



Owner's Manual

SAS
High Output RTL® Subwoofer



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DOCUMENT CONVENTIONS

This document contains general safety, installation, and operation instructions for the Wisdom Audio High Output RTL® Subwoofer. It is important to read this document before attempting to use this product. Pay particular attention to:

WARNING: Calls attention to a procedure, practice, condition or the like that, if not correctly performed or adhered to, could result in injury or death.

CAUTION: Calls attention to a procedure, practice, condition or the like that, if not correctly performed or adhered to, could result in damage to or destruction of part of or the entire product.

Note: Calls attention to information that aids in the installation or operation of the product.



Introduction

Congratulations on purchasing your Wisdom Audio subwoofer. The **SAS's Regenerative Transmission Line™** technology delivers tremendous bass performance in terms of depth, dynamics, and distortion resulting in articulate bass that integrates seamlessly with high-resolution main speakers such as Wisdom Audio's Sage Series.

This manual focuses on the SAS subwoofer itself.

While we expect your local Wisdom Audio dealer to take care of the setup and calibration of the system, we still recommend that you at least briefly review this and the other manuals (SA-DSP Series amplifiers) to understand the system's full capabilities.

Overview

Your Wisdom Audio **SAS subwoofer** uses a modern implementation of an old idea for high quality, low distortion bass reproduction. While the roots of the Regenerative Transmission Line™ go back to the 1950's, it is the combination of modern computer modeling and the vastly more powerful motors of contemporary driver design that make the RTL™ so special.

There is a class of bass enclosures that has been around since the 1950's, which can be described generically as "low frequency tapped waveguides" or "tapped pipes." It was an idea that was a bit ahead of its time then, since fully optimizing its use required both powerful drivers and computer modeling. But, if you are into such things, check out US Patent 2,765,864 (filed in 1955), and an AES paper published in 1959, *"Analysis of a Low Frequency Loudspeaker System."*

We have utilized sophisticated modeling software to fully optimize our enclosures and have developed drivers that are specifically optimized for this application. We call our unique implementation of this relatively old idea a "Regenerative Transmission Line™" subwoofer, or "RTL" sub for short.

All dynamic drivers develop energy on both sides of the diaphragm, with the rear energy being 180° out of phase with the front energy. If you allow the driver to operate in free space (no enclosure), the front and rear energies largely cancel each other out – especially at low frequencies.



In our **Regenerative Transmission Line™ subwoofer**, the energy from the back side of the driver is sent along a long, folded path in such a way that its lowest frequencies arrive back at the front side of the driver in phase, effectively summing to an increase of 6 dB in output. Thus, the energy from both sides of the woofer cone is used in a productive way, resulting in a substantial reduction in distortion and an effective surface area double compared to what you would otherwise expect. As an example, the effective radiating surface area of the two 5" x 7" woofers in the SAS is equivalent to *one* 12" –13" woofer in more conventional enclosures.

The results are quite stunning. Low frequencies are strikingly dynamic and responsive and integrate quite seamlessly with the fast and detailed Sage Series planar magnetic hybrids. As an example, the SAS can output more than 120 dB at 25 Hz.

Unpacking the SAS

The Wisdom Audio SAS subwoofer is a substantial piece of equipment. Please exercise caution when unpacking your SAS to ensure that you do not strain yourself from its (perhaps unexpected) weight.

CAUTION: Do not attempt to lift your SAS by yourself. Unpacking this subwoofer is clearly a two-person job. It is unwise for a single person to attempt doing so. Do not attempt to lift your SAS while bending or twisting from the waist. Use your legs for lifting, not your back. Always stand as straight as possible and keep the SAS close to your body to reduce strain on your back.

Subwoofer Placement

Subwoofers offer somewhat greater flexibility in placement since the frequencies they reproduce are not readily localizable by the human ear. This is because the wavelengths they reproduce are more than ten feet (3 meters) long, but our ears are located only about 6-7 inches (17 cm) apart. Thus, these extremely long waves do not contribute meaningfully to the imaging that the main speakers create.

However, this fact does not mean that the placement of the subwoofers has no effect on the sound quality in the room. Far from it. The subwoofers are the *most* likely to suffer from the response irregularities introduced by the room itself, operating as they do below approximately 80 Hz in most systems.



Recent research into the behavior of rooms as a function of speaker placement has concluded that – if you have the freedom to do so – there are significant advantages to placing several smaller subwoofers around the room, rather than relying on a single large woofer. Moreover, the optimum placement is usually centered on each of the four walls, or deep in the corners of the room. If you have the luxury of doing so, this simple placement strategy can reduce the size of the room’s response irregularities from 20 decibels down to perhaps as little as 6-8 decibels – a tremendous improvement.

Room Treatment

Rectangular rooms have six reflecting surfaces (four walls, ceiling, and floor) that reflect sound to the listener, after various delays introduced by the indirect routes the sound take on their way to the listener. These first reflections are particularly damaging to sound quality. Looking at the simplest case of stereo reproduction, you have a minimum of *twelve* first reflection points in your room that deserve some attention.

