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Foreword

"Your Room is half of your sound." This phrase appears as the headline on the AVAA C214 page of the PSI Audio website, and I could not agree more. As those in the know have been saying all along, the listening room actually has a greater impact on sound quality than a change in audio components. I have known about this ever since I was bitten by the audiophile bug more than 20 years ago, but it took me a long time to give it the same level of consideration as the system itself. The biggest hurdle was the high cost of high-quality, professional solutions. Further, I faced many challenges as I started exploring bass trapping and realized that while the solutions worked to some extent, they also introduced significant drawbacks, leading me to believe that no treatment or only modest treatment yielded the best results. Excessive damping can definitely create an undynamic, dull, or dead acoustic. But I also made the mistake of unknowingly relying on certain problematic room properties to balance out other room issues. A few years ago, after years of experimenting, the penny finally dropped, and I realized I was simply not using the appropriate tools for the task.

Experienced audiophiles often think they've mastered their hobby, and I used to believe this as well. New experiences tend to reaffirm what we already think, leading to a common trap. Nonetheless, I've realized that even after two decades in this field, I continue to learn. The great thing about this hobby and being a reviewer is that every now and then, a product comes along that inspires me in new ways. More rarely, a product or its related routines inspire or enforce changes that yield fresh insights and structural improvements in the sound in my room. The AVAA C214 is one such product.

My Room Acoustic Experiences in a Nutshell

After starting with straightforward GiK 244 panels and Hofa and T.Akustik Spektrum D20 diffusers, trying a forest of Acoustica Applicata DaaDs, stepping up to R.T.F.S Big Blocks, SiRRAHs, Stripes, Ceiling Vanes, and Carreaus, adding SMT diffusers, Resonator Stockholm AB optiffusers, ArtNovion Douro W diffusers, and precisely-tuned Mass Spring Bass Absorbers, it was abundantly clear that properly treating acoustic problems takes a lot of time, and the solutions take up a lot of space.

This apartment has complex resonances, and I now know that such complex acoustical problems cannot be fully addressed with just two panels here or there. Instead, the resonances must be thoroughly mapped and appropriately addressed at all problematic locations. As a result, I ended up with a room filled with various passive acoustic

treatments, and the sound has benefited tremendously. Although the room is still not perfect, the acoustics have improved so much that it has rewired my expectations, and I hear room issues in other rooms pretty much anywhere I go. The other side of the penny is that everyone who visits my room, audiophiles included, feels that all the acoustical treatments are visually overwhelming. Although it is easier for me to accept this solution because of its indispensable effectiveness, and I have grown accustomed to it after working in the broadcast industry for two decades, and like the "studio-look", I can certainly understand the reticence. And this is where active bass trapping provides an ideal alternative.

After completing the final steps to address the acoustics in my room using passive methods and finding that there were still a few problematic areas, specifically excess decay at certain very low notes, this created the ideal backdrop for me to test the PSI Audio AVAA C214 Active Bass Trap.

The main question for me was, of course, whether they truly are as great as described. Secondarily, I wondered how effective they would be in a complex space that was already well-treated using passive means.

PSI Audio

PSI Audio started as a loudspeaker manufacturer in 1977 under the name Roux Electroacoustique. In 1988, it was renamed Relec SA. Over the years, the company developed a variety of speakers, ranging from Hi-Fi to Public Address systems and Professional Studio applications. In 1991, an analog and digital electronics section was added to the acoustic laboratory. From 1992 to 2003, Relec SA worked in close partnership with Studer, developing and producing the OEM line of monitors. In 2004, Studer was acquired by an international group and had to stop selling studio monitors under the Studer brand. This marked the launch of the PSI Audio brand in studio monitoring.

In 2016, PSI Audio released the first active bass trap, named AVAA C20, which is fully analog. From then on, the company continued to develop the AVAA technology. In 2023, the first fully digital AVAA, the AVAA C214, was introduced. PSI is not the first or only manufacturer to produce an active bass trap, as Pass Labs had a large, floor-to-ceiling pipe-shaped active bass trap in the early eighties, and Bag End has produced the E-Trap since 2008. However, PSI did the same for the popularity of active bass traps as Apple did for portable music file players. Furthermore, PSI AVAA is the only solution that works automatically on all resonances, without any adjustments, within 15Hz and 160Hz, in such a small enclosure. While critics will object that digital processing is not 100% real-time, PSI

indicates that this is not critical at such low frequencies, as the long wavelengths allow more than enough time for the required calculations.

Originally intended for the professional studio environment, the C214 soon started popping up in reviews and was increasingly used in the notoriously bad acoustics at audio fairs, shows, and demos.

AVAA C214 Description

At low frequencies, solid boundaries such as walls, floors, and ceilings reflect energy back into the room, creating resonances known as room modes. These modes blur bass, reduce clarity, add peaks at certain frequencies, and mask detail. The traditional method of combating these issues is to use passive bass-trapping methods, such as porous absorbers, plate resonators, and Helmholtz resonators. To be truly effective, you need to use multiple methods and cover a wide surface area. Below 100Hz, foam and rockwool become much less effective, and even the most specialized methods need to be physically large to cover really low frequencies.

The PSI Audio AVAA C214 offers an attractive alternative. This active solution promises performance comparable to passive solutions, up to 40 times its size, from a unit no larger than a small wastebin, making it ideal for those who don't want visually intrusive

ornaments lacing the walls, or when space is simply limited. Despite its 22,5 cm diameter and 62 cm height, it covers a frequency range from an amazingly low 15 Hz to 160Hz. AVAA's compact, sleek design and high efficiency make it a portable solution: it can be easily moved and resumes operation in other rooms or new spaces without calibration. AVAA is quite possibly the easiest, most elegant, and most flexible acoustic solution against room modes available.

The C214 is available in black and white

The C214 does not have signal sensing to switch on and off automatically, and is intended to remain switched on. The unit's power consumption is specified at 1W in standby, 20–40W in regular use, and 48W max. The standby function is accessible only via the remote

control application when the unit is paired with a wireless network. The power consumption in idle (switched on but with no music or sound in the room) is not specified. When measuring this myself, I found that the power consumption in Standby is 0.4 Watts, rising to 0.7 Watts in Idle. In effect, the power consumption is low enough not to worry about.

The unit only needs a power cable and can be used standalone, controlled via a main power switch and two gain buttons on the back. Alternatively, the unit can connect to the home Wi-Fi, allowing easy control over power and gain via an Android and iOS app.

Where's the catch, you ask? Well, at first glance, that looks to be the price. At 3.400 euros each, the solution is not cheap. Nonetheless, as I experienced firsthand, genuinely effective acoustic treatment never is. Specifically, the total cost of the passive treatments in my listening space roughly equals the price of a pair of AVAA C214s.

So how does AVAA work?

