*DSP*eaker Servo 300 User's Manual

Revision History

Rev.	Date	Author	Affected chapters	Description
1.0	10.6.2010	ToLi	All	Original English version

Congratulations for making a wise choice

A DSPeaker product is all about authentic sound – sound without the usual coloration and distortions that draw the attention away from the content -- be it recorded music or other sonic content whose quality matters -- into the equipment that is reproducing it.

On the path towards the ultimate goal of perfect audio, our design philosophy has always been to remove the biggest obstacles first – with solutions that are both efficient and effortless for the user. We are confident that DSPeaker Servo's unmatched sonic performance and ease of use will exceed your expectations.

Please take a moment to familiarize yourself with the product. This manual contains valuable information for safe and successful use.

We wish you many great moments with true, uncompromised audio!

DSPeaker Team

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DSPeaker Servo 300 User's Manual

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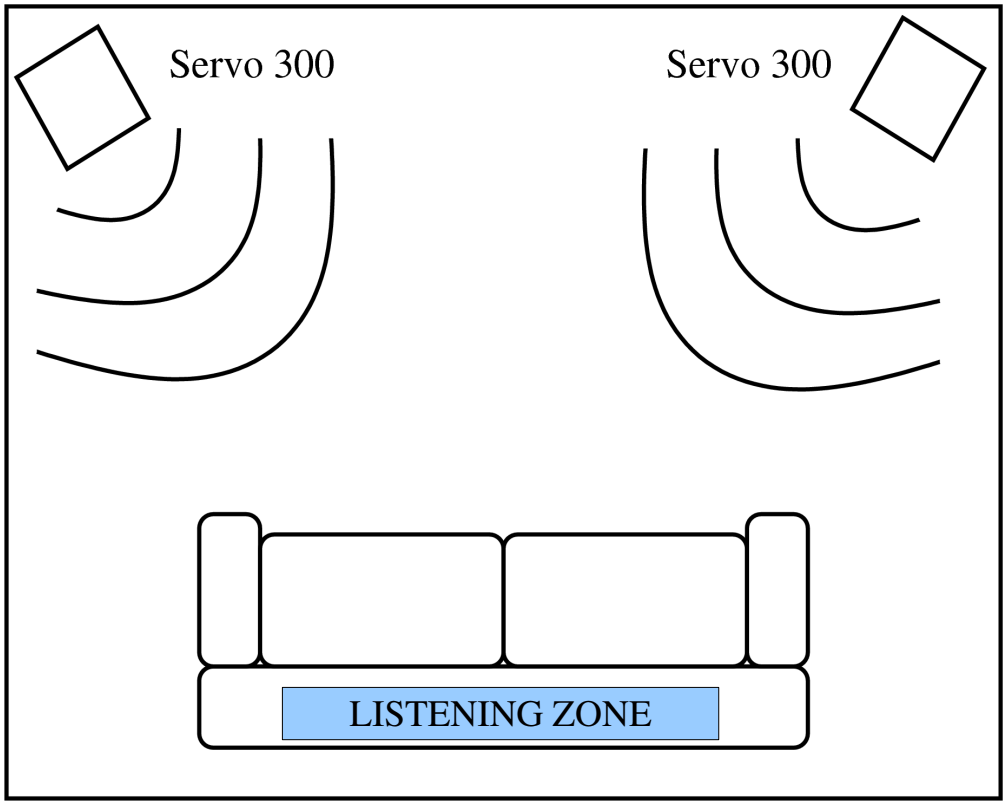
2 Quick Set-up Guide

1. Servo 300 speakers can be placed close to the back wall or even corners, but make sure that there is at least 10 cm (4”) ventilation space behind the back plates of Servo 300 to allow sufficient ventilation.
2. Connect the line-level (pre-out) input of the audio source to input connector.
3. Connect the included microphone into "ANTI-MODE CALIBRATION MIC". connector and place the microphone into the listening position as accurately as possible.
4. Set the input gain control to minimum to suppress any input during calibration
5. Connect the power cord to “MAINS INPUT” connector and the other end into wall outlet.
6. Connect *DSP*eaker Servo 300 power on (power switch to 1)
7. Calibrate the speaker by pressing and holding the control button for about 4 seconds. While the calibration process measures the room, avoid making loud noises. Calibration can be aborted by pressing the button again during calibration.
8. After calibration, you can set the input gain into desired level
9. Repeat the calibration for each Servo 300 speaker.
10. When used with A/V receivers featuring automatic calibration, calibrate the Servo 300 speakers first, and then run the calibration process of the A/V receiver.

