



SLS™ CS301MH Speaker User's Guide

Issue 2

Part Number 9112477

26 August 2020

Dolby Laboratories, Inc.

Corporate Headquarters

Dolby Laboratories, Inc.
1275 Market Street
San Francisco, CA 94103-1410 USA
Telephone 415-558-0200
Fax 415-645-4000
www.dolby.com

European Headquarters

Dolby International AB
Apollo Building, 3E
Herikerbergweg 1-35
1101 CN Amsterdam Zuidoost
The Netherlands
Telephone 31-20-651-1800
Fax 31-20-651-1801

Technical Support

Dolby Laboratories
Portal: <http://customer.dolby.com>
Email: cinemasupport@dolby.com

Region	Support Phone Numbers
Americas	+1-415-645-4900
EMEA	+44-33-0808-7700
APAC	+86-400-692-6780
Japan	+81-3-4540-6782

LIMITED WARRANTY AND WARRANTY EXCLUSIONS:

THE LIMITED WARRANTY AND WARRANTY EXCLUSIONS MAY BE FOUND AT THE FOLLOWING URL:
<https://www.dolby.com/us/en/about/warranty-and-maintenance-policies.html>.

PATENTS:

THIS PRODUCT MAY BE PROTECTED BY PATENTS AND PENDING PATENT APPLICATIONS IN THE UNITED STATES AND ELSEWHERE. FOR MORE INFORMATION, INCLUDING A SPECIFIC LIST OF PATENTS PROTECTING THIS PRODUCT, PLEASE VISIT <http://www.dolby.com/patents>.



IMPORTANT SAFETY INSTRUCTIONS



1. **INSTALLER ASSUMES ALL RESPONSIBILITY AND LIABILITY FOR THE INSTALLATION OF THIS PRODUCT.**
2. Prior to installing this product, read and completely understand the installation instructions. You must read these instructions to prevent personal injury and property damage. Keep the installation instructions in an easily accessible location for future reference.
3. Installation must be performed by qualified, licensed, and insured installers, and installed in accordance with all laws, rules, and regulations applicable to the installation site. Failure to do so could result in serious personal injury or even death. Consult an installation professional if you do not understand the installation instructions.
4. Compliance with local building codes (and, where applicable, national codes) is the responsibility of the installer. Installers should consult with local regulatory authorities for specific codes and/or guidelines for the use of this product.
5. Use proper personal lifting techniques when working with heavy objects to avoid personal injury.
6. Any supplied rigging hardware is intended only for use with the specified loudspeaker. The installer assumes all risk of loss and/or injury arising out of the use of the supplied rigging hardware with any other loudspeaker.
7. This guide is meant only for the purpose of instructing the installer in the intended use of SLS supplied rigging. All other rigging is considered part of the venue and/or installer supplied equipment and is not addressed in this guide.
8. This guide is not a comprehensive source for rigging in general. Installer assumes all responsibility for ensuring that accepted rigging and safety practices are employed. Installer assumes all responsibility for the appropriate use of SLS supplied rigging hardware and follows at a minimum all applicable laws, rules, and regulations in force for each venue.
9. Do not install on a structure that is prone to abnormal vibration, movement, or chance of impact. Failure to do so could result in damage to the equipment and/or damage to the mounting surface.
10. Make sure that no water pipes, natural gas lines, electrical wire, or conduit are present where the speaker is to be installed. Cutting or drilling into water pipes, natural gas lines, electrical wire, or conduit could cause serious personal injury or property damage.
11. Prior to installation, always inspect all hardware components for wear, deformations, corrosion, and missing or damaged parts.
12. This product is intended for installation in dry indoor locations only. Premature product failure or serious personal injury could occur if this product is used outdoors or in wet indoor environments.
13. No open flame sources should be placed on or near the apparatus. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produces heat.
14. Only clean product with a dry or damp cloth.
15. Do not block any ventilation openings.