It should be noted that the AVAA C20 and C214 are not inverted subwoofers. Unlike noise-canceling headphones, they do not use phase cancellation, as I had assumed before investigating the working principle for this review. The AVAA C214 is a digital active pressure-based bass absorber that automatically reduces any disturbing room mode(s) in its operating range. As PSI describes it, the unit creates a virtual hole in the wall, akin to opening a window, through which sound waves can escape.

By measuring pressure using an internal microphone and regulating velocity, the system effectively imposes a specific impedance. It does this by sensing excess low-frequency energy, electronically transforming it, and directing a signal to a pair of woofers. The internal electronic controller adjusts the speed of the air particles based on the frequencies to be corrected. Any emissions from the speakers are absorbed by the chamber behind them, which is filled with a damping fiber. If you look through the grilles, you can see two woofers mounted inside out, which actually makes sense because they play into the sealed internal volume.

Basically, the AVAA system "sucks" excess bass energy from the room. It works as a passive radiator or passive absorber, but thanks to a powerful amplifier, it does so much more effectively. An important difference from noise cancellation in headphones is that the AVAA unit works by absorbing pressure rather than creating it.

In conclusion, the AVAA system does not use noise canceling in the traditional sense, where a system simply detects pressure and counteracts it with opposing sound waves. Instead, it relies on a specific transfer function between the microphone and the

transducers. As an active bass trap, it actually behaves like a typical bass-trap—no anti-sound or noise suppression, just efficient absorption.

Test Tones

To find the ideal placement for the AVAA C214, the manual recommends playing a range of test tones while listening from the listening position to identify problematic frequencies. Next, you should play the problematic tones continuously as you walk along the walls of the room, especially in corners, to find the loudest resonance(s). That's where the AVAA C214 should be placed for maximum effectiveness. It's really that simple, and it works!

Eelco Grimm suggested that a pulsating/intermittent sound file (repeatedly switching on and off) could help identify the best position for the AVAA C214. When playing such a file, the silence between pulses would be clearly noticeable when the reverberation time is short, but with a long reverberation time, the pulses become less distinguishable from one another. With an even longer reverberation time (which occurs due to a room mode or standing wave), they are no longer perceptible, and only a continuous tone can be heard. The spot where this happens is the ideal location for an AVAA. Helios adopted this approach by selecting 11 frequencies that closely match 1/3-octave intervals, since these are the most typical room modes, and generating a pulsating sound file for each.

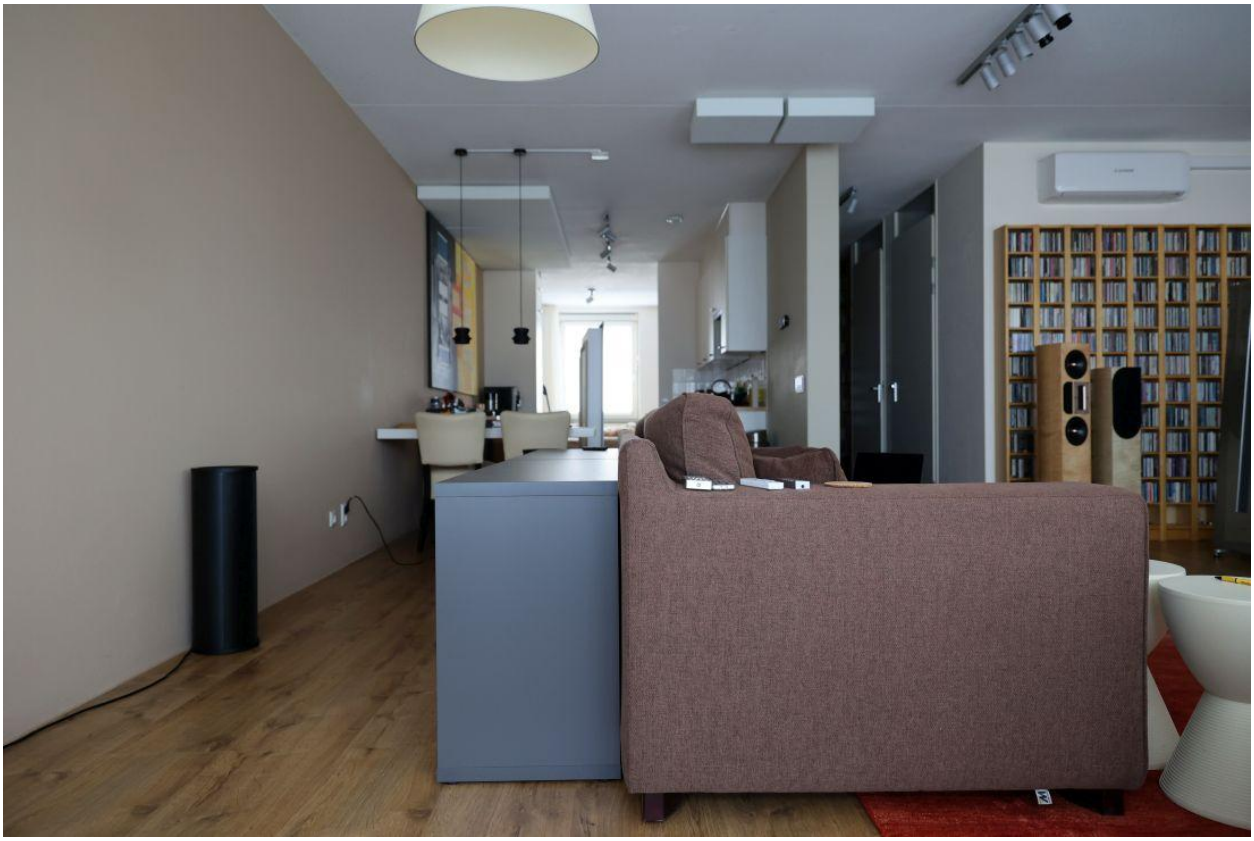
These files are available for download on the Helios website. I used them for this review and will continue using them instead of standard test tones. They work so incredibly well that I consider them indispensable for anyone serious about improving the sound in their room.

Initial Listening

As mentioned earlier, I was curious about how well the AVAA C214 would perform in my space, which was already quite well-treated with passive methods. However, I believe most people will prefer to buy a pair of C214s before undertaking the extensive passive treatment of the room that I have described. Thus, the units will normally be used in a space with predominantly bare walls.

To accommodate this, I removed the two 110 x 160-cm Mass Spring Bass Absorbers from the back of the room, which are normally located behind the listening position to help tame the room's largest room mode at 30Hz. Because this resonance is so low, it is very hard to fully eliminate, even with multiple large, tuned panels (I use six). These panels are tuned to my room's problematic 30Hz, but still work quite well up to several octaves above. With these panels removed, a large, untreated acoustic area remains, 1,5 meters deep and more than 3 meters wide. A corridor with a bare ceiling, wall, and floor of this size is normally a recipe for trouble, and indeed, when standing in that area and talking, you can

hear that it sounds hollow. The reflections color the sound, add blur, and greatly increase the decay of several low frequencies when playing music.



