



Owner's Manual

STS

High Output RTL® Subwoofer

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DOCUMENT CONVENTIONS

This document contains general safety, installation, and operation instructions for the Wisdom Audio STS 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 **STS'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.

We recognize that setting up a **Wisdom Audio High Output RTL®** subwoofer can be a bit more involved than connecting a common sealed or ported subwoofer, which is why we recommend that our systems be engineered and calibrated by Factory Personnel

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

Overview

There is a class of bass enclosure that has been around since the 1950's, which can be generically described as a "low frequency tapped waveguide" or "tapped pipe." It was an idea that was a bit ahead of its time, since fully optimizing its use required both powerful drivers and complex modeling. Your Wisdom Audio STS subwoofer uses a modern implementation of this old idea for high quality, low distortion bass reproduction. Utilizing sophisticated modeling software, we've optimized our enclosures and drivers specifically for this application. We call our unique implementation of this relatively old idea a "Re-generative Transmission Line" subwoofer, or "RTL" sub for short.

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, not only realizable, but also an incredible solution. 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*".

For a partial and very simplified understanding of the RTL, consider that 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 cancel each other out at low frequencies, (long wavelengths).

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, summing to an increase of up to 6 dB in output (4X power). Thus, energy is productively used from both sides of the woofer cone, doubling the effective surface area, thereby reducing cone motion, and substantially reducing distortion. As an example, the effective radiating surface area of the dual 15" woofers in the STS is equivalent to *two* 21" woofers or a *single* 29" woofer in more conventional enclosures, allowing the STS to output more than 130 dB at 20 Hz.

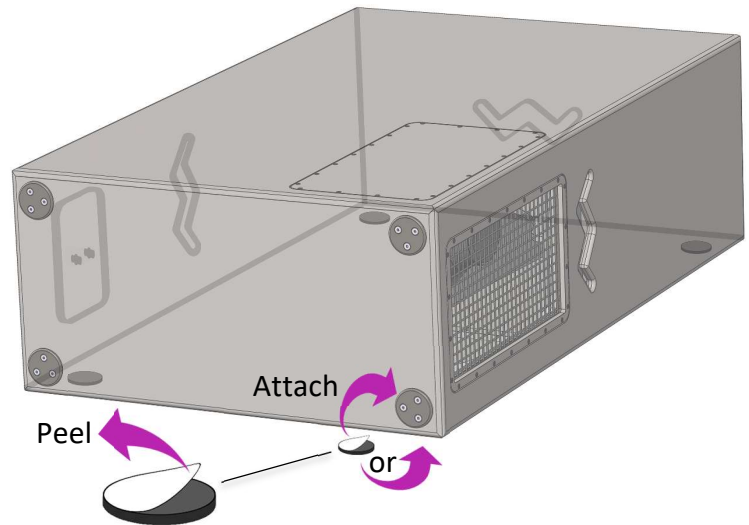
The results are quite stunning. Low frequencies are strikingly dynamic and responsive, integrating seamlessly with the fast, detailed Wisdom Audio planar magnetic speakers.

Unpacking the STS

CAUTION: Do not attempt to lift your STS by yourself. It is large and very heavy.

Unpacking and maneuvering this subwoofer is clearly a multi-person job. To reduce strain on your back, use good technique when lifting, and keep the STS close to your body. The “W” shaped openings on the sides of the enclosure are handles that can and should be used for lifting.

Your STS subwoofer has 4 feet attached to one end of the enclosure. You may set your enclosure on these feet when unpacking. To protect any delicate surfaces, you may attach the four 3" (76mm) diameter heavy felt pads to these feet. Alternatively, if you already know the final orientation of the subwoofer, you may attach the felt pads to the bottom surface of your subwoofer. These 1/4" (6mm) thick pads are supplied with your STS. They have a non-permanent adhesive on one side. Simply peel the backing and attach.