Unfortunately, it is often difficult to do much about the ceiling and floor reflections, even though they are arguably the most destructive. (The minimization of these reflections is one of the strongest arguments for the tall, line source loudspeakers that Wisdom Audio builds.) This leaves you with eight “first reflections” that you

should consider minimizing somehow. These points are easily found by having an assistant slide a small mirror along the four walls of the room, while you sit at the listening position. Any place on the wall where you can see a re- flection of *any* speaker is a first reflection point. Concentrate on the first reflections for the Left and Right speakers first.

If you can, arrange to apply either absorption or diffusion at these eight points (don’t forget the wall behind you). Absorption can be as simple as heavy, insulated drapes; diffusion can be provided by a well-stocked bookcase with books of varied sizes. Alternatively, you can buy purpose-designed room treatments (some sources listed under References, below).

The important things to remember are these: a good room should have a balance of absorption and diffusion; and if you are going to treat only a few areas of the room, the first reflection points are the most important ones to treat.



Professional Acoustic Design

Does this all sound too complicated? For good reason: it *is* complicated.

The difference between the average listening room and one that is professionally designed and implemented is huge. A great listening room will disappear to an astonishing degree, letting the experiences captured in your recordings speak to you directly. A well-designed room is also quieter and more comfortable. It can easily become a favorite retreat for peace and rejuvenation.

If you decide to investigate the possibility of improving your room with the help of a professional, it is important to find someone who focuses on residential spaces. Most acousticians are trained to deal with large spaces – airports, auditoriums, lobbies in commercial buildings, etc. The problems seen in “small” rooms (residential spaces) are quite different, and outside the experience of most acousticians. Find someone who specializes in and has a great deal of experience designing home studios, home theaters, and the like. Your Wisdom Audio dealer may be such a person; failing that, he/she can help you find such a professional.

References

Books on Acoustics

The Master Handbook of Acoustics, F. Alton Everest, TAB Books

Sound Reproduction: The Acoustics and Psychoacoustics of Loudspeakers and Rooms by Dr. Floyd Toole, Focal Press

Setting Up your SAS

The unusual form factor of the SAS allows it to be used effectively in many situations where a more conventional “bass cube” would be either cumbersome or impossible. Examples include locating it behind a couch, in the small space between the couch and the wall or lying flat under a set of risers in a home theater with multiple rows of seating.



The SAS also includes three locations for the exit of the Regenerative Transmission Line™. As shipped from the factory, the vent is located on the end of the SAS enclosure. However, if your location would be better served by the vent being on one side or the other, your dealer can easily swap the grille for the solid aluminum plate that covers the desired exit location. There is no difference in performance, but often a great difference in application flexibility.

VERY IMPORTANT! You MUST use an SW-1 or SA-DSP amplifier. If using another brand of amplifier, you must make sure you use a specific type of surround processor, as the SAS requires special 48dB Butterworth bandpass filter and PEQ settings for the RTL to work properly.

Connections

Speaker Terminals

Connect the + and – terminals of the power amplifier that is driving the SAS to the corresponding + and – terminals of the SAS, located in the recessed input cup.

Note that while Wisdom Audio amplifiers are all non-inverting, some other brands of power amplifiers do invert polarity. It is always best to check the polarity of all your speakers with a polarity checker such as can be found in the [AudioTools](#) suite from Studio Six Digital, or with dedicated hardware such as the [Galaxy Cricket Test Set](#).

North American Warranty

Standard Warranty

When purchased from and installed by an authorized Wisdom Audio dealer, Wisdom Audio loudspeakers are warranted to be free from defects in material and workmanship under normal use for a period of 10 years from the original date of purchase on the cabinet and passive drivers.

IMPORTANT: Wisdom Audio loudspeakers are designed for installation and operation in environmentally controlled conditions, such as are found in normal residential environments. When used in harsh conditions such as outdoors or in marine applications, the warranty is three years from the original date of purchase.



During the warranty period, any Wisdom Audio products exhibiting defects in materials and/or workmanship will be repaired or replaced, at our option, without charge for either parts or labor, at our factory. The warranty will not apply to any Wisdom Audio products that has been misused, abused, altered, or installed and calibrated by anyone other than an authorized Wisdom Audio dealer.

Any Wisdom Audio product not performing satisfactorily may be returned to the factory for evaluation. Return authorization must first be obtained by either calling or writing the factory prior to shipping the component. The factory will pay for return shipping charges only if the component is found to be defective as mentioned above. There are other stipulations that may apply to shipping charges.

There is no other express warranty on Wisdom Audio products. Neither this warranty nor any other warranty, express or implied, including any implied warranties of merchantability or fitness, shall extend beyond the warranty period. No responsibility is assumed for any incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts and other states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty is applicable in the United States and Canada only. Outside of the U.S. and Canada, please contact your local, authorized Wisdom Audio distributor for warranty and service information.