Adding such a small product as a single AVAA C214 in the middle of this bare space seems visually silly, but its effect is anything but small! In fact, the single C214 provides a very similar improvement in bass to the two passive panels. When playing the aforementioned pulsating test tones, the C214's benefits are immediately obvious. Without the C214, the pulses at these frequencies blur together, sounding like wobbly continuous tones. With it switched on, the pulses suddenly resemble a square wave: much drier and staccato, and now distinctly switching on and off. There you have it: the AVAA C214 does precisely what they promise, reducing the loudest room mode at 30Hz and removing most of its decay while improving other boomy low-bass frequencies just as easily. Importantly, it works fully transparently, affecting only the room's undesired reverb, blur, and boom, and doing nothing else whatsoever. This is something that porous absorbers can only aspire to. And even when they work at such low frequencies, then only very narrowband, while the C214 simply covers the entire bass range between 15Hz and 160Hz.

When playing music, you also hear right away that the sound is now much tighter and cleaner. The more even-handed bass and significantly shortened reverb lead to a much

more articulate and precise bass. Bass lines are easier to follow, and the performance becomes rhythmically more interesting.

Adding a second C214 unit and spacing them almost two meters apart again did precisely what one would expect. The second unit enhanced what the first unit did and delivered even more precise, incisive bass. While it was definitely better, it was not twice as good. For this area, a single unit and two other passive panels would be a more reasonable solution.

Remarkably, the improvement in bass from a single C214 is equivalent to that of two large panels, which is even more amazing given the unit's small size. However, the C214 has a different impact on the rest of the sound than the two large panels. This is only logical, as the C214 stops working at 160Hz, where the panels continue to provide damping. This is audible as a reduction in midrange clarity, some flutter echo, and a larger, albeit more diffuse soundstage. With the panels back in place, the sound becomes more intimate and direct, confirming that a large empty space also needs a bit of damping in addition to bass treatment alone. However, treating higher frequencies is far easier than treating low bass, and much more cost-effective as well.

Gain

The gain can be set on the unit itself using two buttons on the back, or via the Android or iPhone app. In most cases, the default 0dB gain setting will work very well. If there are obstacles near the unit, a lower setting may be needed. Alternatively, where possible, a higher setting can yield even more efficiency. I found that +3dB maximizes performance in my room. It should be noted that when set too high, the C214 can enter a feedback loop in which it starts amplifying its own signal, like a microphone too close to a speaker. This can also happen when standing in front of a unit with high gain or when covering the microphone area. However, unlike a traditional microphone feedback loop, the C214 auto-senses this condition and temporarily reduces gain until it stabilizes.

Above: The setup before testing for this review, with the speakers halfway into the room.

Below: The rearranged setup after testing for this review, with the speakers much closer to the rear wall.

About the room

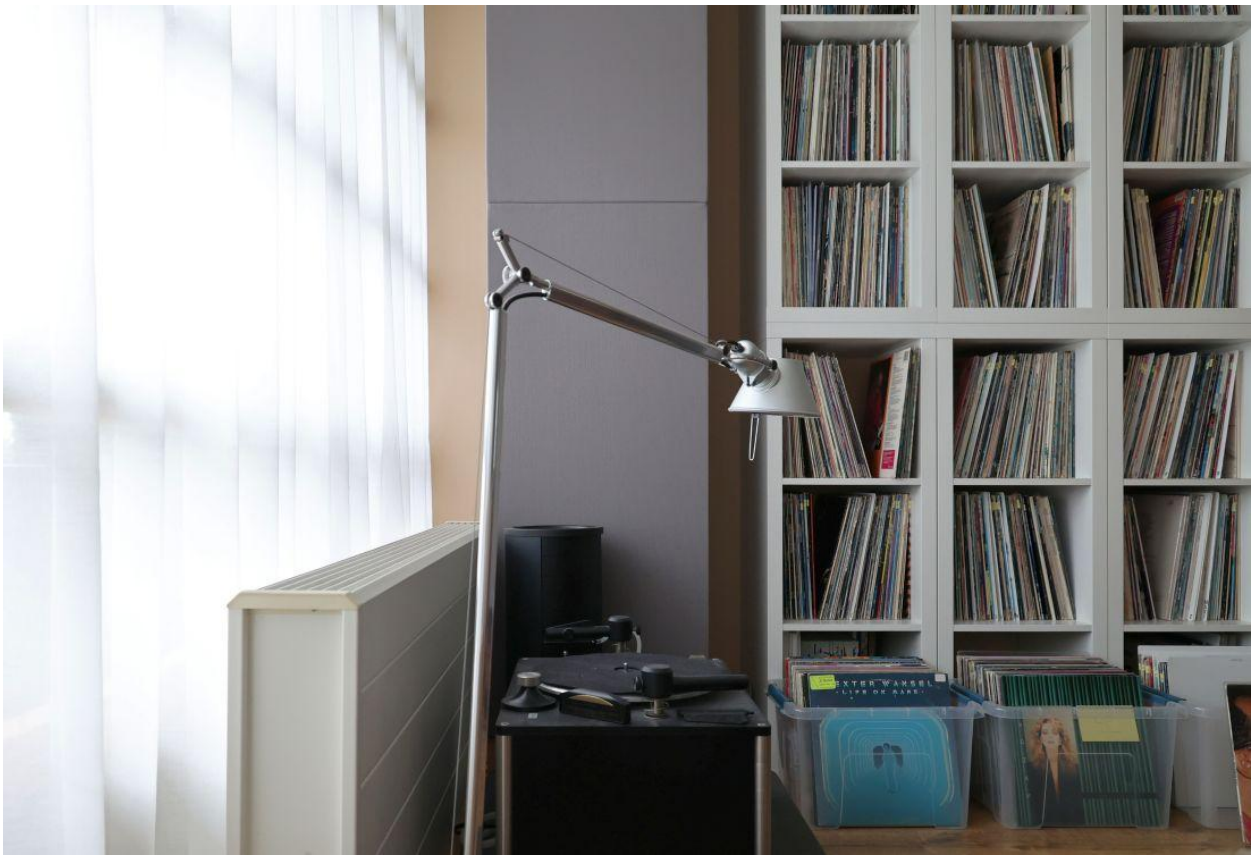
The front wall of my listening area is already well treated with two Mass Spring Bass Absorbers in the left and right corners, and one more in the middle, covered with ArtNovion Douro W diffusers to avoid excessive damping, which is especially important because the Apogee Duetta Signature speakers are full-range dipoles. There are also three Vicoustic VicTotems: one in each corner to reduce upper bass resonance and manage reflections, and one more in the left corner to help treat the bass. With these measures, the front wall is almost entirely covered. The back of the room is asymmetrical and only problematic on the right-hand end. This corner is covered with two R.T.F.S. Big Blocks. Since the kitchen area and an adjacent open space are on the left, the far-left corner is essentially non-existent.