What's included:



STS subwoofer



**3" (76mm) diameter felt
feet, 0.25" (6mm) thick (X4)**



1 pair Banana Plugs

Subwoofer Placement

Subwoofers offer some flexibility in placement since the frequencies they reproduce are not readily localizable by the human ear. This is because the acoustic wavelengths they reproduce are more than 10 feet (3 meters) long, and our ears are only about 6-7 inches (17 cm) apart, a fraction of these wavelengths. 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 a room. Far from it. 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. This response irregularity is not a property of subwoofers but rather a characteristic of low frequency reproduction of any form in a closed space. In fact, in a typical room where a stereo pair of full-range speakers are used, or a single subwoofer, it is common to see a variance exceeding 20 decibels (dB) in sound pressure level (SPL) between various seating positions. Is that a lot, and can we use an EQ to fix the issue?

The short answer is, yes, that is a lot, and no, EQ can't fix it. Unfortunately, equalization simply won't work, nor would we want to use it, even if we could. Here's why. For reference, 20dB is a factor of 100 in power. 100X! To put that in context, suppose you had a 50-watt power demand to reproduce a bass note at one seating location, and a 2nd seating location only 1 meter away had a 20dB depression in the response of the same note. To establish the same output at the 2nd seating location would require 100X more power, (5000 watts), to bring it to the same acoustic level. This is fully outside the

capabilities of nearly all systems, and it would have driven any conventional system well beyond its limit. In addition, the EQ would affect all seating locations, and the first location would now have a 20dB peak. This is why equalization, in general, has limited value. But it is useful when an overall correction is needed. What, then, can be done so everyone experiences the same deep, articulate, and impactful bass? The answer lies in minimizing the acoustic “seat-to-seat” variance.

Acoustic variance is caused by the low frequency waves (pressure and rarefaction cycles) reflecting around the room and interfering with each other. At some frequencies and locations, the reflected waves sum to higher sound pressure levels (pressure/rarefaction cycles are more in phase). At other frequencies and locations, they sum to lower sound pressure levels, (pressure/rarefaction cycles are more out of phase). The dimensions of the room primarily dictate the interaction, but placement of the subwoofers affect the excitation of these room modes, or standing waves, as they are often called. Careful placement of subwoofers can significantly reduce and even eliminate some room modes. A single subwoofer can reduce seat-to-seat variance to less than 6dB in some rooms if it is properly placed. One such place could be the center of the front wall (between the left and right sides of the room), but a single sub is limited in what it can achieve. In practice, 2 subs should be considered a minimum where there is a single row of seating, but more should be used to minimize the variance where multiple rows of seating are present or where uniform hi-fidelity sound throughout the room is desired. Controlling variance and having the finest listening experience is one of the primary reasons to choose subwoofers over full range speakers, which often can't or are not able to be placed optimally for low frequency reproduction.

Compared to full-range speakers, subwoofers have the advantage that they can be placed at various locations and in multiples around a room to mitigate the naturally occurring standing waves. How many and where to place them is a science unto itself and beyond the scope of this introduction. It is truly the job of an expert to provide guidance in placement. There are also professional tools and computer programs available now to aid in selecting the optimal, or as it is in many cases, the best compromise in placement. We recommend contacting us directly at info@wisdomaudio.com to arrange to run a subwoofer analysis on your room and to help you find the absolute best placement for each of your subwoofers.

Room Treatment

Room Treatment for subwoofers is quite different than that for satellite speakers, (primary listening speakers). The absorbers need to dissipate an enormous amount of energy and have a broad bandwidth without introducing their own resonances. This typically requires large absorbers that are placed at intersecting boundaries. It can also be done actively, but this again requires very powerful transducers to keep up with the demands of the primary subwoofers. Room treatment for subwoofers should always be considered a last resort for tweaking response irregularities, since, at best, they are only tweaks. The best approach is to use modeling software along with multiple subwoofers to control the standing waves in the room. This approach should be conducted by an experienced professional. Please contact your Wisdom Dealer for more information.

