



ASC SubTrap™ Big Bass Improvement

By John Kotches



Introduction

The field of home acoustics control is crowded with relative newcomers to the industry. In this field, the Acoustic Sciences Corporation (ASC) is a relative veteran, and was one of the first companies to offer products for home and professional environments to address noise abatement and acoustical control issues.

ASC's best-known product was awarded U.S. Patent 4,548,292 for a "Reflective Acoustical Damping Device For Rooms." That isn't a very catchy name; we're much more familiar with the product's retail name of TubeTrap™. The TubeTrap has achieved a rather interesting position in that it is used as both a generic (as is Xerox for photocopying), as well as a specific product. ASC has evolved far beyond the TubeTrap and now offers a wide range of acoustics products for the home, studio, and professional environments. The TubeTrap still graces the product lineup and has two first cousins, in the quarter-round and half-round TubeTrap products.

Art Noxon is president of ASC and the inventor of the TubeTrap. Art holds advanced degrees in both physics and mechanical engineering, with a focus on acoustics. His company's product line has greatly expanded since its inception 20 years ago.

When it came time to build the dedicated home theatre/multi-channel room in my new home I took the advice of a friend and fellow *Widescreen Review* writer Stacey Spears. It was Stacey who suggested I use ASC's ISO-Wall solution. Stacy has a complete dedicated ASC room, including both sound and vibration proofing and conditioning. And Editor-In-Chief Gary Reber uses SubTraps in one of the reference systems at *Widescreen Review*.

I couldn't have been happier with the results of this decision, and I've been rewarded with a room that's free of the usual boominess that can result from typical construction. A few months back, well after completion of my room, ASC's Marcus Thompson and Ty Moyer suggested that I try out their new subwoofer stand to eke a little more bass performance from my room. Between this, that, and the other, what started off as an experiment ended up becoming a review of their acoustic SubTrap.

Construction And Technical Details

The ASC SubTrap is a relatively unassuming product. It looks just like a small footprint subwoofer and acts like a "sub-stack." Its use is very simple; set your subwoofer on top, and away you go!

SPECIFICATIONS

General

Dimensions (WHD In Inches): 18 x 18 x 18 and 22 x 22 x 22
 Support: 250 Pounds
 Vibration Isolation Feet
 Fabric Colors: Standard Black and custom available
 Weight (In Pounds): 25 and 40
 Price: \$659 and \$839 (more for custom sizes and fabrics)
 Available online or through local dealers

Manufactured In The USA By:

Acoustic Sciences Corporation
 4275 West Fifth Avenue
 Eugene, Oregon 97402
 Tel: 541.343.9727 / Fax: 541.343.9425
 1-800-ASC-TUBE (272 8823)
www.acousticssciences.com

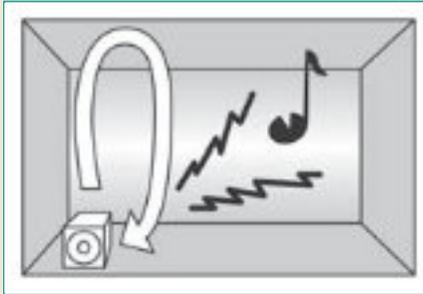
"The ASC SubTrap made a marked difference in the bass reproduction in my room, and I got the measurements to prove it!"

Feedback Control: The Science Behind The SubTrap

Arthur Noxon,
President Of ASC/Inventor Of The
TubeTrap

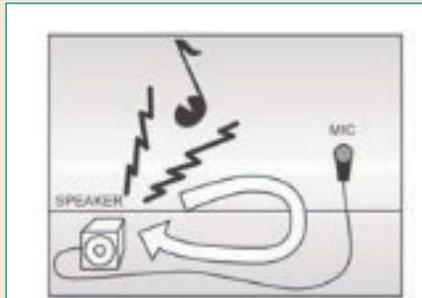
Feedback can happen in most any type of audio system, adding a howl or whistling tones to the program material. It happens when sound loops back into the electronics and generates some version of the original signal within the electronics. Feedback loops must be controlled to achieve accurate reproduction of the program material.

The most common form of feedback is electroacoustic. A good example of this is the howl of an open microphone on stage. It



can be fixed by moving the microphone, changing its pick-up pattern or applying equalization (EQ). Mechanical-acoustic feedback (microphonics) is similar except that it occurs when vibration from a loudspeaker buzzes the electronic circuits or the transport of a record, CD, or DVD. A rumble or ragged tone is heard. Platform isolators can decouple the vibration conduction path.