16. Hearing damage can result from prolonged exposure to excessive sound pressure levels (SPL). The loudspeaker is easily capable of generating SPL sufficient to cause permanent hearing damage to performers, production crew, and audience members. Caution should be taken to avoid prolonged exposure to SPL in excess of 90 dB.
17. The products covered by this manual are not intended for use in rain or high-moisture environments. Moisture can damage the product and cause corrosion of electrical contacts and metal parts. Do not expose the speakers to rain or direct moisture.
18. Keep speakers out of extended or intense direct sunlight.
19. The loudspeaker can generate considerable acoustical energy and may move during use. The system must be mounted in a way that allows sufficient clearance for this movement without risk of contact with the building structure, rigging, or other equipment.
20. Installed systems should be inspected at least annually or as required by local laws. The inspection shall include a visual survey of all corners and load-bearing surfaces for signs of cracking, water damage, delamination, or any other condition that may decrease the strength of the rigging frame and speakers. The rigging hardware must be inspected for fatigue at least annually or as required by local laws. The inspection shall include a visual survey of the hardware for signs of corrosion, bending, or any other condition that may decrease the strength of the hardware.
21. THIS APPARATUS IS NOT INTENDED FOR STAND-ALONE FLOOR-STANDING INSTALLATIONS WITH NO ANCHORAGE.
22. DO NOT SUSPEND, HANG, OR FLY THIS APPARATUS.
THIS APPARATUS MUST BE INSTALLED ACCORDING TO THE INSTRUCTIONS IN THIS MANUAL.
23. No information contained in this guide is intended as a warranty on the part of SLS. Anyone using this information assumes all liability arising from its use. Product abuse, use of the product not in accordance with SLS instructions, or use in an application for which the product has not been designed is not covered under any SLS warranty, nor is SLS liable for any loss or damage.

Table of Contents

Chapter 1 Introduction	1
1.1 CS301MH Overview	1
1.2 CS301MH Specifications	1
1.3 Processor Settings	2
Chapter 2 Installing the SLS CS301MH.....	3
2.1 Installing the SLS CS301MH	3
2.1.1 Tools Required.....	3
2.1.2 Positioning the CSB215.....	4
2.1.3 Installing the CS301MH with a CSB215	4
2.2 Connecting Audio	7
2.3 Dimensions.....	7
Appendix A Environmental Compliance and Regulations.....	9
A.1 EU Environmental Regulations and Compliance.....	9
A.2 Russian Environmental Regulations and Compliance.....	9
Appendix B Setting System Limiters.....	11
B.1 Setting up System Limiters	11

Introduction

1.1 CS301MH Overview

The SLS™ CS301MH is a cinema loudspeaker that is used as the mid-high-frequency component in a System 300A or System 400A screen channel for 5.1 and 7.1 cinema auditoriums and medium-to-large Dolby Atmos® equipped auditoriums..

Dedicated 3/8"-16 inserts and bolts are provided for use with the included yoke.



Figure 1-1 SLS CS301 (Mounts on Top of SLS CSB215 or SLS CSB215CM)

1.2 CS301MH Specifications

Following are the CS301MH general specifications:*

- Frequency response: 200 Hz to 20 kHz
- Sensitivity: 1 watt @ 1 M: 103 dB
- Continuous power rating: 300 watts
- Maximum continuous rated SPL at 1 meter: 128 dB
- Drivers: Dual 8-inch mid frequency, PRD1200 ribbon high frequency
- Size
 - Width: 18.7 inches (476 millimeters)
 - Height: 38.1 inches (968 millimeters)
 - Depth: 14.5 inches (369 millimeters)
- Net weight: 90 pounds (40.8 kilograms)
- Shipping weight: 102 pounds (46.3 kilograms)

*SLS Audio reserves the right to make changes to existing products without notice.

1.3 Processor Settings

Following are the CS301MH processor settings:

Crossover Section	Frequency	Slope	Delay ¹	Gain ²	Phase
CSB215 and CSB215 (× 2) highpass filter	35 Hz	24 dB Octave (fourth order) Butterworth	0 ms	CSB215: 0 CSB215 (× 2): -3 dB	In
CSB215 and CSB215 (×2) lowpass filter	200 Hz	24 dB Octave (fourth order) Linkwitz-Riley	0 ms	CSB215: 0 CSB215 (× 2): -3 dB	In
CS301MH highpass filter	200 Hz	24 dB Octave (fourth order) Linkwitz-Riley	0 ms	0 dB	In

1 Some digital signal processors (DSP) change the propagation delay for each output depending on the amount of processing on the channel.

