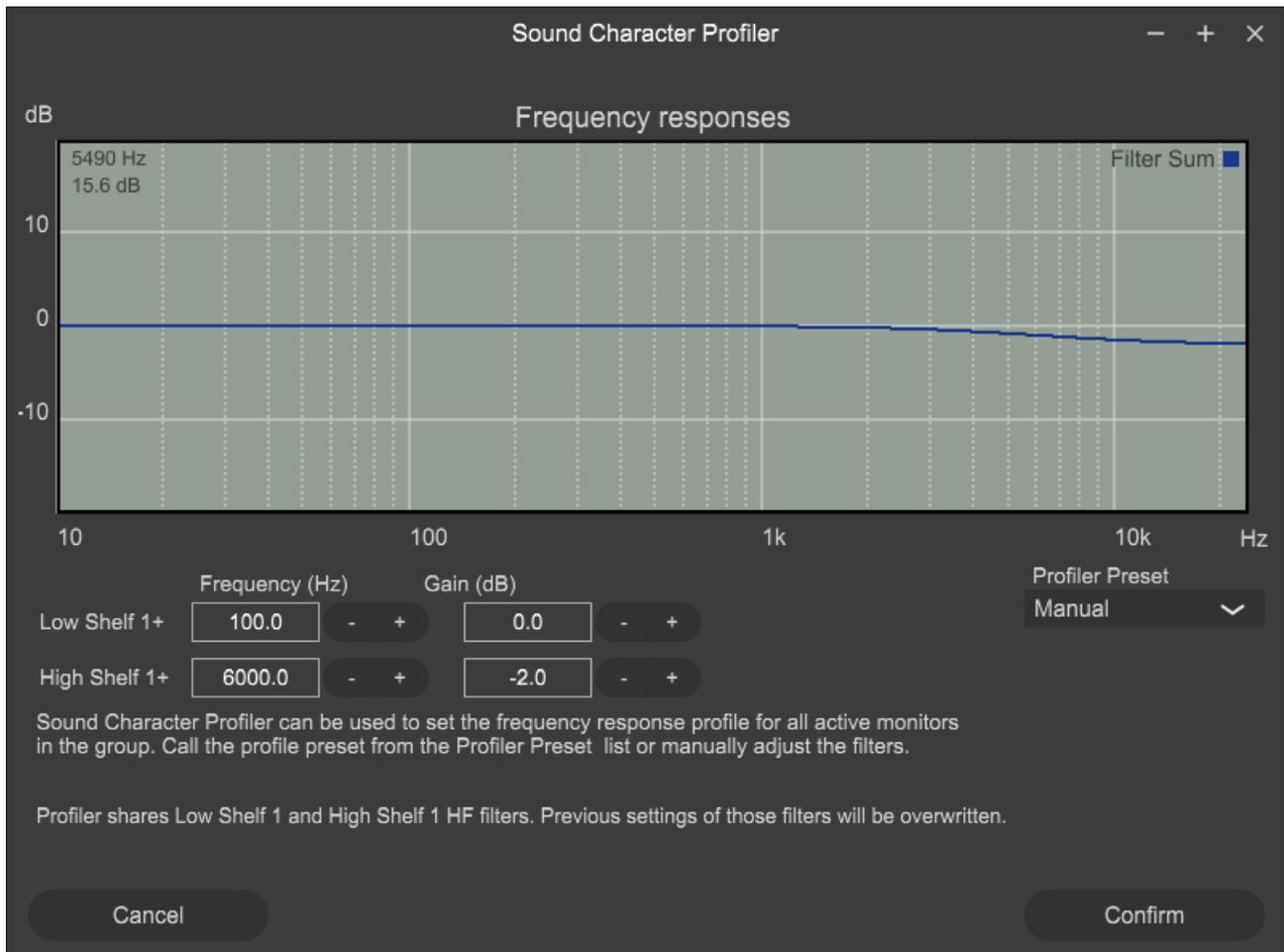


Figure 43. Sound Character Profiler tool.

### 8.4 Level Panel

When the GLM main window is inactive, for example while GLM is in the background of a DAW application, the GLM Level Panel can display a selection of information including

- Master level.
- Dim.
- Preset Levels.
- Bass Management bypass.
- Calibration.

- Group Preset name.
- Microphone level.
- System status.

Settings | Level Panel | Visible sets the Panel on or off and controls the duration of visibility after any change of GLM group, or volume-related settings. To disable the Level Panel, set Visible to 'never.'

Settings | Level Panel | Position sets the location of the Panel on the computer display.



Figure 44. GLM Level Panel.

## 8.5 Optional Gain

The Optional gain in the Acoustic Editor is available for high output capacity monitors and subwoofers that support this feature (\*). The optional gain can be adjusted 6 dB steps (levels 0, +6, +12, and +18 dB). This feature is used when the audio source cannot produce a signal level that is high enough. Using this feature may increase the idle channel noise level created by source.

\* The Optional Gain is available for 8351A, 1237A, 1238A, 1234A, 1234AC 1236A, 1235A, S360A, 8351B, 8361A, 7380A, 7382A, W371A and 8381.

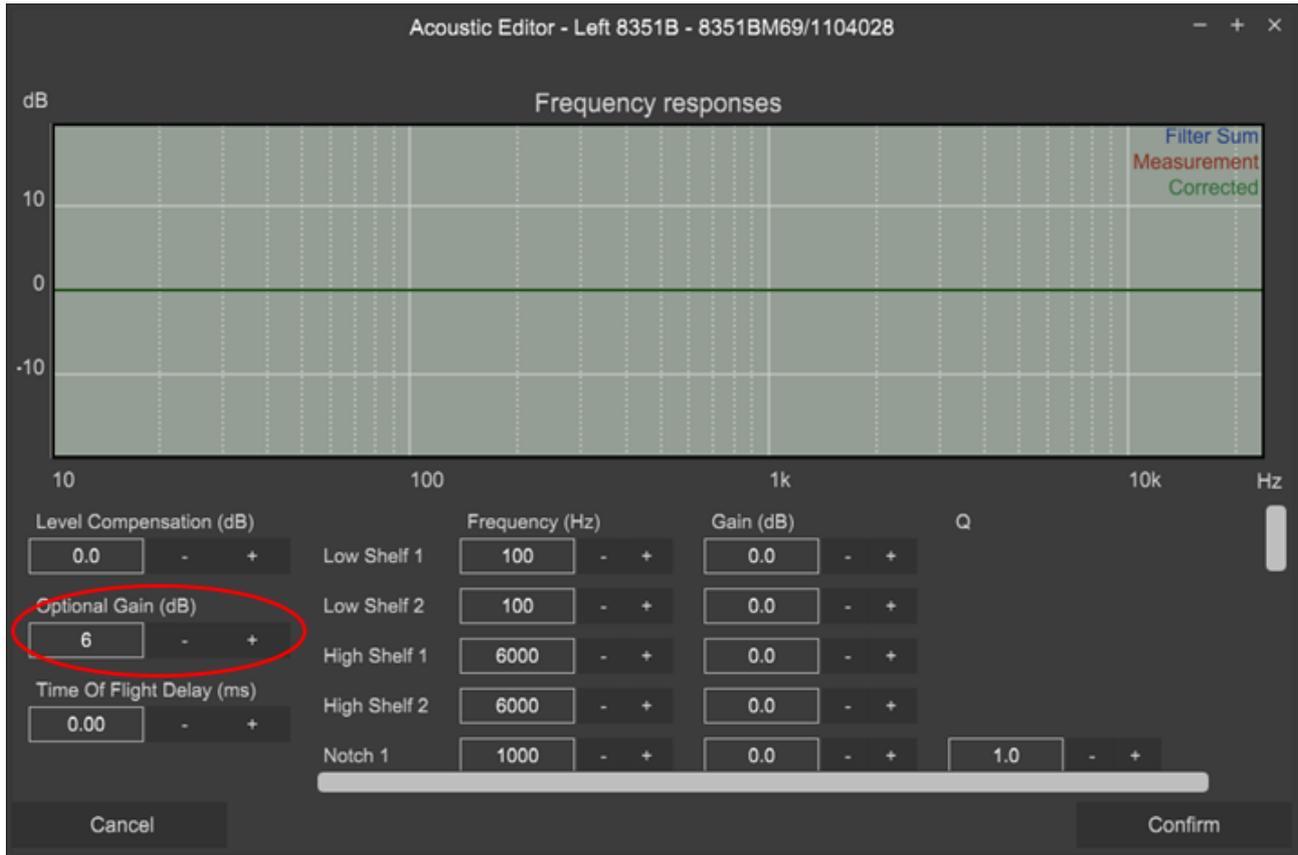


Figure 45. Optional gain option in the acoustic editor.