Room treatment for satellite speakers is quite different and can be very effective in changing the sound character of the room and improving detail, intelligibility, and imaging. More information on this can be found in other Wisdom publications not dedicated to subwoofer installation.

Professional Acoustic Design

Does this all sound 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

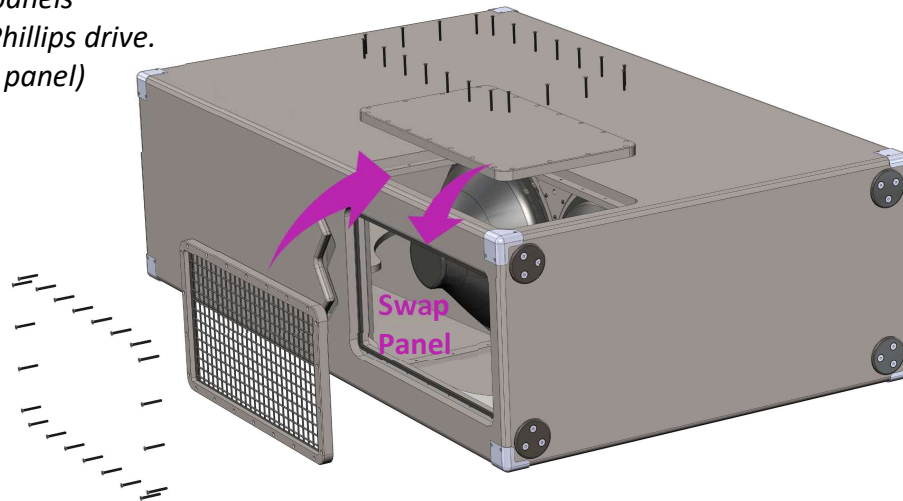
Setting up the STS

There is no escaping the fact that the STS is a large subwoofer. However, it is designed to have remarkable installation flexibility for something so large. As an example, it may be used in any orientation, such as laying on its broad side, allowing it to be built into a set of risers or as part of a “stage” in front of the screen.

The STS also includes three locations for the exit of the Regenerative Transmission Line. As shipped from the factory, the vent is located on the narrow side of the STS enclosure. However, if your installation is better served by the vent exit-location being on one side or the other, the grille can be swapped with one of the vent-covers. There is no difference in performance, but a sizeable difference in application flexibility.

1. As illustrated below, to swap panels, simply remove the grille and the panel where the grille is to be placed using a #2 Phillips drive. The blank panel is more easily removed after the grille since panel can be pushed from the inside.
2. Reattach the grille and the panel in their new locations.

*Changing the panels
requires a #2 Phillips drive.
(22 screws per panel)*



The STS is a passive subwoofer, meaning that it does not come with a “plate” amplifier or internal crossover. The crossover function is normally provided by the surround preamplifier in the system or one of our Wisdom SA-Series DSP amplifiers. We highly recommend the use of our DSP amplifiers since they also include the acoustic profiles to optimize the linearity of the subwoofer, the same function a plate amplifier serves in active subs, and a very important element in RTL subs.

The sensitivity of the STS is quite high, at 101 dB/2.83V/1m (2.83V is one watt at 8Ω). Therefore, you do not need a powerful amplifier to drive the STS. However, if you want to fill an unusually large space, the STS can handle 5000 watts of power and deliver more than 130 dB at 20 Hz, (measured at one meter).

Making the STS Connections

VERY IMPORTANT! While we highly recommend the use of a Wisdom Audio SA-DSP amplifier, if using another brand of amplifier, you must make sure to use a surround processor that can provide the 48dB/oct Butterworth filters and PEQ settings that allow the STS RTL to work properly. For more information on these filter profiles, please contact Wisdom Audio at information@wisdomaudio.com and reference this product.