With these passive bass traps, I was able to place the speakers closer to the front wall than before (now 194 cm versus 3,5 meters), resulting in more powerful bass with no more nulls. Before the addition of the Mass Spring Bass Absorbers, such placement came at a steep price, with huge bass peaks, a boomy sound, and significant coloration. Although I now finally had a relatively even-handed frequency response down to 40 Hz, I still had to accept some room-induced bass blur and coloration, as well as some remaining peaks with too much decay at 30 Hz and 40 Hz.

Before this review, the only way to reduce the aforementioned resonances was to position the speakers much closer to the listening position, almost halfway into the room. This yields a very clean and transparent sound, but at the expense of rolled-off bass below 70Hz and the introduction of nulls, which cannot be effectively corrected with acoustic treatment or, for that matter, with DSP. This has to be addressed by adjusting the speaker placement and the listening position, which, in turn, results in excess coloration. And that is where my primary interest in the AVAA C214 comes in.

Serious Listening

Initially, I got sent one pair of AVAA C214s. After connecting them with long power cables, I tested the room using the Grimm test tones. As expected, the two front wall corners were the biggest offenders, and predominantly the left corner. When standing in the right back corner, I could hear multiple resonances, but at a lower volume than in the other corners. In any event, since the sofa was positioned further from the back wall, I no longer felt that this corner had much of an influence on the listening position anymore. Nevertheless, I placed a C214 in several positions in that corner and listened to all the test tones, not just in the listening position but everywhere in the room, but the C214 did not appear to have an effect in that corner.



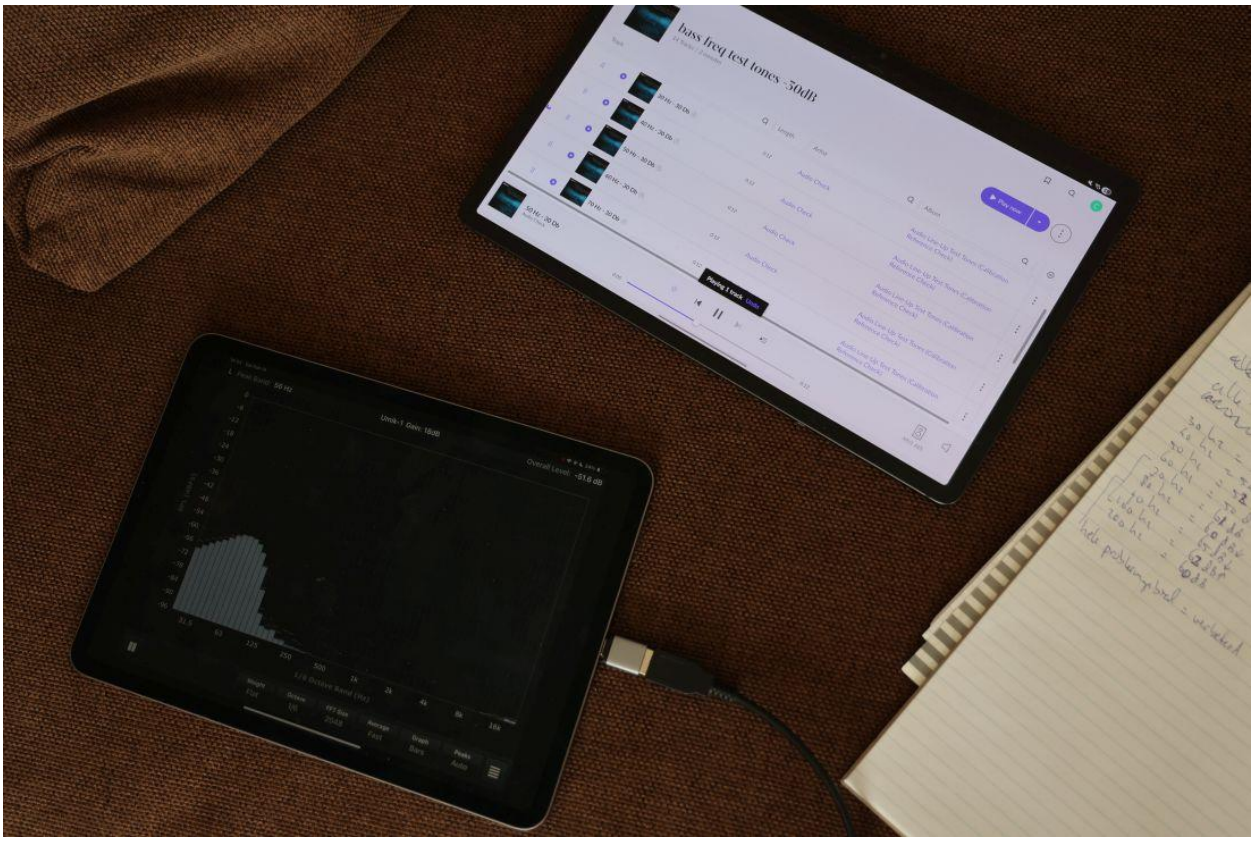
Interestingly, the C214 was initially highly beneficial when placed in the recess in the glass wall on the right, where the room widens. Usually, bass traps do not increase bass output, but sometimes they do. Here, they counteracted a 50 Hz mode that reduced bass output at that frequency in the listening position, making it very noticeably stronger and clearer.

However, its benefit was specific to 50Hz, and I felt that the C214 had a broader effect when placed at the front wall, so I continued experimenting with that first.