Unlike ordinary speakers, Servo 300 speakers can be placed into the corners of the room to optimize the bass and room response.



2.1 Placing the Servo 300 Speaker

Servo 300 speaker is designed to be positioned close to the room walls and corners, where the response can be extended even as low as below 30Hz. However, safe distance of 10 cm (4 inches) to curtains or any other objects behind the speakers must be maintained to allow sufficient ventilation for the amplifiers. Do not place any flammable objects or materials near the amplified back plates. The speaker is equipped with built-in version of highly acclaimed Anti-Mode™ room correction algorithm. Anti-Mode™ will automatically flatten the power response and minimize modal ringing of room resonances at the frequency range 24 - 152 Hz. Because of this, Servo 300 will feature a lot more accurate bass control than for example bass tone controls present in other active loudspeakers.

For improved stereo imaging, it is adviceable to use acoustic treatment in the side walls next to Servo 300, or maintain at least 25-50 cm (10-20 inches) distance between the speaker and side wall. Shorter radius, even only 15 cm (5 inches) is usually enough to the back wall. Always keep the back panel of Servo 300 away from flammable objects, as the power amplifiers generate always some heat. Servo 300 has revolutionary acoustic DXT lens, which will give perfect radiation pattern to +/- 25 degree angles, as well as superb baffle integration leading to well distinguished in-room response at also higher frequencies.

2.2 Usage

2.2.1 Control Button

The control button has different meanings in different situations, also depending on whether it is pressed briefly or pressed and held for longer period. All the operation functions are logical and intuitive:

- Short press when the speaker is on will toggle the *Anti-Mode* correction ON (status led GREEN) and OFF (status led ORANGE).
- Long press when the speaker is on and microphone connected will begin the Anti-Mode automatic room calibration process. (more info on chapter 2.4)
- Long press when the speaker is on but without the microphone connected will begin Active Suspension (*ASCM*) calibration (more info on chapter 2.5)
- Short press in the middle of the calibration process (*Anti-Mode* or *ASCM*) will abort the calibration and return the settings of the previous calibration.
- Short press when the speaker is in STANDBY (led is RED) will turn on the speaker.

2.2.2 Status LED

Status LED signals the user about different situations and statuses

- Green LED indicates that the speaker is on and Anti-mode is engaged
- Orange LED indicates that the speaker is on and Anti-Mode bypassed
- Blinking orange LED indicates that the speaker is performing calibration
- Red LED indicates that the speaker is in “Stand By” state or in the middle of calibration
- Blinking red LED is warning about input level nearing A/D saturation threshold or some error condition (See errors and warnings)

2.2.3 Input Gain Control

The input gain control adjusts the input sensitivity of the input A/D converter. Attention: always keep the input gain setting in minimum while performing Anti-Mode calibration to avoid any disturbances originating from the audio source or cables. If the A/D converter is almost saturating due high input voltage, the status led will start blinking red light. If the the input voltage becomes too high, some amount of distortion can occur. To prevent this, the input gain control can be adjusted to a lower value.

2.2.4 Automatic Wake-up and Stand-by

The speaker will go to power saving “Stand By” mode deactivating it's power amplifiers when it has detected no input signal in 15 minutes. The speaker will also wake up automatically when it detects signal at the audio input. Wake up will take a few seconds as the power amplifiers must be turned on. When the speaker is detecting audio signal at the input in stand by and waking up, it will flash the led green once. The speaker is on when the led turns green or orange, depending on whether the Anti-Mode correction was on or off before going into the stand by previously.

If the speaker is not used for longer periods, it is adviceable to turn it off completely from the power switch.