### 8.6 GLM Control with MIDI

MIDI support enables a MIDI device to control several aspects in GLM, for example the GLM Volume, Mute or Group selection, via MIDI commands. MIDI support can be enabled/disabled using the 'Settings : MIDI settings' menu item.

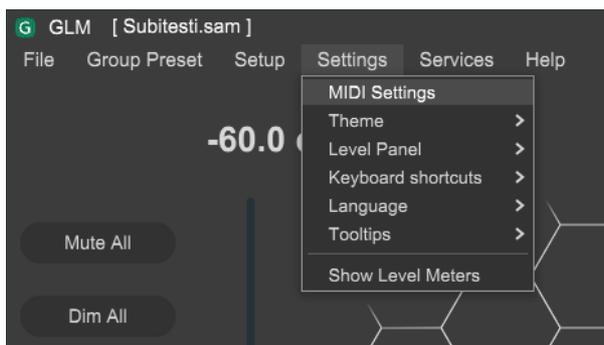


Figure 46. Accessing the GLM MIDI settings.

GLM MIDI Settings

Enable GLM MIDI interface

MIDI Input Device: loopMIDI Port

MIDI Output Device: loopMIDI Port

MIDI Channel: 1

GLM Function	CC	Type	GLM Function	CC	Type
<input checked="" type="checkbox"/> Volume	20	Value (0-127)	<input checked="" type="checkbox"/> Group1	31	Momentary
<input checked="" type="checkbox"/> Volume+	21	Momentary	<input checked="" type="checkbox"/> Group2	32	Momentary
<input checked="" type="checkbox"/> Volume-	22	Momentary	<input checked="" type="checkbox"/> Group3	33	Momentary
<input checked="" type="checkbox"/> Mute	23	Toggle	<input checked="" type="checkbox"/> Group4	34	Momentary
<input checked="" type="checkbox"/> Dim	24	Momentary	<input checked="" type="checkbox"/> Group5	35	Momentary
<input checked="" type="checkbox"/> Preset Level1	25	Momentary	<input checked="" type="checkbox"/> Group6	36	Momentary
<input checked="" type="checkbox"/> Preset Level2	26	Momentary	<input checked="" type="checkbox"/> Group7	37	Momentary
<input checked="" type="checkbox"/> BM Bypass	27	Momentary	<input checked="" type="checkbox"/> Group8	38	Momentary
<input checked="" type="checkbox"/> System Power	28	Momentary	<input checked="" type="checkbox"/> Group9	39	Momentary
Volume Step Size: 0.5			<input checked="" type="checkbox"/> Group10	40	Momentary
<input checked="" type="checkbox"/> Solo Dev.	43	Value (0-127)	<input checked="" type="checkbox"/> Groupx	30	Value (1-10)
<input checked="" type="checkbox"/> Mute Dev.	44	Value (0-127)	<input checked="" type="checkbox"/> Group+	41	Momentary
			<input checked="" type="checkbox"/> Group-	42	Momentary

Annotations:

- Enable/disable GLM MIDI interface.
- MIDI log, messages received from selected MIDI device, MIDI interface must be enabled.
- Can be used to find channel, message type and message ID desired control of MIDI device.
- Selected MIDI device for GLM control.
- Selected MIDI channel for GLM control.
- GLM control function.
- MIDI message type mapped to GLM control function.
- Message ID mapped to GLM control function.

Figure 47. MIDI settings page.

GLM functions, other than Volume, require 'Toggle' MIDI messages to work. Once a button is pressed this sends out a value > 0 and when the button is pressed the second time the message value sent is 0. MIDI controllers usually come with command editing software that allows you to customise the behaviour of the controller components, e.g. encoders, faders, pedals and buttons. For more information, see data about toggle and momentary MIDI functions available in several web sites, for example via this link: [Toggle-and-Momentary-MIDI-functions](#).

Each monitor placed onto the hive grid gets assigned a MIDI ID automatically. The MIDI ID can be used to program the SOLO/MUTE MIDI control for the monitors. The MIDI ID for each device can be found from the monitor info popup by right-clicking the monitor icon in the main page.

Left

Model: 8351B

Serial: 8351BZ041B6406

ID: 1795078

MIDI ID: 7

Status: normal

Stored Switch: Off

Bass Man (Hz): 85

Input(s) In Use: Dig.A

I/O Level (dBFS): -130 / -130

Temp. (deg C): 0

Calibrated: Yes

Firmware Version:

Buttons: SOLO, MUTE, Test, Firmware, Settings

## 9 Stand-Alone Operation

SAM Monitors and Subwoofers are set up and calibrated using GLM Management Network and GLM user interface software.

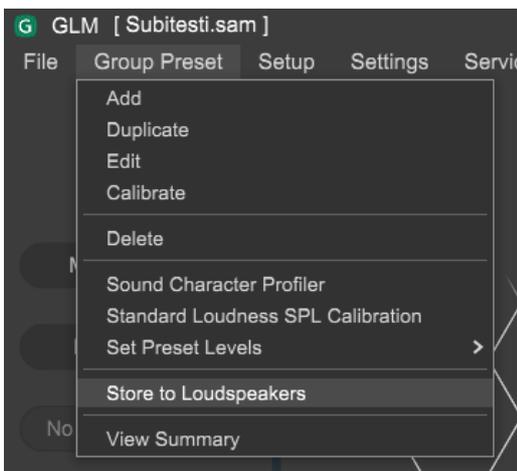
After setup, monitors, subwoofers and the GLM adapter can also operate without having a computer connected to the GLM Adapter. This is called stand-alone operation. The functions related to stand-alone mode include:

- Storing all calibration settings permanently into monitors and subwoofers.
- Using the GLM Adapter as a volume control interface.

### 9.1 Storing values permanently in monitors and subwoofers

SAM Monitors and Subwoofers internally retain their settings after using the Store to Loudspeakers function. **In some monitors and subwoofers, the 'Stored Controls' switch must be turned ON for the stored settings to have an effect!**

Storing is done in the 'Group Presets' menu and 'Store to Loudspeakers' menu command.



Settings that are stored

- Current Group Acoustic Settings.
- Standalone Volume Control Max Level.
- Startup Level.
- ISS sleep delay settings.
- ISS sensitivity settings.
- LED usage settings.
- Input Selection.