As with any system, you should make changes to the connections only when the power is turned off to avoid any chance of inadvertently causing a problem (such as a short circuit).

We recommend using heavy-gauge copper speaker wire. The type and gauge may vary depending on amplifier size, wire length, wire route (internal vs. external cabling), and local and national electrical codes. Please consult an authorized dealer to determine what wire is required for your application.

NOTE: When connecting the outputs of your amplifier to the subwoofer, take care to get the polarity correct. Connect the positive (+) terminal on your amplifier to the positive (+) terminal on the STS; likewise, connect the negative (–) terminal on the amplifier to the negative (–) terminal on the STS.

The STS utilizes unique binding-post style input terminals that accept bare wire or banana plugs. Either connection style will securely retain the speaker wire. The binding posts accept up to 6AWG (4mm dia.) wire directly, while the banana plugs will accept up to 8AWG (3.3mm) wire. The following instructions show how to use the banana connection, followed by the direct wire connection.

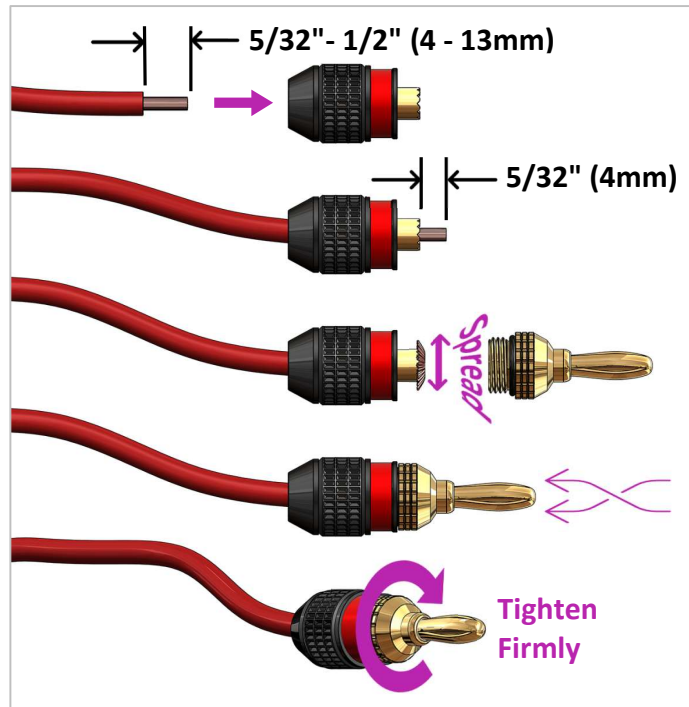
Banana Plug Installation

Remove the insulation from the ends of the conductors;

5/32" - 1/2" (4 - 13mm). Conductors with an insulation diameter of 4mm or more will require 13mm of exposed conductor.

With the endcap of the banana plugs separated from the banana tips, pass the conductor through the proper polarity endcap as shown, exposing **5/32" (4mm)** of the conductor.

Spread and evenly distribute the strands of the conductor over the tip of the endcap. Replace the banana tip, guiding it over the strands, and screwing the banana tip onto the body of the connector by **rotating the tip** as shown.