Room-acoustic feedback occurs when loudspeakers couple with room modes. The

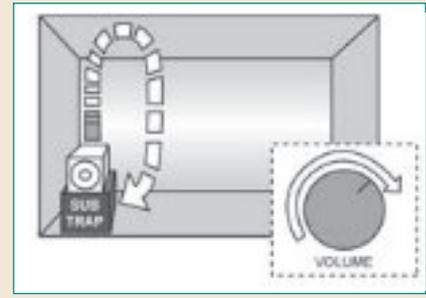


Feedback occurs when the toneplaying and the return path delay sync up in a continuous tone generation loop.

subwoofer is particularly vulnerable to room-acoustic feedback, especially the vertical room mode. It colors the playback and blurs the articulation. Room-acoustic feedback control is essential in all quality audio playback environments.

Without room acoustic feedback control, the subwoofer couples to one or more room modes and gets so loud at those frequencies that the overall bass volume has to be turned down. But that also turns down the volume of the program material. The result is the "one note bass" effect, and it is the common shortfall in subwoofer performance.

To reduce mode coupling, the subwoofer can be moved around the room, but the basic problem, the vertical room mode, remains. For an 8-foot ceiling, the feedback resonance is at 70 Hz, right in the middle of the subwoofer response curve. EQ can be applied, but that only quiets the loudness of the mode coupling. The inarticulate slurring, the failure to present a fast tracking dynamic bass line, remains inadequate. The ASC-SubTrap is a pre-engineered broadband acoustic feedback control system that



directly addresses vertical mode coupling, regardless of ceiling height. It reduces the excessive loudness (one note bass) and improves the articulation (mud) normally associated with subwoofer placement on the floor.

The setup is almost too simple. Lift the subwoofer up and slip the SubTrap underneath. 1) This raises the subwoofer up off the floor, out of the vertical mode pressure zone and decouples the subwoofer from being able to contact a pressure mode and pump energy into the mode. 2) In addition, a bass trap has been located on the floor, right in the middle of the vertical mode pressure zone. Any vertical mode action that might be stimulated by the subwoofer is rapidly damped out. 3) Finally, the SubTrap acts as an iso-deck, a floating platform to mechanically decouple the subwoofer vibration from the floor, electronic gear, video equipment and the rest of the house.

When vertical mode buildup is eliminated, the EQ can be turned off, and the subwoofer volume can be turned back up to match the main listening level. The subwoofer can finally do its job, which is to complete the full bandwidth presentation of dialogue, musical detail, and explosive program material.

According to ASC, by raising the subwoofer off the floor and putting a bass trap in its place, the subwoofer is effectively decoupled from the vertical room mode. Excess bass buildup is reduced, and the playback volume of the subwoofer can be turned back up. See the sidebar article on Feedback Control: The Science Behind The SubTrap, for the science behind this remarkable acoustic product.

Unfortunately, when you use a subwoofer with the dimensions I do, the standard sizes of the ASC SubTrap don't work. While custom sizes are available, after discussion about my environment, Marcus ended up sending me two of their 17- x17-inch stands to mount my behemoth. This would allow me to test review subwoofers with

SubTraps, should I find that they do indeed do the trick.

I started off my installation adventure by marking the subwoofer's location on the floor and wall, so I could aim for duplicating the position as closely as possible, save for the added height of the subwoofer stand. This way I was dealing with one variable, the SubTrap, which is always considered the best approach. Unfortunately, I'm not yet equipped for high-octane RTA (real time analyzer), but most of the claimed benefits of the SubTrap was demonstrable (and measurable) with Meridian's Meridian Room Correction™ (MRC™) software provided with my trusty 861v4 Preamp/ Processor.

Since I've mentioned that ASC claims a variety of benefits for the SubTrap, I will

enumerate a few of them now:

- Lifts subwoofer out of the floor pressure zone, replacing it with a pressure zone bass trap.
- Shifts ceiling feedback reflection outside upper crossover frequency.
- Improves attack transients by reducing vertical mode ringing.