2 Assumes amplifiers have equal voltage gain.

Equalization Section ¹	Frequency	Q	Bandwidth ²	Level
CSB215 and CSB215 (× 2) low frequency	None			
CS301MH high frequency/medium frequency	320 Hz	2.87	0.50	-4 dB
	900 Hz	4.0	0.36	+3 dB
	System 300A: 2,330 Hz System 400A: 2,300 Hz	2.87	0.50	-5 dB
	6,800 Hz	2.87	0.50	-4 dB
	8,700 Hz	2.87	0.50	-2 dB

1 Equalization Settings were developed in an anechoic environment.

2 Different DSP manufactures are not consistent in their implementation of digital parametric equalizations.

SLS recommended filters are not replicated by all DSP devices. If the DSP device being used continuously varies the bandwidth of the filter depending on the gain, the DSP does not match our settings. (Most of these devices do not allow filter Q to be shown.)

Limiting Section ¹	Threshold/RMS Voltage	Attack	Release	Peak Stop Voltage
Low frequency	60 V	16 ms	256 ms	120 V
High frequency/medium frequency	42 V	2 ms	32 ms	84 V

1 See [Appendix B](#)

Installing the SLS CS301MH

2.1 Installing the SLS CS301MH

To complete a screen channel, medium to large auditoriums use an SLS™ CS301MH combined with a single SLS CSB215 or CSB215-CM loudspeaker (System 300A) or dual CSB215s or CSB215-CMs (System 400A). The CSB215 and CSB215-CM are interchangeable, so any reference to a CSB215 in this documentation is also applicable for a CSB215-CM.



Warning: TO PREVENT INJURY, THIS APPARATUS MUST BE SECURELY ANCHORED TO THE BUILDING STRUCTURE IN ACCORDANCE WITH THE INSTALLATION INSTRUCTIONS IN THIS DOCUMENTATION. CONSULT A PROFESSIONAL MECHANICAL OR STRUCTURAL ENGINEER TO OBTAIN APPROVAL FOR ALL ATTACHMENTS TO THE BUILDING STRUCTURE. THIS APPARATUS MUST BE INSTALLED BY LICENSED PROFESSIONAL INSTALLERS. IF NOT ATTACHED TO THE BUILDING STRUCTURE PROPERLY, THIS APPARATUS COULD FALL AND CAUSE PERSONAL INJURY OR DEATH. INSPECT ALL COMPONENTS BEFORE INSTALLATION. THIS APPARATUS IS NOT INTENDED FOR STAND-ALONE FLOOR-STANDING INSTALLATIONS WITH NO ANCHORAGE. ALL LOCAL BUILDING AND SEISMIC CODES MUST BE ADHERED TO.

2.1.1 Tools Required

- Integrating with CSB215: 7/32-inch Allen wrench for removing bolts from the CSB215 to install CS301MH yoke into the available CSB215 3/8"-16 installation points
- Integrating with CSB215-CM: 6 mm Allen wrench for removing bolts from the CSB215 to install the CS301MH yoke into available M10 installation points
- Tools and installer-provided hardware to anchor the CSB215 to platform building structure (See [Securing the CSB215/CSB215-CM with Installer-Provided Hardware](#))
- #2 Phillips screwdriver for attaching speaker wire to barrier strip

2.1.2 Positioning the CSB215/CSB215-CM

When used with the CS301MH, position the CSB215/CSB215-CM with the two drivers aligned horizontally, as shown in [Figure 2-1](#).

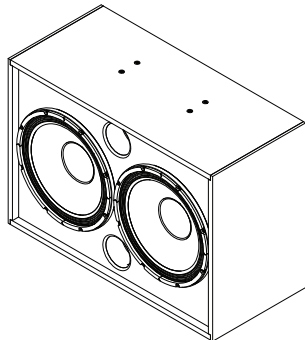


Figure 2-1 Correct CSB215/CSB215-CM Orientation for Use with CS301MH

2.1.3 Installing the CS301MH with a CSB215/CSB215-CM

To install the CS301MH with a CSB215/CSB215-CM:

1. Remove the four bolts on the top of the CSB215 cabinet using the 7/32-inch Allen wrench (6 mm for the CSB215-CM).
2. Position the yoke provided with the CS301MH with the two slots on the arms of the yoke facing the back of the CSB215/CSB215-CM. These slots allow you to vertically aim the CS301MH downward toward the audience and secure it at the correct angle. If the CS301MH mid/high needs to rotate up, turn the yoke 180 degrees from what is shown in the following figure, so that the slots face forward.
3. Align the yoke on top of the four holes, reinsert the bolts through the yoke, and then tighten. If the holes do not line up, the CSB215/CSB215-CM was placed in the wrong orientation.