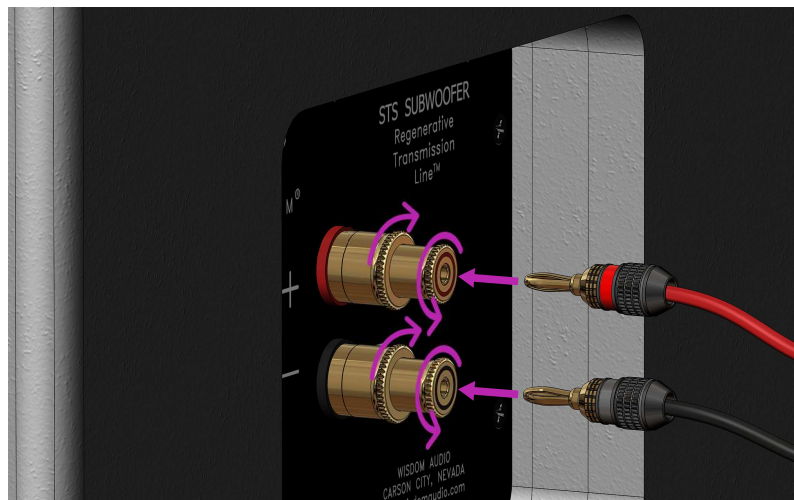


STS Banana Connection

There are two knurled nuts on each of the STS terminals, one large and one small. The large ones are used when connecting the wire directly to the terminals. The small knurled nuts are used when connecting banana plugs. The large ones are unused when using banana plugs.

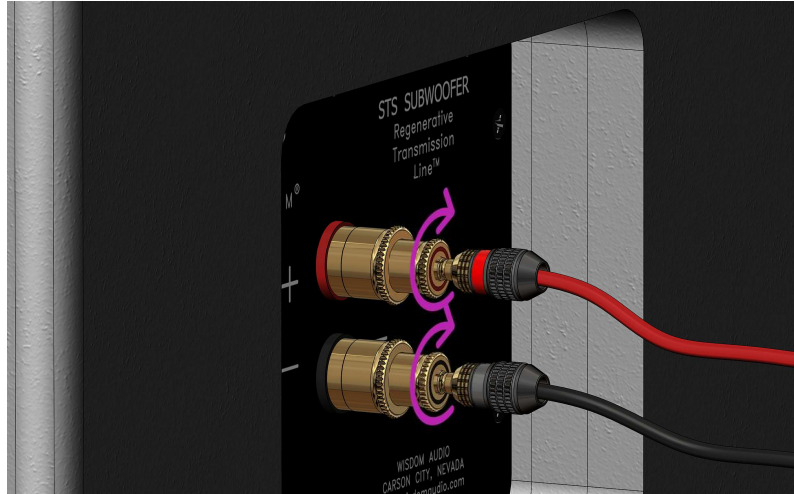
Tighten the large knurled nuts and loosen the small knurled nuts on both input terminals, as shown.

Insert the connectors using care to ensure the proper polarity is maintained.

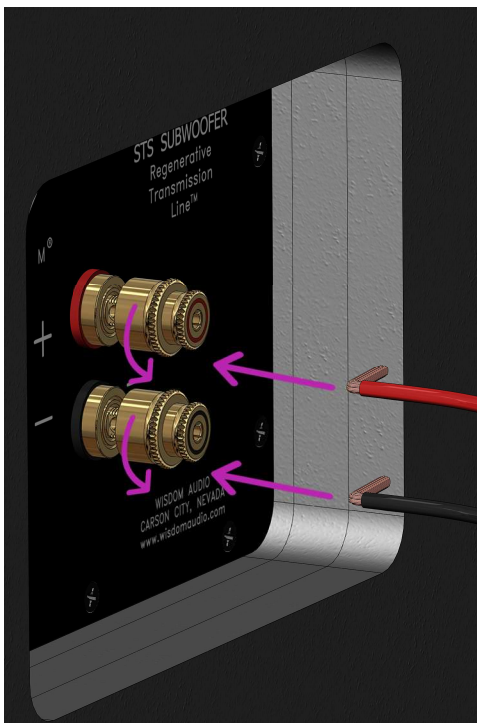


Rotate the small knurled-nut clockwise and tighten to secure the banana plug.

Caution: To remove the banana plug, it is necessary to loosen the small knurled nut before attempting to remove the plug. Failure to loosen the nut could damage the banana plug.