2.3 Errors and Warnings

The speaker will monitor constantly it's input level, positional feedback of the woofer cone, currents of the amplifiers, operating temperature, status of the DSP and microphone input in calibration. The speaker can maintain safe operation in many different situations, but might inform the user about these. If electromagnetic pulse disorients the DSP, a special integrated “watchdog” will turn the power off instantly to prevent permanent damage or misbehaviour. If the temperature becomes dangerously high, the speaker will go into stand by mode and wake up only after it has cooled down to safe range. If an external force is pressing the woofer cone for too long, the speaker will flash the status led red, and eventually shut itself down if the external force persists.

2.3.1 Blinking Red Status LED

In normal operation, the blinking status led simply tells the user that the A/D saturation threshold is reached. This does not necessarily require any actions from the user, as there is still about 4 dB headroom until the level is too high and the A/D converter saturates. However, if the sound occasionally starts to distort, it is adviceable to adjust the input gain control down to lower the input voltage and prevent distortion.

2.3.2 Status LED is Lit Red

When the speaker is in standby mode, the status led is red. If the status led turns to red in the middle of the normal operation (with input audio present), there might be failure due to several reasons. The speaker will automatically shut down if it detects any failure in its operation or in the sensor data. For example, if external force is pressing the woofer cone, the speaker will detect inconsistence between sensor and input A/D, leading eventually to shut down in order to prevent damage to voice coil. After failures the speaker will restart next time in safe mode and make some checks to return to normal operation safely. After safety checks, the speaker will restore normal status.

2.3.3 Thermal Shut-down

The Servo 300 speaker are also equipped with thermal sensors. If the operating temperature increases too much inside the speaker, it will shut down automatically. After the temperature is back to safe levels, the speaker will return to normal function.

2.4 Anti-Mode™: Automatic Room Correction

The room response is one of the biggest influences in reproduction of sound, altering the tonal balance especially at the lower frequencies. In order to accomplish perfect sound characteristics in every circumstance, the active speaker should be able to measure the room and adjust itself to the existing acoustic conditions. *DSP*eaker Servo 300 is equipped with the highly acclaimed built-in Anti-Mode™ algorithm, which is capable of automatically and effectively measuring the room and correcting the effect of room-induced distortion, including standing waves.

Before calibration, the output gain must be at 0dB, or the calibration will not begin. Anti-Mode™ calibration is performed by connecting the included measurement microphone into its dedicated 3.5mm jack at the back panel. After this the microphone is placed into the listening zone. The input gain of the speaker is set to minimum to avoid any input signal that could disturb the following series of automatic measurements. The calibration will begin when the control button is pressed and held for about four seconds. The calibration will feature two consecutive measurement sweeps, each taking approximately one minute. It is adviced not to make any loud noises while the calibration is in progress. The calibration process automatically adjusts the volume to optimal levels.

The calibration can be cancelled anytime by pressing the control button again. Once the calibration is finished, the correction settings are stored in to the internal memory of the speaker, in which they will remain even if the power is switched off or the power cable disconnected. The settings can only be replaced by a new calibration, which is recommended if the speaker or listening zone is moved. Remember to calibrate each Servo 300 speaker individually, and do this before the calibration of your A/V receiver.

Adjusting the level of bass after Anti-Mode™ calibration:

It is important to recalibrate A/V receiver after all Servo 300 speakers have been calibrated first with the Anti-Mode algorithm. Otherwise the level of the bass may be incorrect, as the receiver would have adjusted it relative to the existing room modes which are reduced after Anti-Mode calibration.

2.5 ASCM Calibration

The speakers are incorporated with patent pending processor controlled *Position Feedback measurement* and *Active Suspension Compliance Management System, ASCM*. Thanks to the ASCM, the speaker will not suffer any common phenomena of uncontrolled low-frequency energy storages, and will deliver the fastest, tightest and most accurate bass possible even to the lowest octaves in-room. The speaker has also not herited the “boxy” or “boomy” sound character of reflex-type speakers, as the active suspension with closed enclosure will offer unmatched control over the entire audible bass range.

The ASCM is calibrated at the factory, which will be sufficient for years to come. However, as in all speaker drivers, the spring compliance of the cone will vary after extensive usage over the years. To compensate for this, it is adviceable to run ASCM calibration once the speaker has been used for about one or two years (depending on activity). Later on, the parameters do not vary any more, meaning ASCM doesn't necessarily need to be calibrated again.