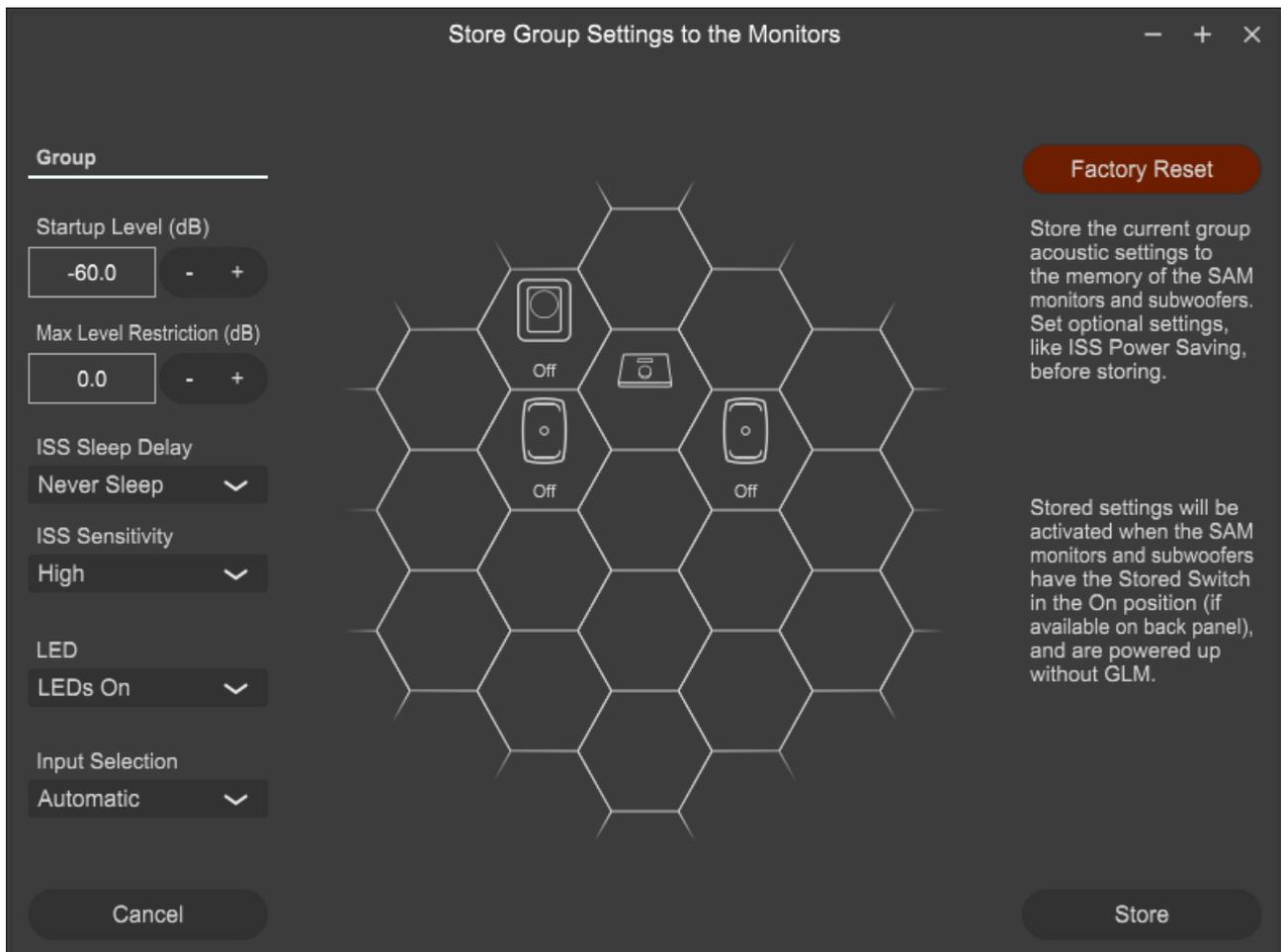


Figure 48. Store Group Settings page.

Support for LED Disable and Input selections is not available in the following products:

7260A, 7261A, 7270A, 7271A, 8240A, 8250A, 8260A, 8351A, 1238CF, 1237A, 1238A, 1238AC, 1238DF, 1234A, 1234AC, 1236A

ISS support is not available in the following products:

7260A, 7261A, 7270A, 7271A, 8240A, 8250A, 8260A, 1238CF

## 9.2 Using a USB power supply

The hardware Volume Controller can also be used for adjusting the sound level when the computer is detached from the GLM Adapter. When this is done, the GLM Adapter must be powered with a standard USB power supply. The voltage output of the USB supply is 5 V DC.

To use an external USB power supply, remove the USB cable from the computer and attach the cable to a USB power supply, as shown below.



## 9.3 Level Control with GLM Cabled Volume Controller

The monitoring level can be controlled without a computer. GLM Volume Controllers are available for this. The cabled GLM Volume Controller connects to the GLM adapter.

When the volume controller has been connected to the GLM Adapter and the computer is connected, the system level fader disappears from the GLM main window. The system level is controlled only with the volume knob as long as it is connected to the GLM Adapter.



Figure 49. Hardware level controller.

## 9.4 Connecting the GLM Volume Controller

The Volume Controller is connected to the GLM Adapter via a 3.5 mm jack showing a level control triangular sign. See the bottom of the GLM adapter for more information.

**Caution: Turn the Volume Controller fully counter-clockwise (level down) before connecting the Volume Controller to the GLM Network Adapter, as the setting on the volume controller will be applied as soon as the controller is connected.**



Figure 50. GLM Network Adapter connections from left to right: USB to computer or to USB power supply, hardware level controller input, GLM Measurement Microphone input, GLM Network and Terminator connectors.

## 9.5 Wireless Volume Controllers

Wireless Volume Controllers are available for adjusting the sound level. The wireless Volume Controllers use radio frequency communication and do not need a line of sight to the GLM Adapter. The typical maximum operating range is 30 metres.

Wireless controllers work with the GLM Adapter after pairing. Wireless controllers are not supported by the Genelec 9320A SAM Reference Controller.

Pairing happens during the first 10 seconds after powering up the GLM Adapter. To pair with a GLM Adapter, on the RF Remote, first press and hold '+' or 'speaker icon +' button and then press and hold '-' or 'speaker icon -' button. To check that the pairing has succeeded, observe the back LEDs of the GLM Adapter. After successful pairing, the back LEDs will start blinking when you press a button on the RF remote. If you do not observe this, repeat the pairing process.

Genelec wireless controllers can increase and decrease the audio output volume level and turn the system on and off. On the six-button remote, the '<' and '>' buttons select the active group when GLM software is running on the computer. For more information on the wireless volume controller, consult your Genelec sales representative.

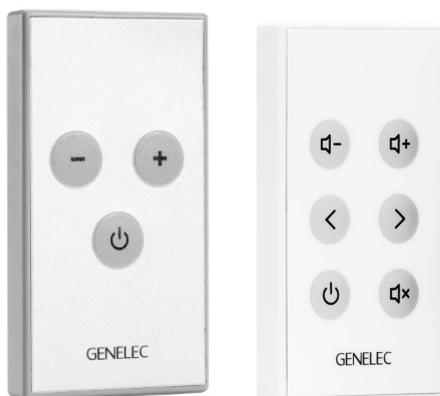
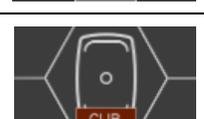


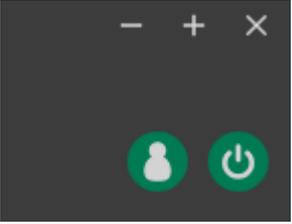
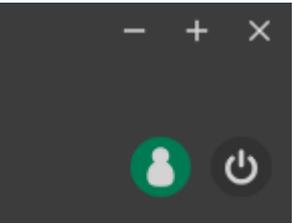
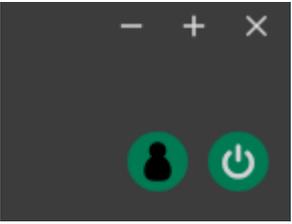
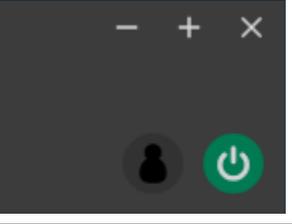
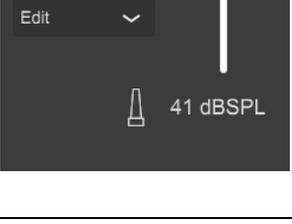
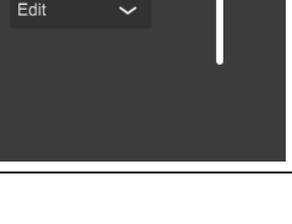
Figure 51. Two wireless remote controllers (9101) for use with GLM.