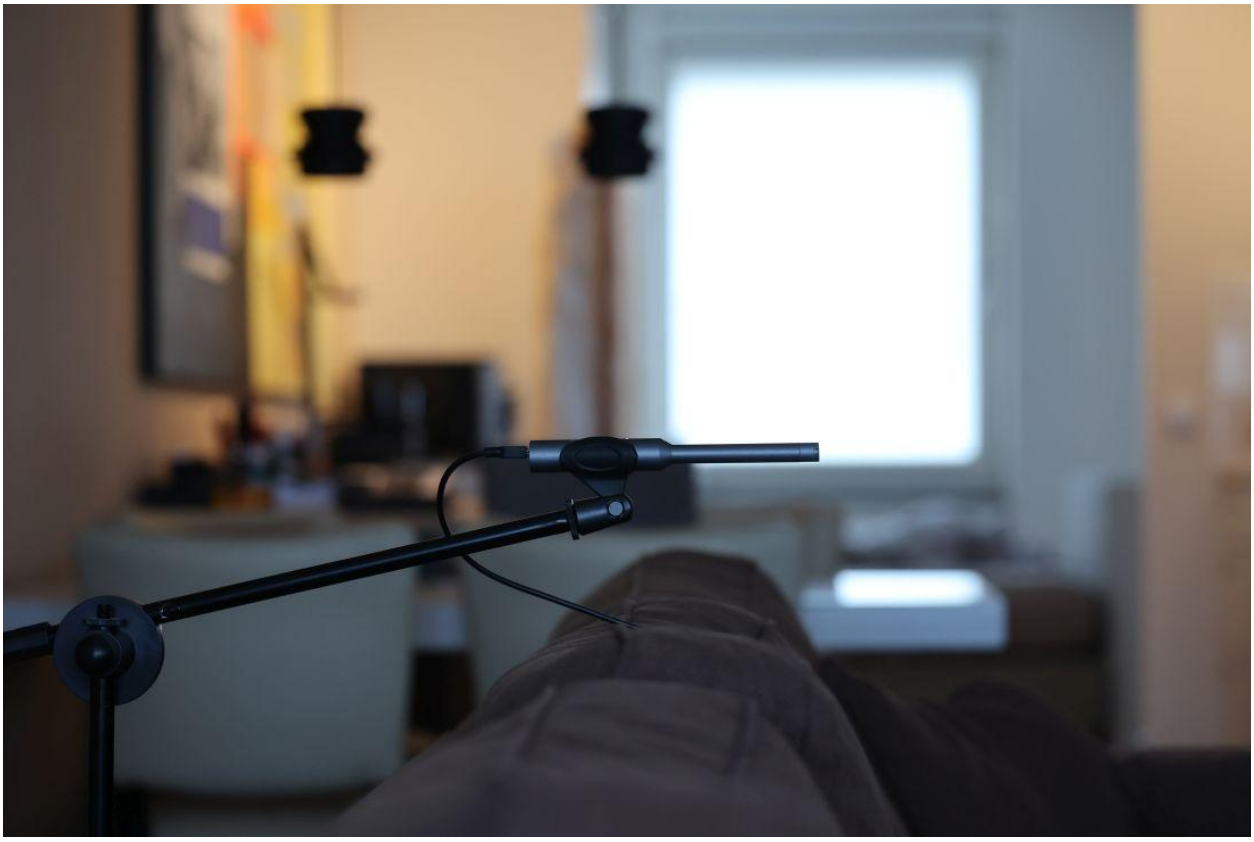
I started with one pair of AVAA C214s on the front wall, one in the left corner (where the resonances are loudest) and one in the right corner, and re-ran the test tones. When playing the 63Hz and 125Hz pulsating test tone with the C214s switched off, I heard it as an almost continuous tone with just a small amount of modulation. There it was: my room's biggest issues, clearly identified. However, there seemed to be no improvement, as the tones remained more or less continuous. I heard barely any difference when switching one or two C214s on or off, even though I had made sure to try all the positions where this resonance was loudest.

Then, I discovered that it made a huge difference when I moved my head all the way forward while remaining seated. This indicated that the back portion of the room was affecting the results, contributing to room resonances at the same 63Hz frequency. This

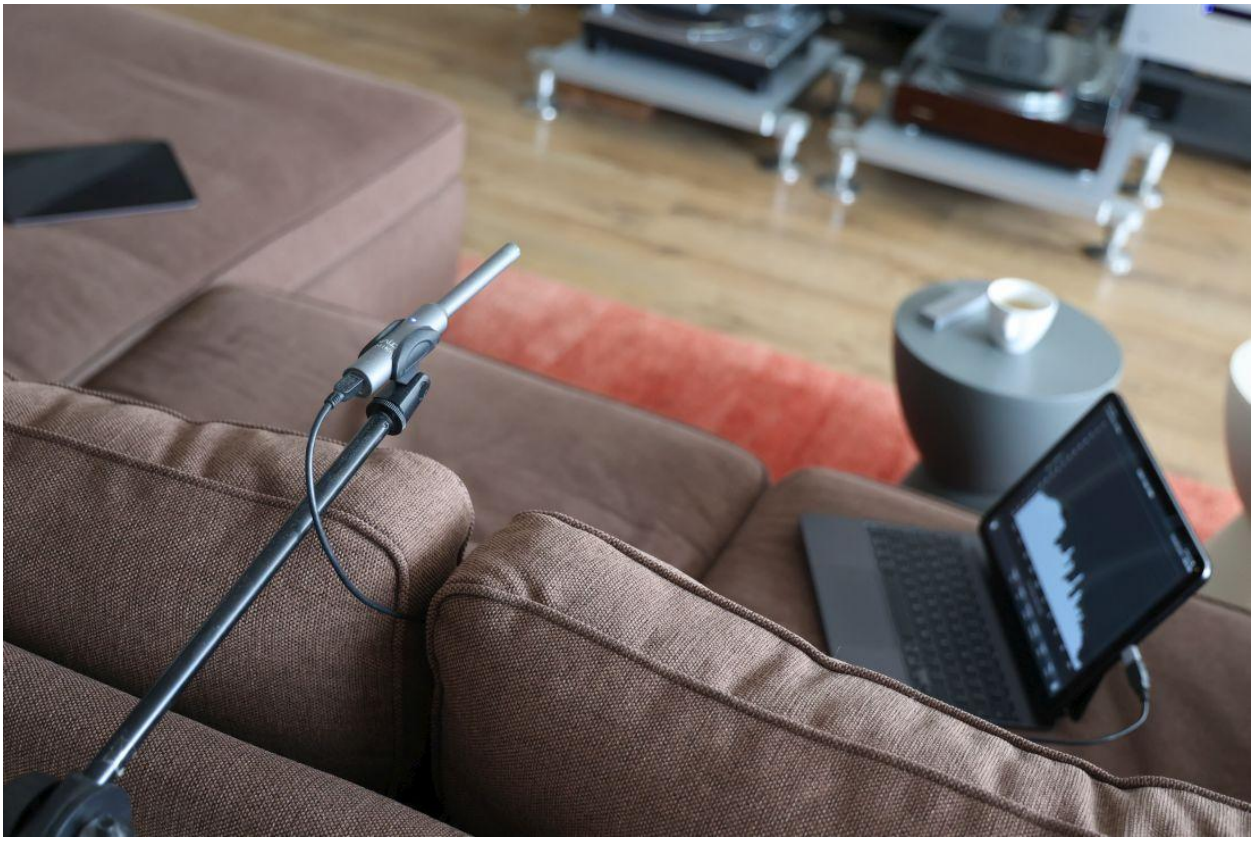
made me think I might need three or four C214S in this complex space, but before giving that more thought, it motivated me to find an even better position for the listening sofa. Via incremental steps, I settled on a sofa position 60 cm more forward, now 150 cm from the back wall. Sure enough, with the sofa in the newly optimized position, the difference between having the C214s switched on or off was now night and day! The left unit made the largest difference, but the right one sure helped as well. With two AVAA C214s switched on, I immediately heard crisp, staccato, clearly intermittent tones, rather than an almost continuous tone. There and then, the C214s proved themselves beyond any doubt.