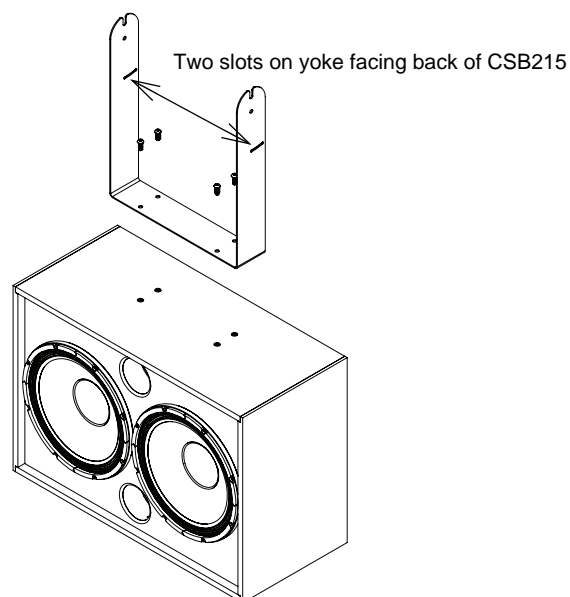


Figure 2-2 Placing CS301MH Yoke on CSB215/CSB215-CM

4. Loosen the two bolts on each side of the CS301MH cabinet, using the 7/32" Allen wrench, to provide enough space for the yoke to slide between the bolt and the side of the cabinet.
5. Remove the two vertical set bolts from the CS301MH using the 5/32-inch Allen wrench.
6. Place the cabinet into the top slots in the yoke, and loosely tighten the bolts.
7. Set the vertical angle of the cabinet, and tighten the two bolts.
8. Insert the vertical set bolts, and tighten to anchor in the vertical angle.

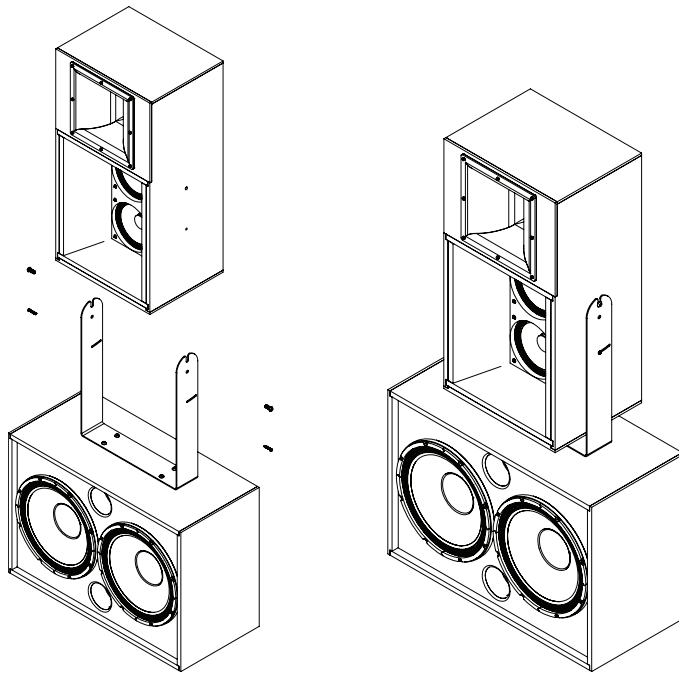


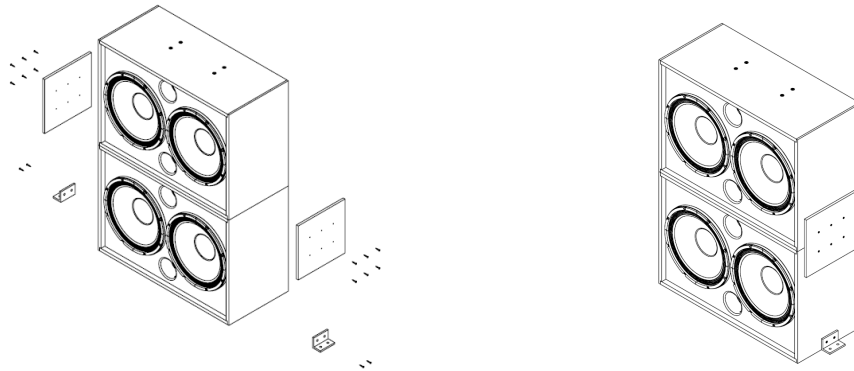
Figure 2-3 Placing CS301 on CSB215 (System 300A)