## 10 Additional Information

### 10.1 GLM display indications summary

Table 4. Display indications summary

Icon	Icon action	Device LED action	Meaning and solution
	Steady green	Steady green	Device is working normally and passes audio.
	Flashing green	Flashing green	Device is working normally, and it is selected (under attention) in the GLM.
	Light outline	Steady yellow	Device is not part of the group; audio does not pass through.
	Black cell	n.a.	Device cannot be found. It may be turned OFF or the network is not working.
	Steady green	Steady green	Device is soloed, audio is passing through.
	Steady red	Steady red	Device is muted, audio is not passing through.
	Clip panel	Flashing red and green	Device is clipping, reduce the level.
	Prot. panel	Flashing yellow and red	Device is under protection, reduce the level.
	Update panel	No indication	Device has an update available.

Icon	Icon action	Device LED action	Meaning and solution
	The Power icon is green	System power is ON monitors are online and LEDs are green.	System is turned ON and functional. The system can be turned OFF by clicking the Power icon.
	The Power Icon is grey	System power is OFF monitors are offline and LED are off.	Monitor(s) are turned OFF and can be turned ON by clicking the Power icon.
	The network icon has dark silhouette	No indication	Login to MyGenelec from Services menu or by clicking the network icon.
	The network icon is all dark	No indication	There is no connection to the Genelec Cloud. Check the internet connection and then Login to MyGenelec from the Services menu or by clicking the network icon.
	The microphone icon is visible	Microphone is connected to the network adapter	Microphone is showing measurements of the sound level. GLM Adapter uses Z weighting, meaning that all frequencies receive the same weight.
	The microphone icon is invisible	Microphone is not connected	Check that the microphone is connected to the 'Mic in' connector.

## 10.2 Monitor and subwoofer LED light indications summary

Table 5. Monitor and subwoofer LED indications summary

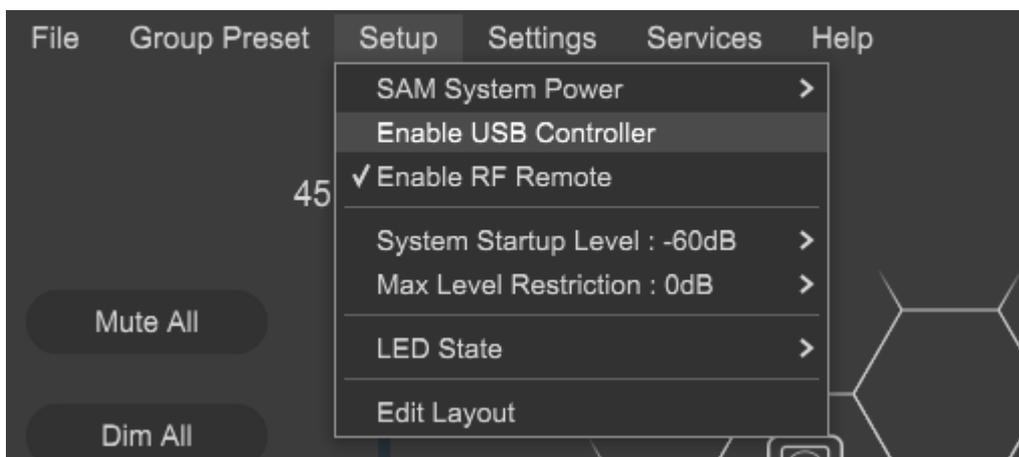
Device LED action	Meaning
Steady green	Normal state.
Slowly blinking green	Normal ISS power saving state.
From yellow to green	Normal operation during device start-up.
Steady yellow	Monitor or subwoofer is not part of the group.
Steady red	Muted from GLM.
Flashing red	Signal clip (analogue).
Flashing red	Bit errors in the incoming AES/EBU digital audio.
Flashing red	Digital signal potential clip (digital audio very close to 0 dB FS).
Flashing yellow	Protection.

**NOTE:** When using the SE7261 subwoofer with digital input monitors (8130), the LEDs of the monitors do not follow the actions listed above.

For example: For the 8130, steady yellow means that the monitor receives a valid digital signal and automatically reproduces this digital signal. Steady green means that the monitor automatically reproduces an analogue audio signal because a valid digital signal does not exist.

## 10.3 Griffin Powermate USB Controller

Griffin Powermate is a USB Controller supported by GLM. No drivers are needed to use the Griffin Powermate with GLM. Griffin Powermate functions can be enabled from Setup / Enable USB Controller menu. The Powermate setting is individual for each GLM Setup file.



Griffin Powermate functions with GLM are:

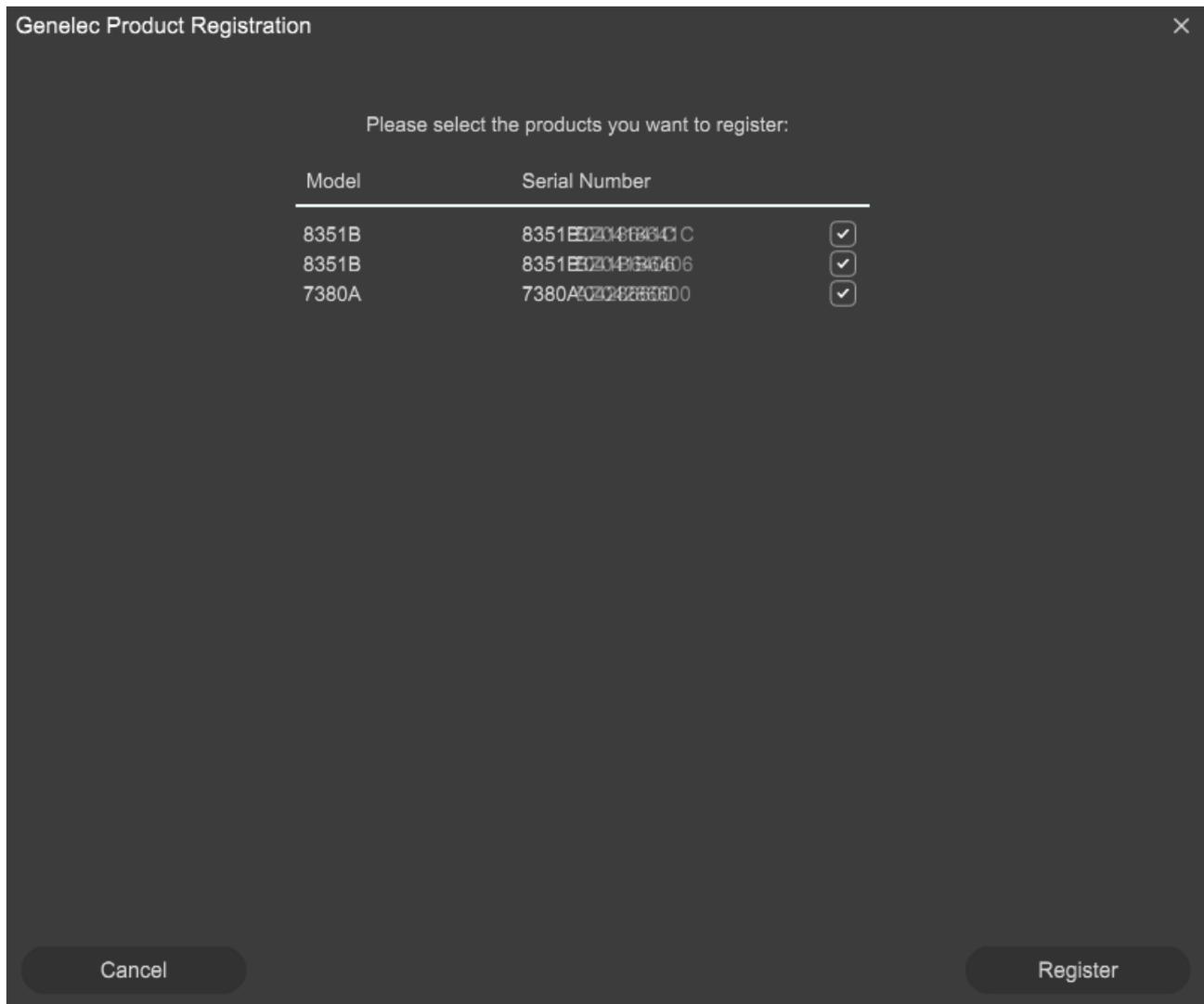
Action	Effect
Rotate Clockwise	Increase level.
Rotate Anti-clockwise	Decrease level.
Press	Mute and unmute.