As a quick side note, I want to add that before this test, I was pretty sure that I had already found the ideal listening position using a calibrated measurement microphone with standard test tones and lots of listening to music. But thanks to the pulsating test tones and procedures carried out for this review, I discovered that the circumstances could be further improved.



Motivated by the fantastic results, I felt compelled to reconsider the placement of the speakers as well. With the listening sofa "locked" in the position where the distinction between pulses was most pronounced, I continued looking for even more optimized speaker positions. Sure enough, I was able to find an even better balance with the speakers a little further back, where the low bass was stronger, and although not uniform in decay, the low bass response was now essentially flat down to 30Hz. On the other hand, the room-induced bass blur persisted, and the coloration was now worse than in the previous setup I arrived at using music and normal test tones. Essentially, I now had the perfect testing bed for the AVAA C214s!



With great anticipation, I queued the test tones and sat down in the listening spot, ready to hear how much more improvement could be achieved with the speakers in their newly refined positions. Sure enough, there was excellent differentiation when playing the pulsating test tones at all frequencies, but to my surprise, this was the case whether the C214s were switched on or off. I could no longer reliably tell whether the units were on or off. For a moment, I wondered whether the AVAAs might not be able to further improve the already pretty good situation.

But as soon as I started listening to music, I noticed a significant improvement with both units on. Sure, it was not night and day as it had been before, with a less ideal speaker and sofa placement, but it was unmistakable.

Because the AVAA system does not affect the music signal itself and only affects how the room responds, its effect does not necessarily slap you in the face. But sure enough, whenever I switched the units off, it was abundantly clear how much they cleaned up the sound. Even if the bass was pretty even-handed before, and the test tones did not unveil a difference, the articulation and differentiation in low bass notes when playing music had significantly increased. Moreover, even though the C214s do not operate above 160Hz, I'd swear the soundstage was now better organized, with improved focus and increased clarity, allowing all the little sounds to be more distinctly separated. I kept switching the

units on and off, and indeed, transient behavior was snappier, dynamics increased, and the entire performance was now more solid, exciting, and realistic with the C214s switched on. Then, there was one more surprise...

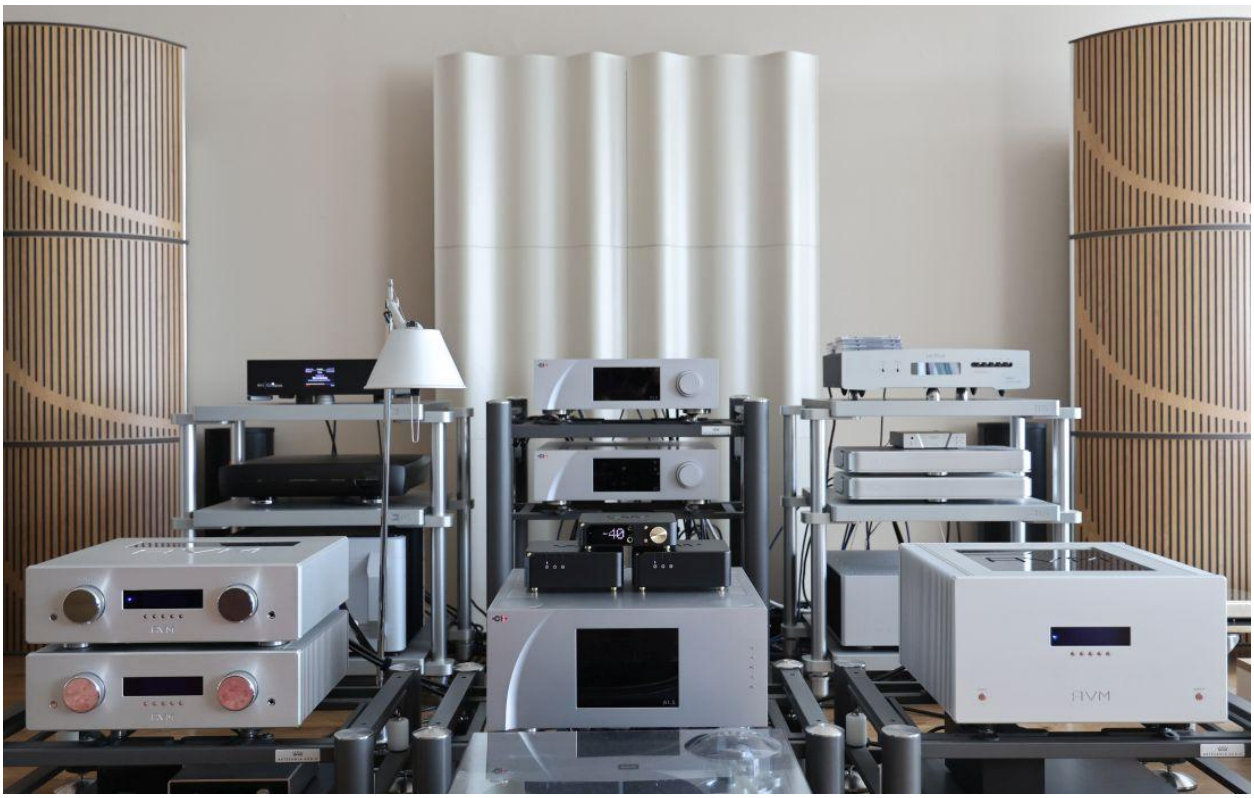
When I stood up while the music was still playing, and without using the C214s, I was unpleasantly surprised by some bass notes playing much louder than others and also lingering on for much longer. In that listening location, it was almost as if I had returned to the old speaker- and sofa positions! Then, I switched the units on, and lo and behold, the sound immediately snapped back into focus! All the bass notes were now evenly loud, and the reverb was gone. Now I knew why the sound still improved so much, despite the absence of obvious effects using the test tones.

Below: Placement matters, but it is not highly critical.

Next, I experimented with the precise positioning of the two C214s, and I soon learned that this is not very critical. Whether they are stacked high up in the untreated left and right corners, in front of passive bass traps, or closer together on the floor, the improvements as described are consistent and vary very little. Heck, they even worked well when positioned right behind the speakers. While efficiency varied slightly, and the best performance was achieved in empty corners, the difference was far smaller than I had anticipated. Implementation really could not be any easier.