Securing the CSB215/CSB215-CM with Installer-Provided Hardware

Installer-supplied hardware must be used to secure the CSB215/CSB215-CM to a platform that is attached to the building structure (to prevent screen-channel movement during operation). Following is an example of installer-supplied hardware that may be used for this purpose. We recommend #10 × 2" wood screws or 4-5 mm diameter wood screws to penetrate the speaker cabinet by a minimum of 0.75-inch (19 mm) to a maximum of 1.5 inches (38 mm). The wood screws must be at least 2 inches (51 mm) apart for attaching an angled steel plate to the CSB215. (See the following figures.)

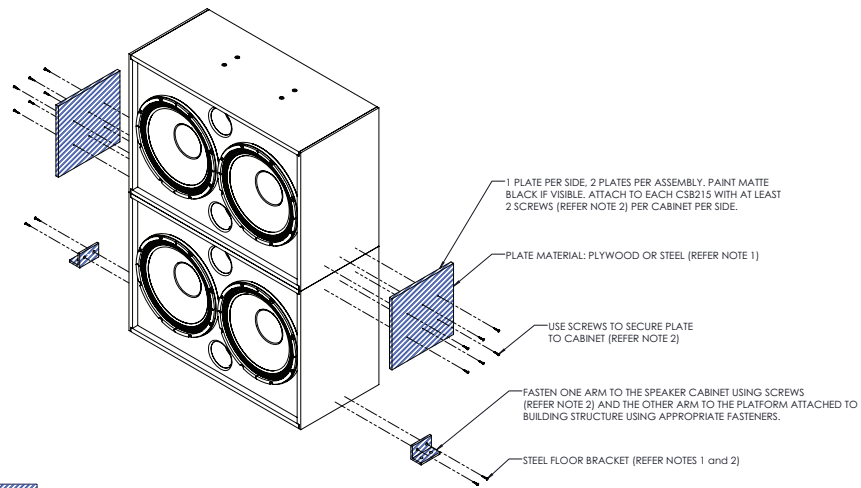


Warning: SOUND VIBRATIONS CAN CAUSE THE CSB215 TO SHIFT ITS POSITION IF NOT ANCHORED TO THE BUILDING STRUCTURE. CONSULT A PROFESSIONAL MECHANICAL OR STRUCTURAL ENGINEER TO APPROVE ALL ATTACHMENTS TO BUILDING STRUCTURE. USE AN APPROPRIATE SIZE AND QUANTITY OF HARDWARE TO ANCHOR TO BUILDING STRUCTURE. WE RECOMMEND #10 × 2-INCH WOOD SCREWS OR 4-5 MM DIAMETER SCREWS. FOR MORE DETAILS, SEE THE FOLLOWING FIGURE. YOU MUST TIGHTEN ALL HARDWARE SECURELY.



NOTES:

1. USE MINIMUM 0.5-INCH (12 mm) PLYWOOD OR MINIMUM 0.0625-INCH (2 mm) THICK STEEL PLATE. PAINT MATTE BLACK IF VISIBLE.
2. USE # 10 X 2 INCH WOOD SCREW OR 4 - 5 mm DIAMETER SCREW THAT PROVIDES A MINIMUM 0.75 INCH (19 mm), MAXIMUM 1.5-INCHES (38 mm) PENETRATION INTO SPEAKER CABINET. SCREWS MUST BE AT LEAST 4 INCHES (102 mm) APART FOR WOOD PLATE AND 2 INCHES (51 mm) APART FOR STEEL PLATE.