Figure 52. Griffin Powermate USB controller.

## 10.4 Product Registration from GLM

The **User : Services : Product Registration** menu item now offers a smooth method of registering Genelec products. The registration is available for all the monitors visible on the GLM Network.

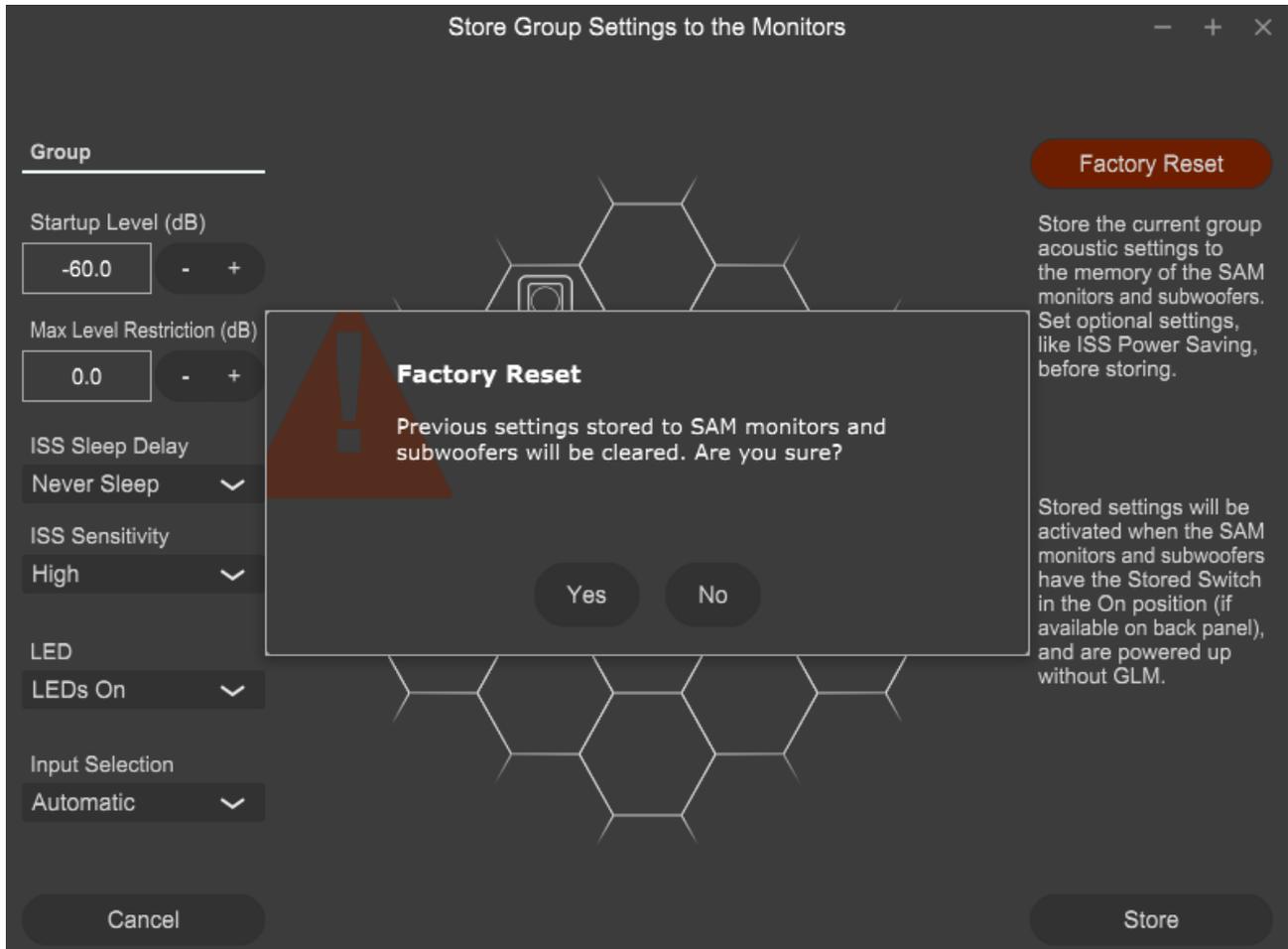


Model	Serial Number	
8351B	8351B0204868400	<input checked="" type="checkbox"/>
8351B	8351B0204868406	<input checked="" type="checkbox"/>
7380A	7380A0204868400	<input checked="" type="checkbox"/>

Each MyGenelec user has a **personal page listing all registered products**, with the option to add and modify the registrations online.

### 10.5 Factory Reset from GLM

The settings stored on monitors and subwoofers can be set back to factory defaults from the 'Store Group Settings to the Monitors' page (Group Preset : Store to Loudspeakers menu item). The factory reset can be done by clicking the 'Factory Reset' button and confirming the reset in the dialogue.



## 10.6 Uninstalling GLM

To uninstall GLM:

Windows:

- Uninstall GLM from **Control Panel\All Control Panel Items\Programs and Features**.
- Delete **glm5.log** and **GLMv5.cfg** files from **C:\Users\username\AppData\Roaming\Genelec** folder. These files are unique for each user.
- Delete **C:\Users\username\Documents\Genelec\GLM5** folder, including setup files. This is unique for each user.

Mac:

- Delete **GLM5.app** from **/Applications** -folder.
- Delete **glm5.log** file from **~/Library/Logs/Genelec** -folder. This is unique for each user.
- Delete **glm5.cfg** file from **~/Library/Application Support/Genelec** folder. This is unique for each user.
- Delete **~/Documents/Genelec/GLM5** folder, including setup files. This is unique for each user.

If GLM configuration needs to be cleared, then delete the **GLMv5.cfg** file. After this, launch GLM and use **File : Open** to load existing setup files.

## 11 Frequently Asked Questions

### 11.1 Why do ID tones vary in different system configurations?

Different SAM monitors generate different identification tones. The identification tones are listed in the table below.

Table 6. Identification tones

SAM Systems	Used ID tone
82xx Series SAM monitors	Pink noise
83xx Series SAM monitors	Pink noise (SAM system ID tone was used earlier)
72xx Series SAM subwoofers	Low frequency sinewave
73xx Series SAM subwoofers	Low frequency sinewave (SAM system ID tone was used earlier)
12xx Series SAM monitors	Pink noise

### 11.2 How do I duplicate a Group?

A Group can be duplicated. This is a safe way to manually edit acoustic settings.

Choose the Group you want to duplicate by clicking on the Group name. The active Group is highlighted in green colour. To create a duplicate of this Group, in the 'Group Preset' menu, choose 'Duplicate'. This creates a full copy of the selected Group including all acoustic settings. The duplicated Group gets a default name. You can change the default name to what you want to have by selecting the new Group, in the 'Group Preset' menu select 'Edit'. To finalise your edit, choose 'Confirm Group' and 'Confirm AutoCal' to exit the edit.

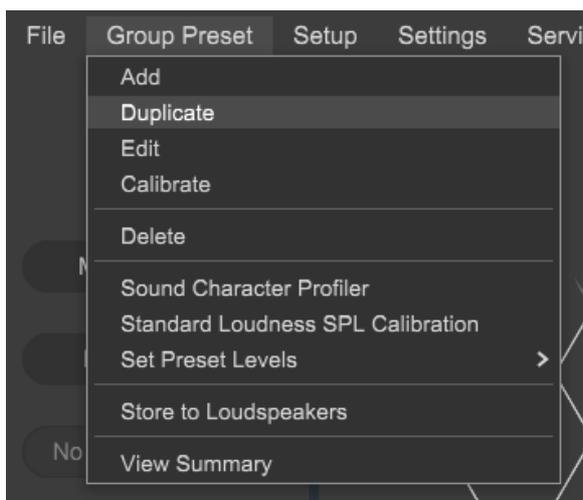


Figure 35. Using the 'Group Preset' menu to duplicate a Group.