These items can be objectively verified, and I have provided a series of MRC graphs demonstrating whether or not the product meets its design criteria. The Meridian Room Correction tool is included as part of their 861v4 and G68 Preamp/ Processors. Think of this as a poor man's RTA because my upgrade budget was blown on the 861v4!

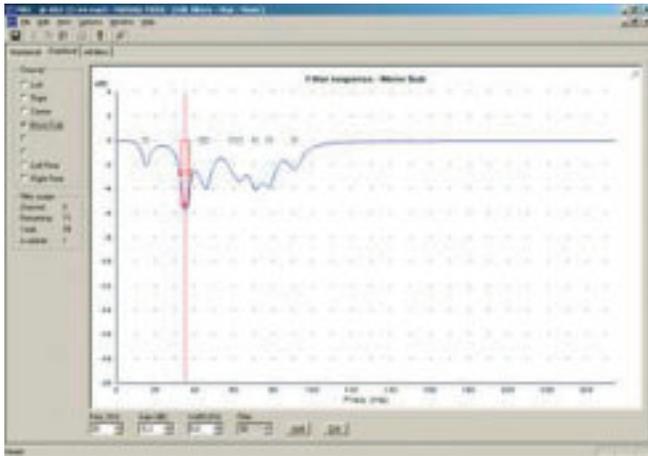


Figure 1

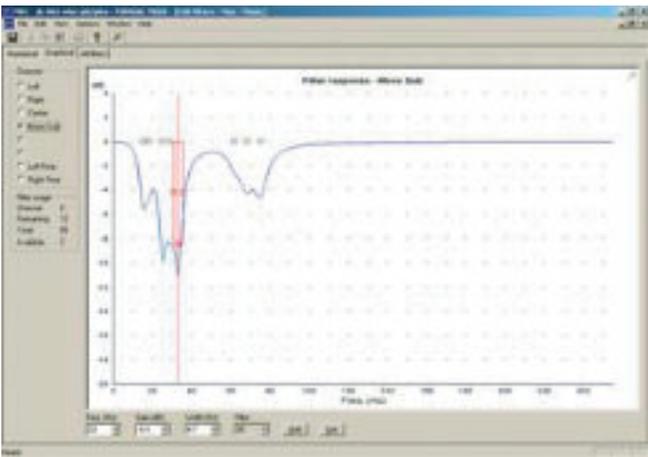


Figure 2

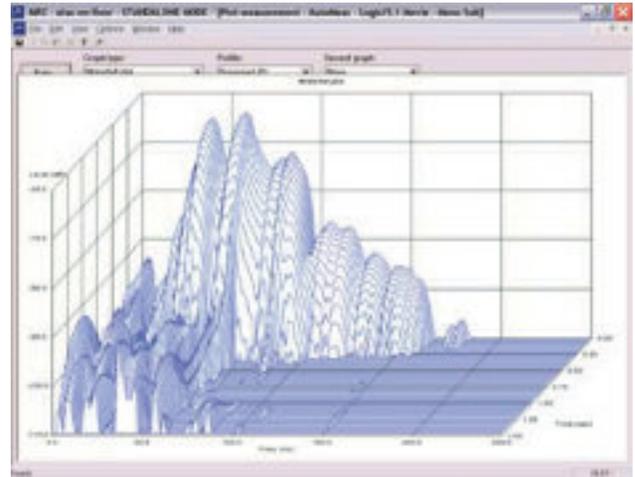


Figure 3

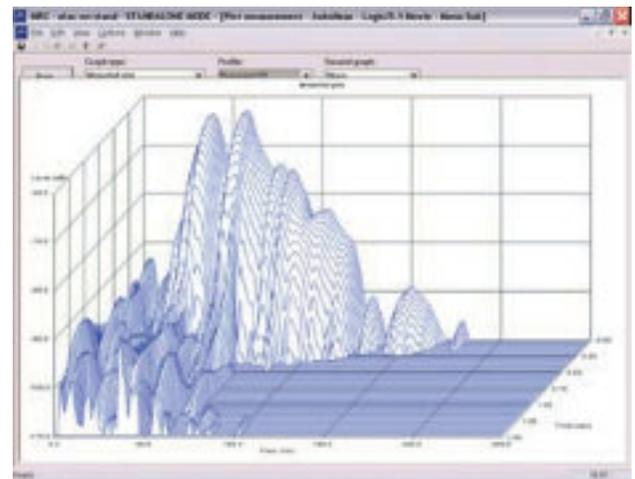


Figure 4

Results

Figure 1 shows the filter response for the correction required by MRC to get the resonance peaks back down to earth for my SV Subwoofers PB-2+. Just below 40 Hz is a 6 dB peak, and there are several 4 dB peaks at about 45, 79, and 80 Hz, plus additional corrections below 40 Hz.