 ITEM PROVIDED BY INSTALLER

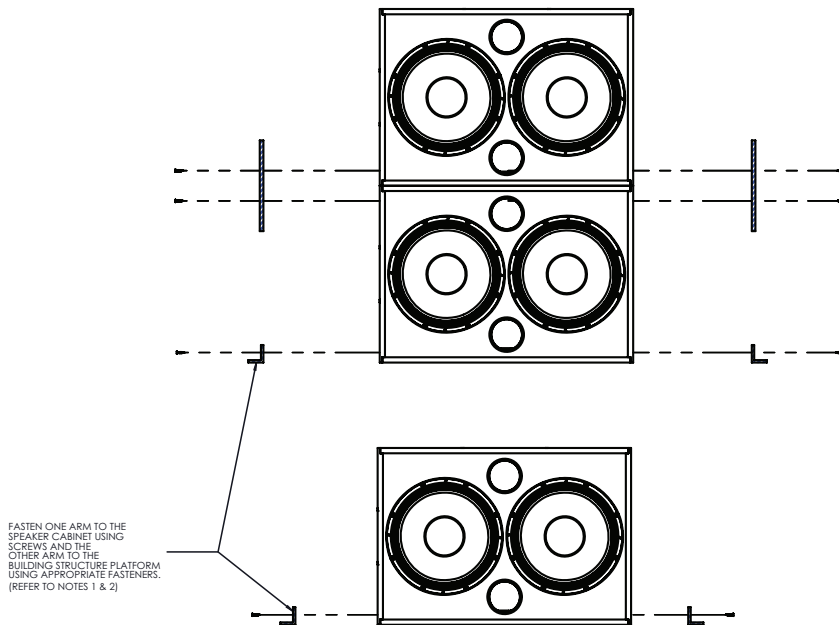


Figure 2-4 Anchor CSB215 Units Together (System 400A Only) and to Building Structure Platform (System 400A and System 300A)

2.2 Connecting Audio

The input barrier strip accepts 16- to 12-gauge wire, either with #6 spade lugs or bare wire. Always use industry standard practice for selecting wire gauge based on the product power rating and cable length. Note that the barrier strip is marked with plus (+) or red indicators to show the polarity. Per IEC standard, a positive voltage on the positive marked input results in the low-frequency drivers moving outward. Always tie down the cable to available hardware to minimize any buzzing or pullouts.

If possible, play sound through the speaker to check for any connection issues, buzzing, rattling, or vibrations.



Warning: TURN OFF ALL AMPLIFIERS WHEN CONNECTING THE LOUDSPEAKER WIRING.