### 11.3 How can I update firmware?

Firmware updates are necessary to ensure that your SAM system can support all features, continues to have the highest performance and benefits fully from calibration. Firmware updates may also be suggested by GLM for other devices, if they have not been updated earlier. Please follow the instructions below to check if updates are available.

The firmware update is started within GLM software, in the *Info Feature*. The steps required to check and update the firmware depend on whether you have previously run any system setups.

#### **Steps to apply firmware updates for users that have completed at least one system Setup, which is now actively running.**

- Right click on any monitor or subwoofer icon on the GLM software main page and choose “Show Info” to open the info popup.
- Click the “Firmware” button to open the Firmware update window.
- See the Current Version, and Version Available info if the firmware update is available. Check the “Update” checkbox to select a monitor to be updated and then press the “Update” button to update the firmware.
- **Wait until all selected devices are updated. The update status is indicated in the “Status” column. The update usually takes less than one minute per monitor.**
- Close the Update window after all monitors are updated.

#### **Steps to apply firmware updates for users that are setting up for the first time and have not completed any system setup yet.**

- Connect the GLM Adapter or 9320A SAM Reference Controller to the computer and connect the monitors and subwoofers to the GLM adapter / 9320 Reference Controller.
- Launch GLM and create a system layout.
- Define a Group.
- Skip AutoCal and AutoPhase (by pressing the ‘skip’ button).
- Save the Setup with any name.
- The main window will now open.
- Right click on each monitor, subwoofer or network adapter icon in the GLM software main page and choose “Show Info” to open the info popup.
- See the Firmware Version info field. The update button will be active if an update is available, then press the “Update” button to update the firmware.
- Wait until the device is back online. This usually takes less than one minute.
- Repeat the process for all monitors on the GLM Network.
- Perform the acoustic calibration by selecting the Group: Edit Group menu item.

**Genelec Firmware Update** ✕

The latest firmware versions available for each devices online. Click the Update -checkbox to update the device firmware and click the Update button to start.

Device Name	Current Version	Version Available	Update	Status
Left	8351B 3 0.0.0 1.20.2.5009	sw1_20_2_5009_hw0_0_0	<input checked="" type="checkbox"/>	Will be updated
Right	8351B 3 0.0.0 1.20.2.5009	sw1_20_2_5009_hw0_0_0	<input checked="" type="checkbox"/>	Will be updated
Left 7380A	7380A 1 0.0.0 1.12.2.5047	sw1_12_2_5047_hw0_0_0	<input type="checkbox"/>	-

Update

Close

## 11.4 How do I compare a calibrated and uncalibrated SAM system?

A) Using the AutoCal Bypass button located on the main page. One can evaluate the benefits of using AutoCal calibration. When the Bypass button is active, all AutoCal-optimised acoustic settings are bypassed.

The influence you hear during bypass is complex because all these settings are temporarily set to default values where they have no effect:

- Equalisation to reduce and remove room colourations.
- Level calibration for the listening position.
- Time-of-flight compensations for the differences in monitor distances to the listening position.
- System delay compensation (system delay is an additional delay applied to all monitors and subwoofers).

B) After a Group has been calibrated and the calibration has been confirmed, the acoustic settings are set for the Group and stored in a Setup file.

An uncalibrated Group can be created as follows: Select a calibrated Group, then use the menu item 'Group | Add Group' and select 'Confirm Group'. Then click 'Skip Calibration'. This operation retains the Group configuration but clears all the acoustic settings and restores the factory settings.

### **11.5 How so I calibrate SAM systems for different listening positions?**

Groups can be used to calibrate SAM systems for different listening positions (sweet spots). First, create a group and calibrate it to the first listening position. Then, choose this group and choose menu command 'Group | Add Group'. Name the new group and make the necessary edits to it and click the 'Confirm Group' button. Next, place the Genelec calibration microphone at the second listening position and run calibration by double-clicking on the measurement microphone icon.

After both groups are created and calibrated, the location-specific calibration for each listening position can easily be selected by selecting the corresponding group tab in the main GLM window.

### **11.6 Can analogue and digital signal sources be mixed?**

Yes and no. One type of signal can be used in one group. However, it is easy to create two groups, one for analogue input and another for digital audio input. After this, switching from one group to the other will select the input signal type.

### **11.7 How do I switch between analogue and digital signal?**

Groups can be defined to select analogue or digital input signals. Both types of signal can be connected to Genelec SAM Monitors.

The group definition contains the selection of analogue or digital audio input signals. The selection applies to all monitors and subwoofers in the group.

Note that a digital signal cable carries typically two channels of audio. For this reason, the channel to be reproduced needs to be selected for each SAM Monitor by selecting the subframe A or B. GLM software offers default values that cover the most common channel pairings (for example, in digital stereo, the subframe A is selected for the left monitor and the subframe B is selected for the right monitor).

### **11.8 What does ISS mean?**

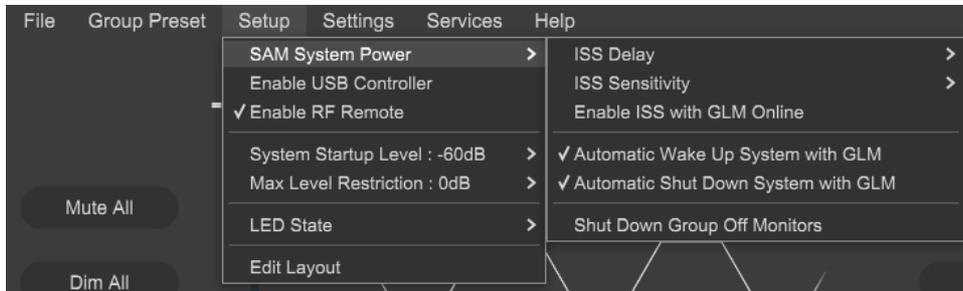
ISS a Genelec trademark and it refers to **I**ntelligent **S**ignal **S**ensing. ISS will put monitors or subwoofers into a low-power consumption state when there is no audio or control signal detected for a certain period. When in ISS state, monitors and subwoofers wake up after audio or control is detected again.

### **11.9 Can I power up and shut down the SAM system with GLM?**

Yes. The 'SAM System Power' menu item can be used to power up and shut down a SAM system. By default, GLM will send a wake-up command to the GLM Network when the application is launched – if the 'Automatically Wake Up System with GLM' menu is checked – and all SAM monitors and subwoofers will power up.

When the GLM application is closed, SAM monitors and subwoofers will continue to play audio by default. It's possible to turn off the whole system when the GLM application closes. Choose this functionality by checking 'Automatically Shut Down System with GLM' in the menu. This selection sends a shut/down command to the GLM network when the GLM application closes.

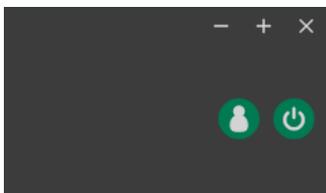
These two menu items are stored in each GLM Setup file.



The 'Enable ISS with GLM Online' selection enables GLM to continuously monitor the input level to the monitors, and to turn ISS active, powering down the monitors, when no input is detected during the selected time. Normally, having the GLM active prevents the monitors to go into power-saving ISS state. The time and level to engage ISS power save are set in the 'ISS Delay' and 'ISS Sensitivity' settings.

When the 'Shut Down Group Off Monitors' can be selected to automatically power down all the monitors that are not assigned to be part of the currently active Group.

The Power icon sends a single command to the GLM Network. It can be used to, e.g., wake up monitors that have been powered down by using the power push button on the monitor.



Notes:

- Some older SAM models won't support ISS (8240, 8250, 8260, 1238CF, 7260, SE7260, 7270, 7271), and some models require a firmware update (8351, 12xx with version 'xxxx x xxxx 0152 xxxx' or older).