Obtaining Service

We take great pride in our dealers. Experience, dedication, and integrity make these professionals ideally suited to assist with our customers' service needs.

If your Wisdom Audio loudspeaker must be serviced, please contact your dealer. Your dealer will then decide whether the problem can be remedied locally, or whether to contact Wisdom Audio for further service information or parts, or to obtain a Return Authorization. The Wisdom Audio Service Department works closely with your dealer to solve your service needs expediently.

IMPORTANT: Return authorization must be obtained from Wisdom Audio's Service Department BEFORE a unit is shipped for service.



It is extremely important that information about a problem be explicit and complete. A specific, comprehensive description of the problem helps your dealer and the Wisdom Audio Service Department locate and repair the difficulty as quickly as possible.

A copy of the original bill of sale will serve to verify warranty status. Please include it with the unit when it is brought in for warranty service.

WARNING: All returned units must be packaged in their original packaging, and the proper return authorization numbers must be marked on the outer carton for identification. Shipping the unit in improper packaging may void the warranty, as Wisdom Audio cannot be responsible for the resulting shipping damage.

Your dealer can order a new set of shipping materials for you if you need to ship your loudspeaker and no longer have the original materials. There will be a charge for this service. We strongly recommend saving all packing materials in case you need to ship your unit someday.

If the packaging to protect the unit is, in our opinion or that of our dealer, inadequate to protect the unit, we reserve the right to repackage it for return shipment at the owner's expense. Neither Wisdom Audio nor your dealer can be responsible for shipping damage due to improper (that is, non-original) packaging.



Specifications

All specifications are subject to change at any time in order to improve the product.

- **Number of required amplifier channels:** 1
- **Frequency response:** 30Hz – 80 Hz $\pm$ 3dB relative to the target curve
- **Impedance:** 8 Ω
- **Sensitivity:** 90 dB/2.83V/1m
- **Power handling, peak:** 450w
- **Maximum SPL:** 115dB / 25 Hz /1m
- **Dimensions:** See appropriate dimensions drawings on next page
- **Shipping weight, each:** 45 lbs. (20 kg)

For more information, see your Wisdom Audio dealer or contact:

Wisdom Audio

1572 College Parkway, Suite 164

Carson City, NV 89706

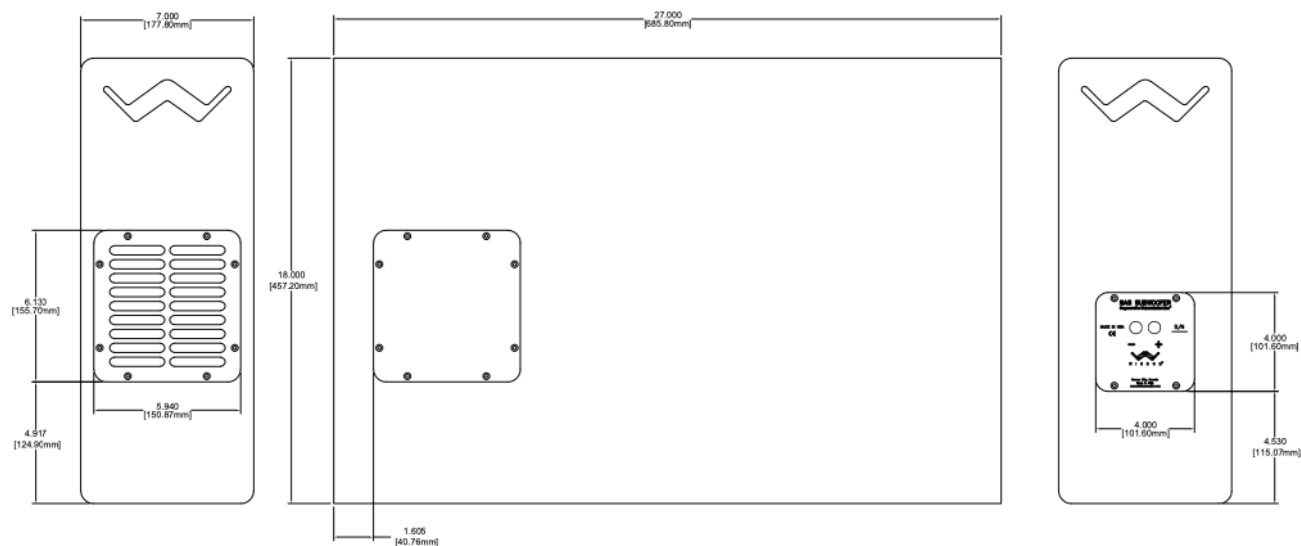
wisdomaudio.com

information@wisdomaudio.com

(775) 887-8850



SAS Dimensions





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Wisdom Audio 1572 College Parkway, Suite 164
Carson City, Nevada 89706 USA
TEL (775) 887-8850
FAX (775) 887-8820
wisdomaudio.com