Contrast this with the filter response in Figure 2, where the subwoofer is perched atop both of the side-by-side ASC SubTraps. Here, it would seem that the response is “worse,” but that isn’t truly the case. There are fewer peaks, which can still be easily corrected by MRC, and in the region below 40 Hz, where boom isn’t as prevalent. Contrast this with the response between 40 to 80 Hz, where no filters are required (or used).

That’s just one subwoofer, though, and one would hope that ASC’s SubTrap isn’t a

one-trick pony. If it’s a good product, it should show marked improvements with more than one subwoofer. Fortunately, I had a subwoofer review sample in to work with to verify the results. This time we’ll look at the results from a different perspective, with 3D waterfall plots, which demonstrate the decay time for various frequencies between 20 and 250 Hz. Figure 3 shows the measurements of the subwoofer sitting directly on the floor.

The contrast is Figure 4, where we have the review subwoofer up on the ASC SubTrap, in the same position in the room. While examining the graphs in Figure 4 from highest to lowest frequencies, right to left, take a look between 200 and 150 Hz, and you will notice that the response at about 175 Hz has been flattened, and the decay time at 150 Hz (the highest crossover frequency configurable on the processor) has been lowered. In addition, the large ridge

between 150 and 100 Hz has been reduced in decay time as well. The most striking difference to me is in the 100 to 50 Hz range. Here, there is no substantial overhang, at any frequency; all reverberations are kept below .5 seconds and very close in duration.

Finally, take a look at what filters MRC created for this review subwoofer. The table below demonstrates the characteristics of the filters required to correct both floor and on-stand performance. In this table, green indicates a decrease in filter requirements, and red indicates an increase in filter requirements while the review sample is placed on the subwoofer stand.

It is quite important to note that while some individual frequency filter characteristics are slightly worsened, the aggregate performance is dramatically improved. In the case of filter gain, the variation between largest and smallest filter is just 2.5 dB, and in the case of RT-60, the variance is down to just .053



SubTrap Performance Measurements

Center Frequency	Floor Correction	Floor RT-60	Stand Correction	Stand RT-60
42	5.7 dB	.485	-3.9 dB	.408
37	3.1 dB	.375	-2.4 dB	.355
34	2.5 dB	.359	-3.3 dB	.404
29	2.1 dB	.360	-2.8 dB	.397
21	1.2 dB	.354	-1.4 dB	.368
Variation	4.5 dB	.131	2.5dB	.053

seconds. So, even without MRC to assist, the overall performance is demonstrably improved.

Great, but what does it do for the sonics; good or bad? That's the best result of all. My room had fairly good bass response to begin with, due to its construction with ISO-Wall, but I was pleasantly surprised by the positive effect gained from using the ASC SubTrap. What I noticed the most was an increase in the articulation of bass-pitched instruments. Take, as an example, the bass

guitar playing of Bakithi Kumalo on Paul Simon's great *Graceland* album. A particular favorite is "Diamonds On The Soles Of Her Shoes," where Kumalo really shows off his technique. The bass line jumps octaves, and some of the blistering runs are all over the crossover region. The improvement wrought here was a blast, as the 16th note runs clearly demonstrated a slightly greater clarity at the bottom of his A and E strings.

Conclusion

This review is a bit of a departure for me, since I usually spend a fair amount of space talking about subjective impressions of audio fidelity. I spent very little in this review discussing the audible benefits. That doesn't mean I'm unimpressed, since this is hardly the case.

I'll put it to you this way, the ASC SubTrap made a marked difference in the bass reproduction in my reference room, and I've got the measurements to prove it! Bass articulation was dramatically improved, and the little bit of boominess I heard prior to its use was eliminated. Some very familiar passages that were slightly problematic were now presented with a clarity that I was quite pleased with.

ASC will not be getting the SubTraps back, as I now consider them to be an indispensable part of my review system—and Art, as the cliché says, the check to pay for these is in the mail!