## 11.10 Why are my monitors not going into ISS state?

The reason could be that the monitors are sensing an analogue signal. It's possible to change the ISS power saving sensitivity. ISS Power Saving sensitivity can be selected between three levels: High Sensitivity (default), Medium Sensitivity and Low Sensitivity. High Sensitivity means that a smaller analogue audio signal is needed to wake up/keep active the monitor or subwoofer. Low Sensitivity means that a bigger analogue audio signal is needed to wake up/keep active the monitor or subwoofer. Set and store the ISS settings with the other group settings by clicking 'Store Group Settings' and using the 'Group : Store Group Settings' menu command.

Notes:

- GLM Network communication and AES/EBU digital audio clock will wake up / keep active the SAM Monitor or Subwoofer.
- Some older SAM models won't support ISS (8240, 8250, 8260, 1238CF, 7260, SE7260, 7270, 7271) and some models require a firmware update (8351, 12xx with version 'xxxx x xxxx 0152 xxxx' or older).

### **11.11 What is the “Not used in this setup” bin in the Layout page?**

This bin, or box, enables handling of unused 8130 channels when defining the number of monitors connected to a SE7261 subwoofer. For example, if only two 8130 are connected to input / output number 1 on the SE7261, the 8130 monitor channels 1A and 1B are placed onto the Layout Grid. The unused monitor channels 2A thru 4B (total of six channels) can then be dragged to the 'Not used in this setup' bin.

### **11.12 How I replace a monitor with a new one?**

To replace the monitor or subwoofer with a new one click the 'Setup' menu 'Edit Layout' item. This will open the Layout page. The monitor or subwoofer to be replaced is greyed out on the grid and a new one is in the Stack. Drag the new monitor or subwoofer and drop it over the old monitor or subwoofer. Devices are swapped and the old monitor or subwoofer is placed into the Stack. Drag the old monitor or subwoofer to the 'Not used in this setup' bin and click the 'Confirm Layout' button. Replacement is done and the system can be used normally.

The replacement will copy all settings from the old one to the new one, if models are matching. Otherwise, recalibration is required.

### **11.13 How do I edit the System Layout?**

To edit the System layout, click the 'Setup' menu 'Edit Layout' item. This will open the Layout page. Move monitor and subwoofer icons as desired and click the 'Confirm Layout' button. Replacement is done and the system can be used normally.

### **11.14 Can I use 73xx subwoofers with non-SAM monitors?**

Yes, and with GLM, the 7360, 7370 and 7380 subwoofers can be used under the control and calibration available with GLM and AutoCal while using non-SAM monitors.

Since the 7360, 7370 and 7380 have the built-in 85Hz analogue HP filters that are regularly available in Manual mode using the panel DIP switches, there is a feature in GLM that enables the 85Hz High Pass outputs and AutoCal filters as well as phase control available for optimisation.

Making a new Setup with GLM:

1. Launch GLM and make File > New.
2. Drag the 7360, 7370 or 7380 off the Stack and place in on the Grid. Press 'Confirm Layout'.
3. Then on the Group Define page check the box marked 'High Pass analogue outputs 85Hz'. 'Confirm Group'.

4. On the Calibration Page, make all the checks for mic placement and serial number entry. Double click the mic icon and do the AutoCal calibration for the subwoofer. Confirm Calibration.
5. Skip **AutoPhase**.
6. Save the Setup and return to Main Screen.

Setting Manual Phase In Hybrid Mode From the Main Page:

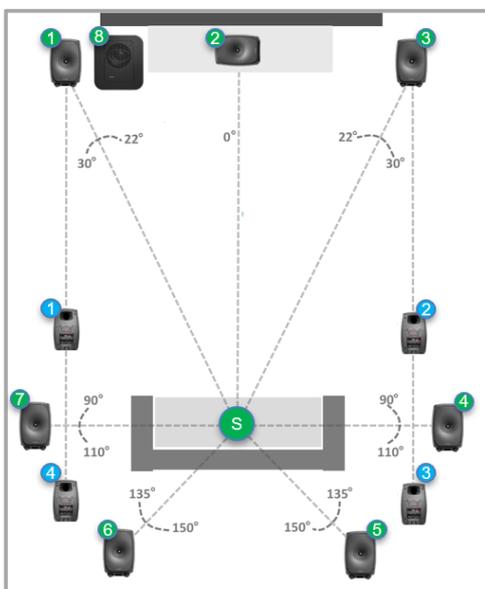
1. Increase GLM Master Fader to -0dB (Full up).
2. Double click the sub icon. The Acoustic Settings page will appear. Move it to the left or right of the GLM Main Page.
3. Provide a test signal at the crossover frequency to the subwoofer input.
4. Using the mic SPL reading, slowly change **Phase setting** using the < or > keys. We suggest you start at -180 then click > stopping at -135, -90, -45, 00, +45, +90, +135, +180 and then noting which setting is the loudest SPL on the mic. Do this slowly (about 4 seconds intervals) as the mic uses a slow update rate. Then choose 'Confirm Settings'.

Adjusting level with Mains:

It is possible, with significant subwoofer EQ bass reduction in AutoCal (see acoustic traces above), that the Main speakers may need attenuation to level match the compensated sub. This may require a bit of experimentation and can be confirmed by Bypassing the Bass Manager 85Hz filter as well as adjusting the sensitivity on the main monitor inputs. Press the Subwoofer Bypass button ON, then OFF to make this comparison.

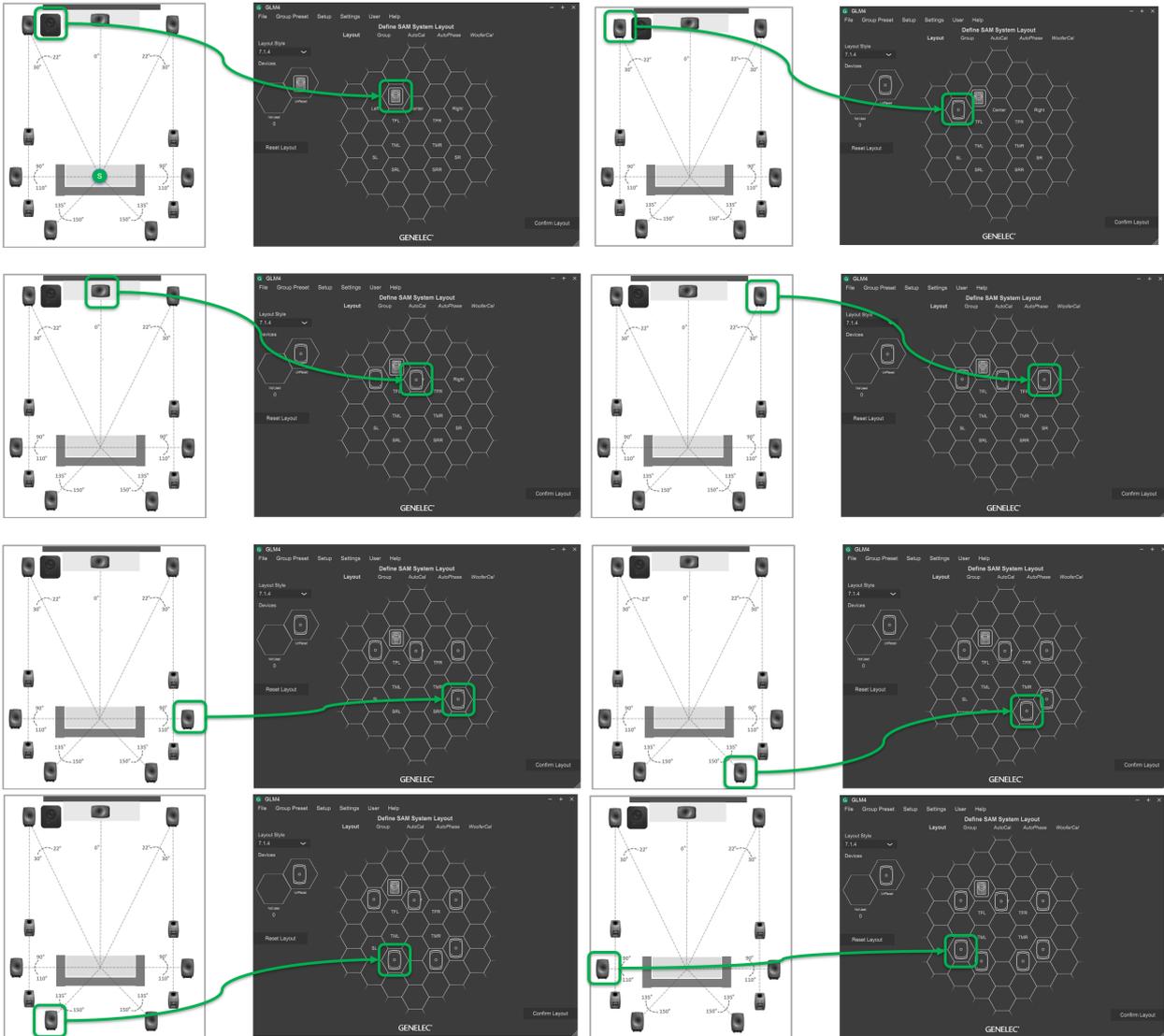
## 11.15 Can I use SAM monitors in 3D Immersive Audio Systems?