I did hear a very worthwhile difference between using one or two. Although my left front corner produces the biggest resonance, and a C214 placed there helps most, I found that a symmetrically placed C214 in the right corner helps immensely in balancing the soundstage and focus. In this space, the second unit is less critical and could be considered dotting the i's, but every time I re-test it by switching the right unit off, I find the blur increases, and I quickly switch it back on. Honestly, I'd have loved it if all I needed was one C214, but alas, two yield a better result.

I also tried a single C214 in the middle of the front wall for good measure. While this still worked to a not inconsiderable extent, the result was less pronounced than with one in the left corner, and with a smaller beneficial effect on focus and soundstage clarity.



Above and below: for convenience and aesthetic reasons, I settled on placement on the floor, in between the two VicTotems. They are placed such that the power LEDs are visible from the listening position.

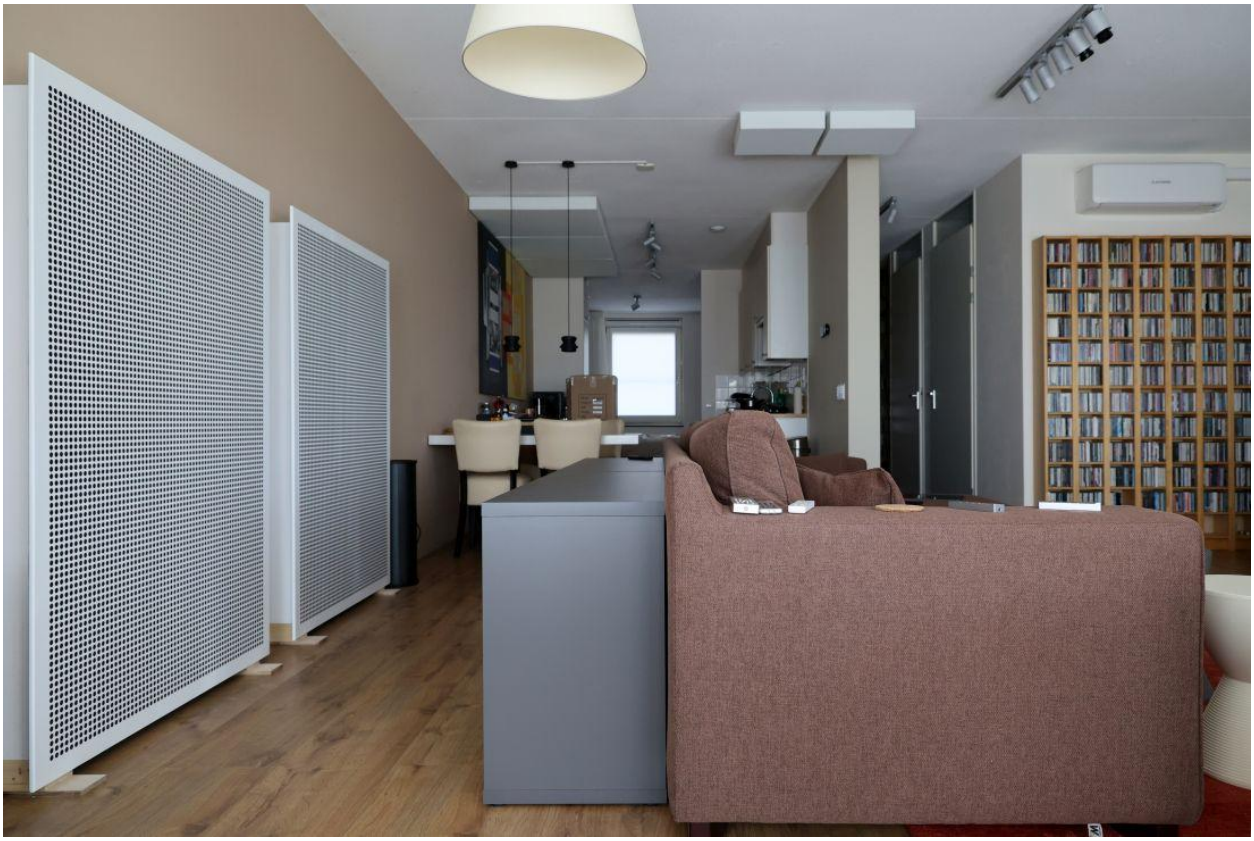
Although I was now very happy with the results, I recalled that the back wall, with its large, exposed, empty floor and ceiling, still affected the overall result, even after reinstalling the two Mass Spring Bass Absorber panels. And indeed, when playing certain R&B or electronic tracks with ridiculously low synth bass, a few low notes still had a bit too much emphasis and decay. Specifically, Janet Jackson's 2 B Loved and Black Eagle on her Unbreakable album, several tracks on Pete Belasco's Lights On album, and particularly the title track on his Deeper album. I was pretty sure that this was easily fixable with one or two C214s along the back wall, but I needed those at the front wall. This strengthened my feeling that I probably needed another set to achieve an ideal result. Upon asking Helios, I was happy to hear that the second demo pair had just been returned and could be sent to me as well.

As soon as the second pair of AVAA214s arrived, I started experimenting with them while keeping the first pair in the same positions in the front-left and front-right corners. First, I revisited the 50Hz issue I had in the glass wall recess on the right with the initial sofa and speaker placement. As I had already observed during testing, the resonance was no longer

present. But also, when listening from other areas of the room, I could no longer hear any benefit to having a C214 in that position. If this had been the end of this experiment, I would still have been extremely happy with the results.

However, with the third C214 positioned between the two Mass Spring Bass Absorber panels, music playback again benefited considerably. The overall bass at all frequencies became even clearer when the C214 was switched on. But more surprisingly, 30Hz benefited immensely. Earlier, without the unit in the back, the pulsating 30Hz test tone still sounded like a continuous wobbling tone, and I assumed that this was just how the Duettas produced bass near their lowest limit. After all, they already sounded massively cleaner than I had ever heard them play before. But that was a false accusation, as, clearly, my room was again at fault! When using only a single C214, the 30Hz pulses snapped into focus, became much drier and staccato, and I now distinctly heard them switching repeatedly on and off. Boy, that extra C214 was precisely what the room still needed! It "simply" and sonically invisibly takes over where the front units stop being effective. Yup, there is no way around it. I already had two C214s in my mental shopping cart, and now I had to add a third!

Honestly, the sound was now so superb that my motivation to keep going had pretty much vanished. But I still had a fourth unit, and I wondered, would it still bring further benefits?



I removed the centrally placed C214 and placed one unit on either side of the two Mass Spring Bass Absorber panels to make a symmetrical "stereo" pair. Well, to be frank, while the fourth unit didn't negatively affect performance, I wasn't sure whether it really helped either. In this case, the single unit in the back was apparently fully up to the task on its own. Although the benefit of the unit in the back is concentrated within a narrower bandwidth than that of the two units in the front, its contribution was nevertheless substantial. Of course, I am a bass-fetishist, seeking the cleanest, tightest, and purest bass. Others may be less critical than I am and may consider a third unit icing on the cake rather than essential.