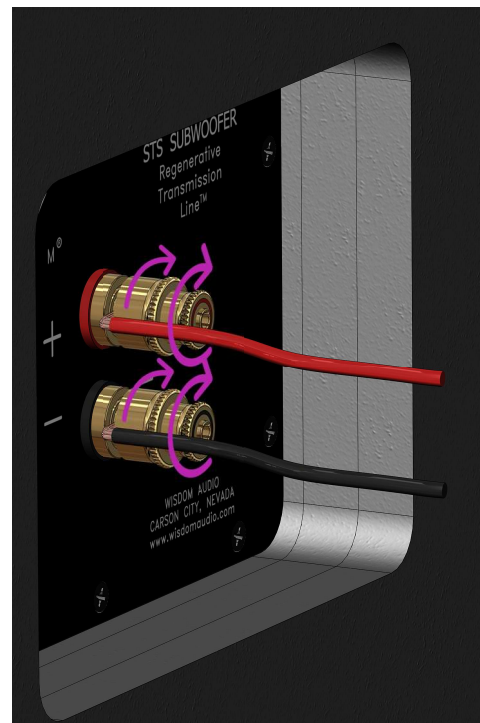


STS Direct Wire Connection



Loosen the large, knurled nuts on both input terminals, as shown.

Strip approximately 3/4" (19mm) of insulation from each conductor. Bend the conductors as needed to ease entry into the terminals.



Insert the conductors in the holes on the sides of the terminals using care to ensure proper polarity is maintained.

Tighten the large, knurled nuts securely and snug the small, knurled nuts to prevent them from vibrating.

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.

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 have 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 to 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.

CAUTION: 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 product.

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 to improve the product.

- **Number of required amplifier channels:** 1
- **Frequency response:** 20Hz – 80 Hz \pm 2dB relative to the target curve
- **Impedance:** 4 Ω
- **Sensitivity:** 101 dB/2.83V/1m
- **Power handling, peak:** 5000w
- **Maximum SPL:** 130dB / 20 Hz /1m
- **Dimensions:** See appropriate dimensions drawings on next page
- **Shipping weight, each:** 350 lbs. (159 kg)