2.3 Dimensions

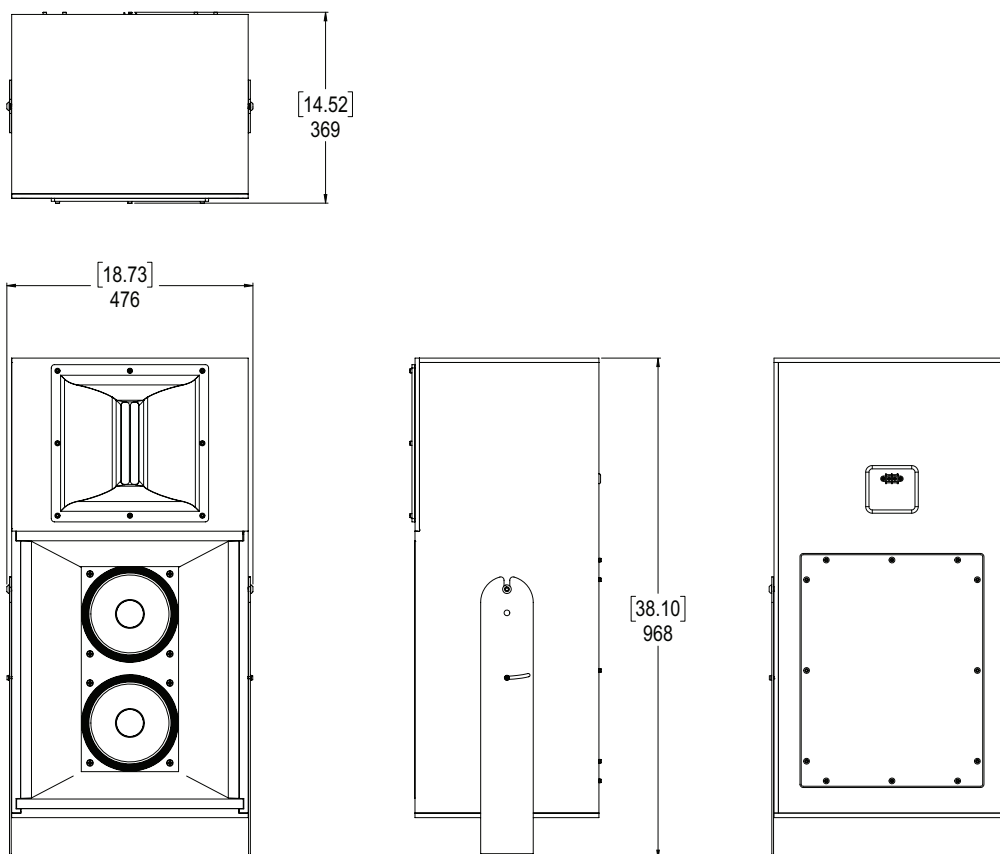


Figure 2-5 CS301MH Dimensions in [Inches] Millimeters

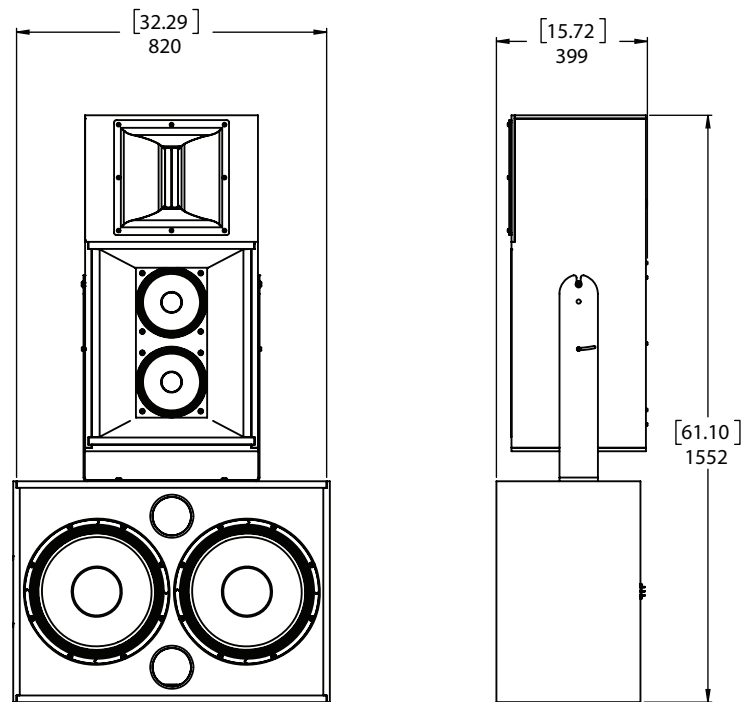


Figure 2-6 CS301MH Mounted with CSB215 (System 300A) in [Inches] Millimeters

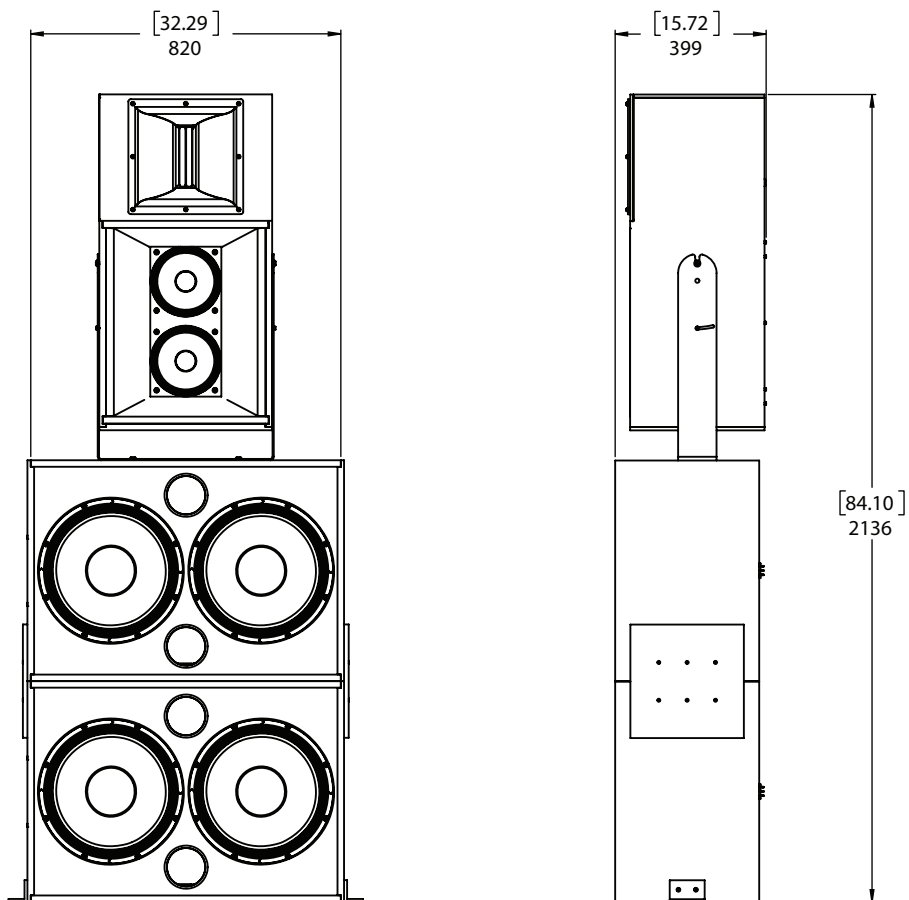


Figure 2-7 CS301MH with Two CSB215s (System 400A) in [Inches] Millimeters

Environmental Compliance and Regulations

A.1 EU Environmental Regulations and Compliance

Following are the CS301MH EU environmental regulations and compliance information.

Restriction of Hazardous Substances Directive (RoHS)

All Dolby® products comply with the requirements of the EU RoHS Directive. For the Dolby Declarations of Conformity, go to

<http://www.dolby.com/us/en/about/environmental-commitment.html>

Product End-of-Life Information

This product is electronic equipment and should be disposed of in accordance with all applicable laws. Do not dispose as household waste. Do not dispose of the product in a fire. Please dispose of this product by taking it to your local electronic waste collection point or recycling center. For information regarding where to recycle electronic equipment, contact your local dealer. For additional information regarding Waste Electrical and Electronic Equipment (WEEE) and product disposal go to

<http://www.dolby.com/us/en/about/environmental-commitment.html>

A.2 Russian Environmental Regulations and Compliance

Following is the CS301MH Russian environmental compliance information.

Restriction of Hazardous Substances (RoHS) Directive

This product complies with Russian EAC RoHS requirements.



Setting System Limiters

B.1 Setting up System Limiters

This documentation explains how to set up system limiters to protect your loudspeaker and provide maximum performance when the digital signal processor (DSP), amplifier, and loudspeaker hardware are all variables. The following procedure provides a limiter setting threshold that can protect loudspeakers in a majority of use cases. However, the speaker drivers may still be vulnerable to content issues, such as sustained feedback or large, low-frequency transients below box tuning. Good system design and common sense should be the rule.

1. Obtain an audio source (to generate pink noise) and a true RMS voltage meter with a bandwidth of at least 20 kHz that can average a reading over a period of at least 10 seconds.