ASCM calibration will measure how much the suspension compliance has been altered since the original values, and automatically compensate for these. The settings are stored in the internal memory of Servo 300, where they will remain until another ASCM calibration overwrites them.

Before calibration, the output gain must be at 0dB, or the calibration will not begin. The ASCM calibration is performed quite like the Anti-Mode calibration, except the microphone is not connected to its jack. To perform ASCM calibration, simply press and hold the control button. The calibration will make one sweep, but after it detects that there is no microphone connected, it will continue with different kind of test signals (subsonic high-excursion excitation). The ASCM calibration will also feature restarting of the speaker, and remeasuring the rest position of the cone springs. **It is extremely important not to touch the speaker cone even if it there is no sound nor movement during the ASCM calibration!** The ASCM calibration is finished once the speaker will return to it's normal operation state (led is green if Anti-Mode was engaged and orange if it was bypassed).

Note: The ASCM calibration does not affect on the room corrections being applied after Anti-Mode calibration.

2.6 Output Gain Switch

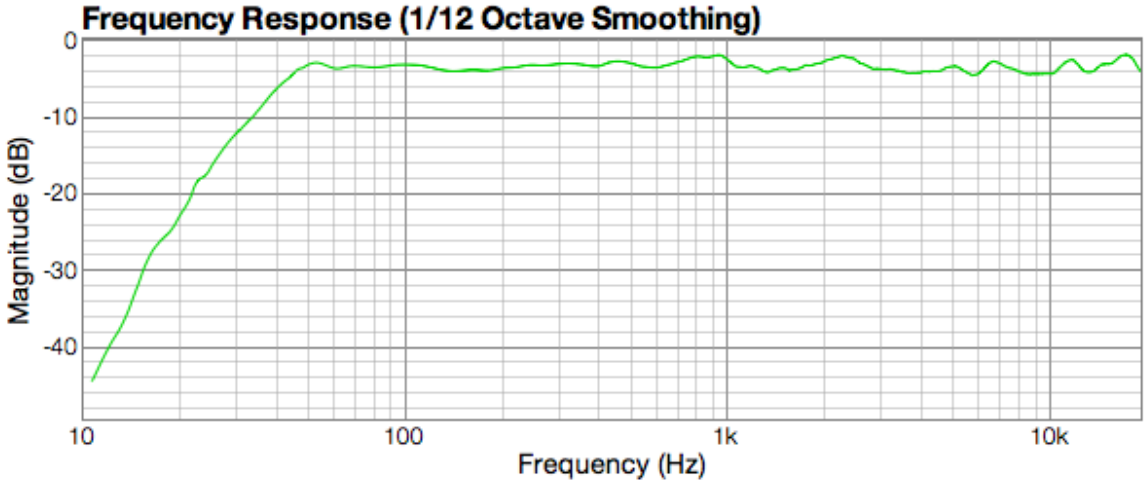
DSPeaker Servo 300 has three settings for different output levels.

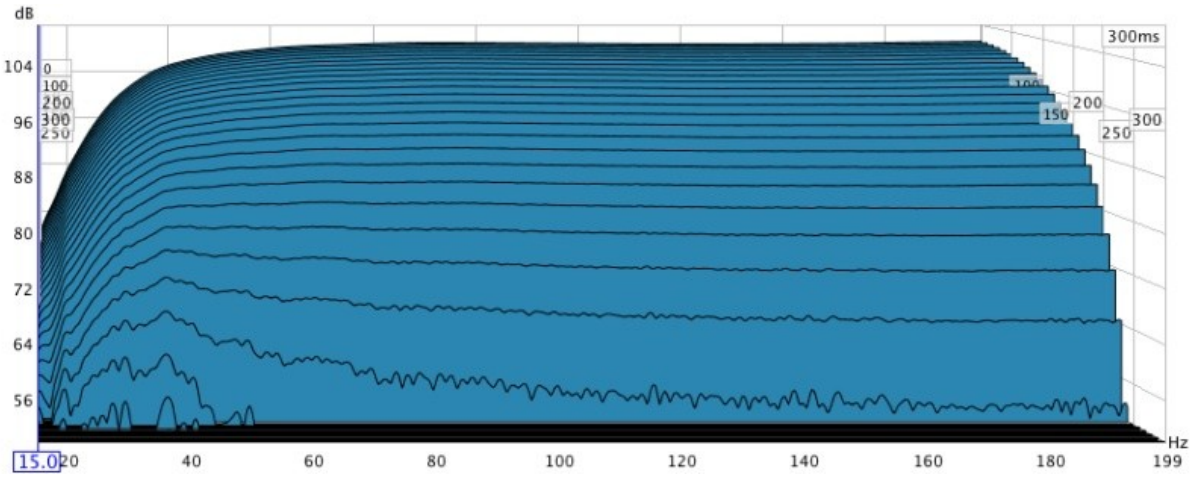
0dB is the default setting, which is suitable for far-field dynamics. It gives the highest peak sound pressure level. However, it also has creates servo-feedback which can sometimes result in higher noise level than desired for near field usage.