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

Wisdom Audio

1572 College Parkway, Suite 164

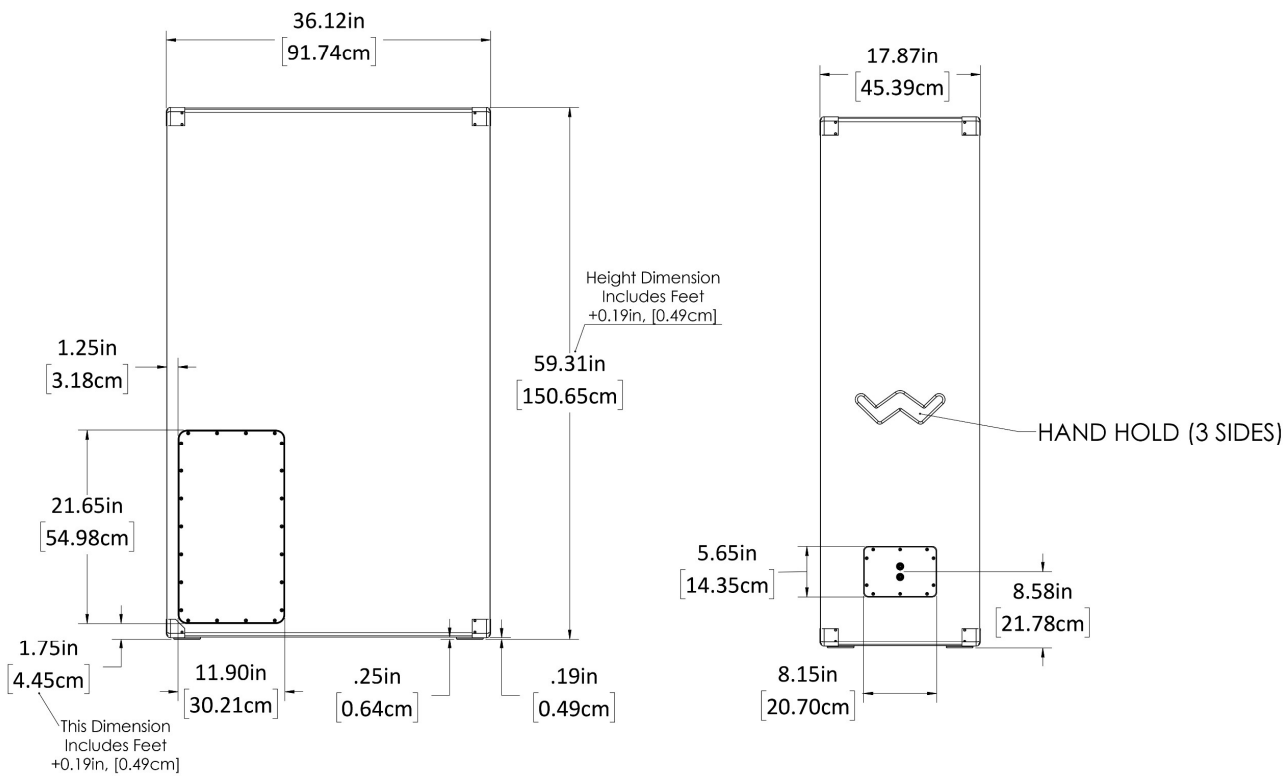
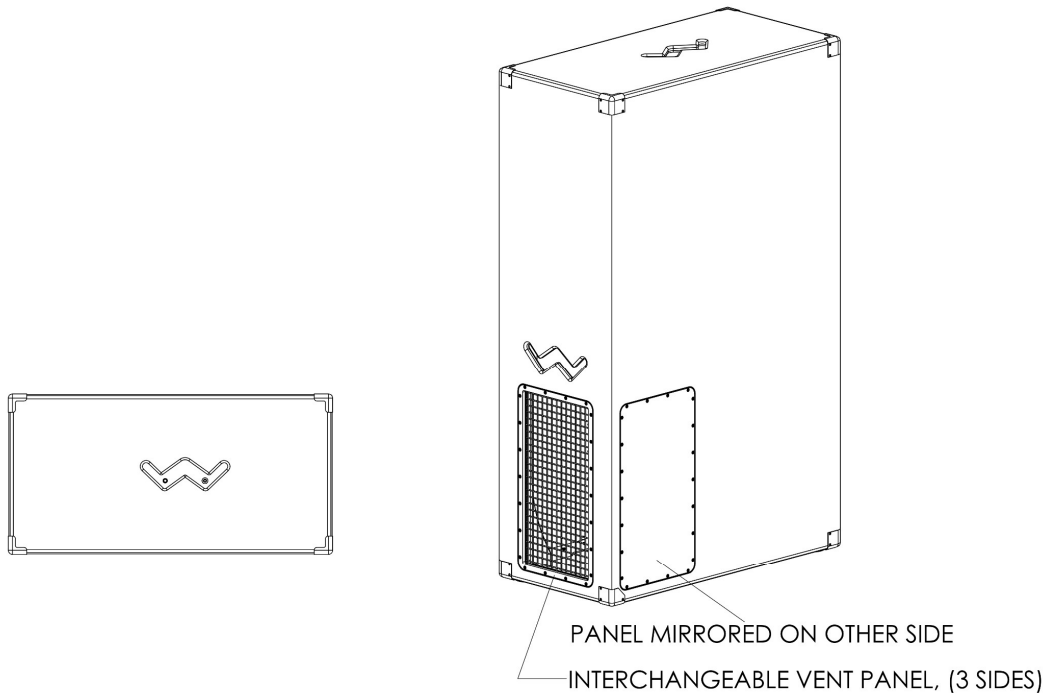
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STS Dimensions





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