2. Complete the room tuning and set the amplifier gain.
To prevent future user error, consider setting the amplifiers at full gain, unless the amplifier gain setting is hardware or software protected. In such a case, you can optimize the amplifier gain to achieve the best signal-to-noise ratio.
3. After completing the room tuning and setting the amplifier gain, bypass the limiter on the DSP that you are using for protection, and leave all other DSP functions for that output engaged. For example, the highpass filter, crossovers, equalization, and so on.
4. Mute all system outputs except the output that is currently being calibrated.
5. Place the voltage meter across the amplifier +/- output terminals and turn up the pink noise source until the reading on the meter is slightly above the specified Threshold/RMS voltage rating for that speaker driver and its recommended processor settings (see [Section 1.3](#)).
6. Play the pink noise only long enough to obtain a stable RMS average voltage reading. For high-frequency drivers, this is typically five seconds, and for full range loudspeakers or subwoofers, it is typically ten seconds.
7. Set the limiter to a minimum ratio of 100:1, and then input the attack and release times recommended by the speaker manufacturer.
8. Engage the limiter, and decrease the threshold until the voltage is lowered to the specified rating, without changing the pink noise gain.
9. Repeat the above procedure for each driver and/or passive loudspeaker you are using.
10. If a predictive peak stop limiter is available on the DSP, engage it at 6 dB above the RMS setting.
11. Monitor for amplifier clipping. If clipping occurs during system use, lower the peak-stop threshold until the amplifier clips slightly. Alternatively, you can engage the self-contained limiter circuit in the amplifier (if it has such a limiter circuit).

You need to perform this procedure only once, as long as the combined amplifier-limiter does not change. However, amplifier gain changes modify the limiter action. If the amplifier gain is decreased, protection engages early, which limits driver output. If the amplifier gain is increased, protection engages only after the driver reading is above the safe RMS voltage.