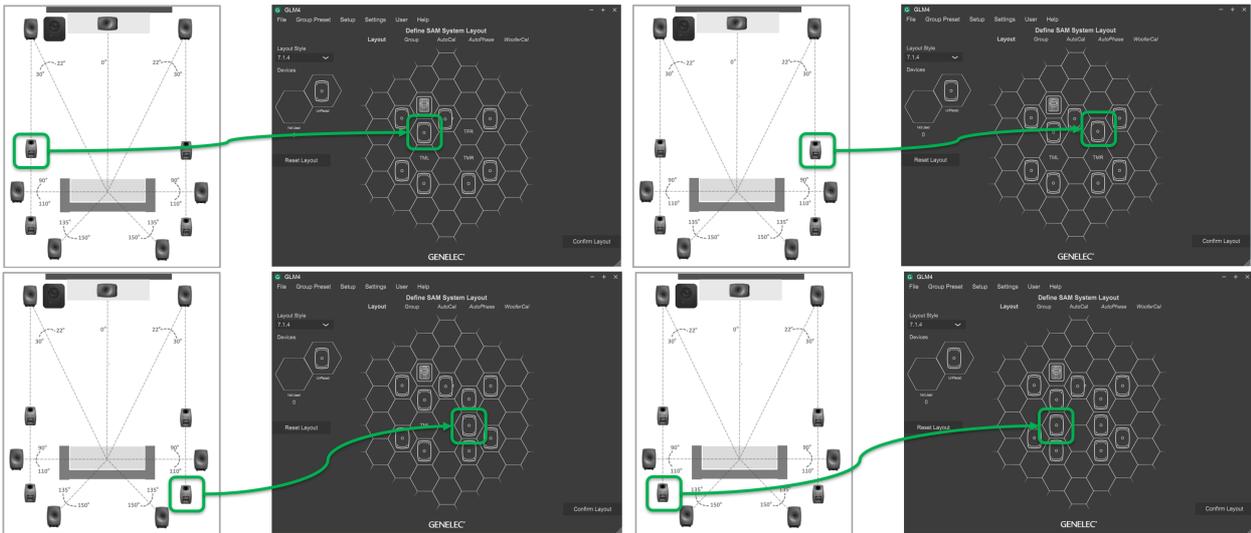
Yes. Immersive audio systems are very easy to setup and calibrate with SAM Monitors and Subwoofers. Here is an example of how to create a Dolby Atmos 7.1.4 system layout in GLM. Configuration of the system in the room is shown below. The green tags are ear-level surround monitors and the blue tags are overhead monitors (top layer).



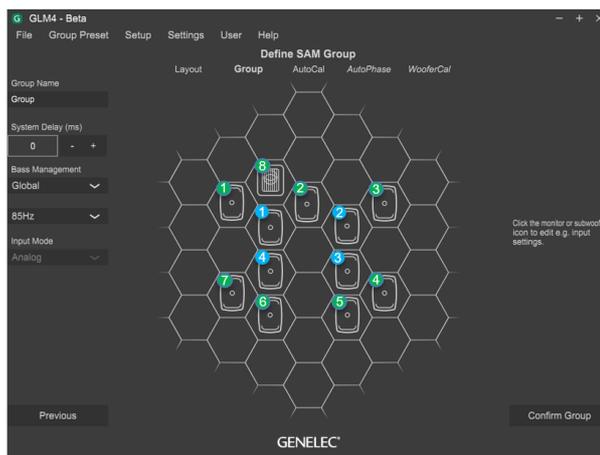
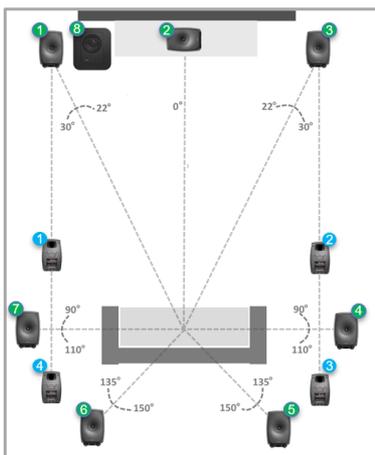
- ① - Left
- ② - Center
- ③ - Right
- ④ - Surround Right
- ⑤ - Rear Right
- ⑥ - Rear Left
- ⑦ - Surround Left
- ⑧ - LFE
- ① - Top Front Left
- ② - Top Front Right
- ③ - Top Rear Right
- ④ - Top Rear Left
- Ⓢ - Seating Position (Sweet Spot)

*Defining a system layout in GLM:* Start by selecting a layout style 7.1.4 and dragging monitors and subwoofers from the Unplaced box to the grid. Each monitor and subwoofer plays an ID Tone when dragged and that helps to identify which monitor is handled. For example, when dragging a subwoofer, it plays a sine tone and can be placed to the grid. The next page shows an example where each monitor is placed to match an Atmos layout. Note that monitors may not appear in the same order as in these examples.





After all monitors and subwoofers are placed on the grid, confirm the layout by clicking the ‘Confirm Layout’ key. After confirmation, monitors should be shown comparable to the picture below. GLM assigns default names to monitors and the ‘Top Front Left’ in Atmos system is named “Left”. To rename, click the ‘Top Front Left’ monitor icon (Blue 1 tag) and change the name.



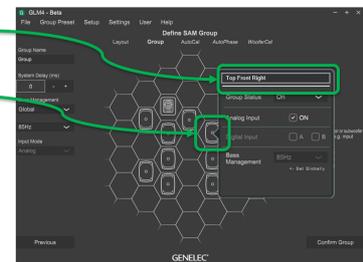
2. Rename monitor Top Front Left

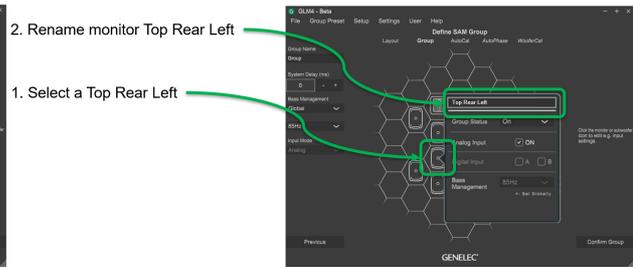
1. Select a Top Front Left



2. Rename monitor Top Front Right

1. Select a Top Front Right





Dolby Atmos works like other multichannel or immersive systems, so no special operations are needed in GLM. AutoCal compensates room responses, level and time-of-flight differences automatically; and SPL level calibration is performed as the last step, as described previously.

# GENELEC®

the sonic reference

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