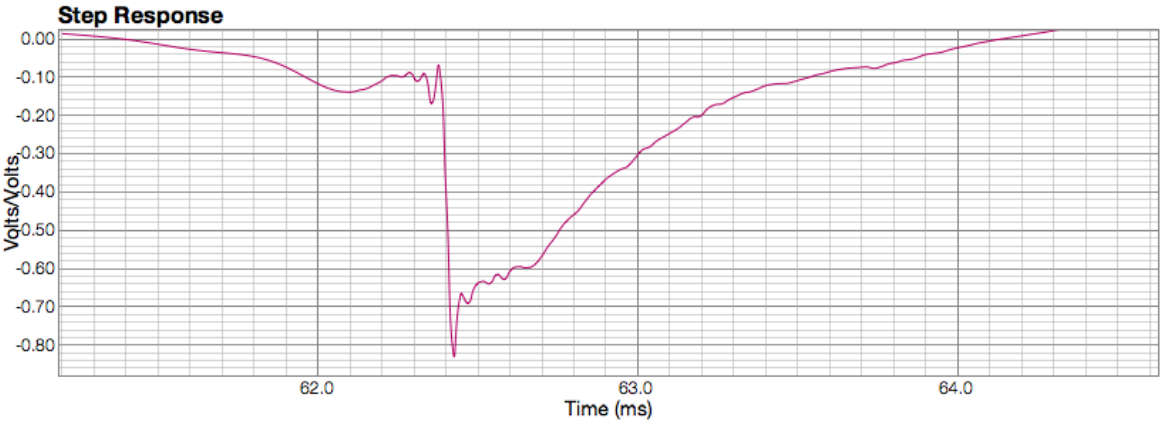
-6dB will drop the output level by 6dB, which will result in lower noise level, but also decreased maximum sound pressure level. This setting is ideal for listening in far-field in a very silent room where the ambient background noise is low.

-12dB will drop the output level by 12dB, which will result in very low noise level, but also decreased maximum sound pressure level. This is an ideal setting for listening in near-field monitoring where the distance to the speaker is less than 1 meter (3 feet).

3 Measurements







4 Technical specification

Technical specifications:	
Operating principle:	Active suspension
Power supply:	230V 50Hz (EU) 110V 60Hz (US)
Amplifier power (continuous):	90W + 90W
Amplifier type	Linear, current-feedback
Input sensitivity:	Line level (max 1.1 Vrms)
Input connections:	Balanced XLR (RCA with adapter) 3.5mm Anti-Mode™ microphone jack
Bass driver:	6.5” Aluminium, long throw
Tweeter:	27mm Aluminium/Magnesium, DXT-lens
Frequency response (1m):	32 - 21000Hz (-6dB)
Harmonic distortion 85dB/1m	<0.1% @1kHz
Dynamic range (unweighted):	>90dB
DSP	VS8053

DSP functions:	
DSP core	VSDSP4 8053
Digital Cross-over:	2150Hz, Linear-Phase
Anti-Mode™ correction range	24 – 152Hz
Anti-Mode™ resolution	<0.5Hz
Anti-Modal filters	6
Digital equalizers	45-20000Hz (±1dB) on axis
Time-domain EQ resolution	~20μs
Total latency (group delay)	~12ms
ASCM correction range	±11mm excursion

5 Manufacturer

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