As a final story, I'm adding my friend MP's experiences, who visits regularly. Listening to some of his Jazz CDs, he initially felt that the improved sound using the C214s felt less full, rich, and warm than with them switched off. Although I did not hear it that way, it is understandable, especially when someone is accustomed to listening in an untreated environment. It's worth keeping in mind that most rooms significantly influence sound color, and people will adapt to it over time. A proper, pure, and clean bass might initially sound lean or dry to these ears. But sure enough, after switching back and forth, MP grew

into it, and soon he found the non-C214'd sound to be slow, blurry, and lacking vitality and expression. Like me, he did not want to return to the old sound.

Wrapping Up

This has been quite a lengthy write-up, so I'll try to wrap it up a little bit more neatly before jumping to the conclusion.

As I found firsthand, these handsome small tubular units work precisely as advertised, and they are an absolute lifesaver if you don't want to line the wall with various large bass traps. Plonk one AVAA 214 in the most boomy corner, and you're instantly rewarded with strongly reduced resonance and clearer and crisper sound. Add a second unit and place them symmetrically to enjoy an even clearer, more transparent soundstage, along with even purer bass.

Are they useful for spaces that have already been acoustically treated? Most definitely. Even in my extensively treated space, the C214s have a hugely beneficial effect. The improvement reminds me of the effects I experienced when I started using the PS Audio P20 Power Plant. That difference was so substantial that I now consider the P20 absolutely essential, and I feel the same way about the C214s.

Are two AVAA C214s a complete substitute for passive acoustic treatment? Well, not entirely. In an empty space, they are amazingly effective and can definitely be called lifesavers. In my tests, a pair of AVAA C214s proved more beneficial in the low bass than a pair of passive large bass traps. They tackle bass peaks and excess reverberation every bit as effectively, and often more so, than enormous, heavy Helmholtz Resonator boxes or large mass-spring panels, whereas the C214, in a stylish form smaller than a trash bin, effortlessly goes below the audible threshold. However, it's worth bearing in mind that the C214s operate up to 160Hz and do not affect direct reflections. The most problematic and hardest-to-cure bass frequencies are within the C214's range, but you will have to address issues above the threshold via passive means. The good news is that upper midrange and high-frequency reflections can be easily and affordably addressed. For problems between 160Hz and 300Hz, you'll need to add passive bass traps, and if you want to avoid absorbing too much mid- and treble energy, the solutions tend to become rather expensive as well. Sure, a few sheets of Rockwool will dampen any excess resonances in that range, but in my experience, they also affect the liveliness, pacing, and transient behavior. The best solution I've found for this so far is Vicoustic VicTotem, a system with one hard, reflective side and one soft, absorptive side, that allows the user to apply them precisely as needed. Like most passive solutions, they have a limit in bass depth, and you need at least two 3-segment

towers for them to be truly effective, but they do really work in the upper bass while allowing precise control over midrange and treble reflections or absorption.

I settled on three C214s as ideal for this room, and they work seamlessly together. The front ones provide more precision, clarity, and crisper transient behavior, as well as very effective damping and tightening of several previously rather boomy room modes and the associated overly long decay. The rear unit provides even better damping of very low frequencies between 30 and 40Hz, and further improves the overall precision and clarity. The end result is not only a cleaner, crisper, more balanced bass than I've ever heard in this space, but also better propulsion, more excitement, and an even more open and realistic midrange.

Value

Similar results can be obtained with passive treatment. However, to counteract very low bass, you need very high volume, a large surface area, and sufficient wall space. There is a limit to how low foam treatment can go, usually, not much below 100Hz, if that. Most serious bass problems are below that. When done properly to address all issues, including the lowest bass resonances, using commercial products, this actually does not save any money. Moreover, passive solutions that still work as low as 15Hz must be absolutely huge to be effective. Meanwhile, the C214s are just as effective at 15Hz as they are higher up, so when it comes to curing the lowest room resonances, there is no beating them.

All the passive treatments I used did not yet fully resolve the room's issues. Theoretically, I could add even more Mass Spring Bass Absorber panels (or Helmholz traps) tuned to multiple different resonances to get closer to the C214s wide operating range. But there's no wall space left, so I'd have to start covering the glass wall. Besides losing daylight, this would also cause excessive damping in the midrange and treble. Ultimately, even my seriously treated room still benefits enormously from the addition of a pair of AVAA C214s.

Of course, one could also take the DSP route. Roon has very good EQ, and most home cinema amplifiers have Audyssey or other automatic calibration EQ software on board. However, these products process the audio signal directly, which always introduces artifacts. Besides the audibility of the processing itself, ultimately, dipping the frequency curve in problematic areas is not the same as physically removing the pressure precisely where needed. For those who take their music very seriously and want to keep the music signal as pure as possible, there is no way around physical acoustic treatment, whether passive or active.

Still, one might ask whether the benefits justify the 6.800 euros cost of a pair of AVAA C214s. Well, in a 10.000-euro system, it seems only logical that the money would be better

spent on higher-quality speakers or components. However, loudspeakers can only be as good as the room they are in and the care taken to set them up. The deeper they go in the bass, the more issues they will cause. This is one of the reasons (besides purity and coherence) why 2-way monitor speakers are so popular in small spaces. Even a 1.000-euro pair of floorstanding Dali speakers will sound A LOT better when bad room acoustics have been improved. Nevertheless, I would not recommend adding two C214s to a system with 1000-euro speakers. However, I would go so far as to say that 10.000-euro speakers + 6.800 euros of C214 AVAAs are pretty much guaranteed to sound better than 20.000-euro speakers in a bad room. The reality is that if the room has bad acoustics, which is, sadly, more often than not, there is not a lot of freedom for positioning, and you don't want to line the walls with various types of bass traps, then adding one or two AVAAs will pretty much always be the more sensible choice than purchasing more expensive equipment.

Conclusion

I'm highly enthusiastic about the PSI AVAA C214. These active bass absorbers perform exactly as claimed, and with zero effort. Even a single unit significantly improves precision, clarity, and transient crispness while effectively dampening and tightening several boomy room modes and their decays. At low problematic frequencies, in my case 30Hz and 40Hz, the C214 even outperforms large passive solutions.

Two units along the front wall addressed the bulk of the existing room issues, while a third unit addressed the remaining ones. The result is cleaner, crisper, and more balanced bass than I've ever experienced there, along with better propulsion, more excitement, and a more open, realistic midrange.

While they may seem expensive, truly competent passive commercial solutions aren't either. In any case, no other solution is as easy, compact, or effective as the AVAA C214.

I am so pleased with the result that I will order three units. Hence, they are not only highly recommended, but HFA Favorites!