

Investigating *Personal Amplification Systems* as an Alternative to Traditional PA in Live Music Performance



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This study investigates the potential changes that the use of "personal amplification systems", as opposed to traditional PA systems, can have on the experience of the performance. It looks both at the experience of the performers and the audience.

Note: This is a work-in-progress. No conclusions are being presented as analysis of the results are to be done at a later date.

History

Electrical amplification of live instruments is a relatively new invention. Prior to this, when musicians played together the sound they and their audience heard was the acoustic sound of the instruments. During the twentieth century amplification technology was developed and we started seeing new instruments, such as the electrical guitar. With this new technology, acoustically weak instruments could be projected to a larger audience and with the rising popularity of Rock n' Roll and pop music, audiences grew bigger and bigger.

To address the larger crowds, bigger instrument amplifiers were used, alongside PA systems for vocals. The Beatles' massive live show at Shea Stadium in the summer of 1965 is generally considered as the tipping point for when this technological approach was no longer feasible. Later developments took the live amplification technology towards systems with large PA

speakers to cover the crowd, and monitor speakers on stage to enable the musicians to hear each other.

A notable exception to this is The Grateful Dead's "Wall of Sound" PA system which consisted of massive speaker stacks placed across the stage. Each musician would have their stack of speakers representing them and their instrument, and thereby having a point-of-origin for the sound. This would emulate the way acoustic music was performed and heard. However this system was a massive undertaking to transport and to setup and tear down and as fuel prices increased in the 1970s, it became too cumbersome.

The idea of a PAS is to build on this Wall of Sound idea. Bose, in particular, refers to The Wall of Sound as an inspiration for this kind of speaker systems.

Research Questions

It is based on the following research questions:

- How do the members of a band perceive differences between a musical performance using a "Personal amplification system" (henceforth "PAS") as opposed to a traditional PA system?
- How do members of the audience perceive the differences?

The goal is to examine the way a PAS could be used as a substitute for a regular PA system. Is it a feasible solution? Are there things to be gained on stage? In the audience? What are the trade-offs?

Terminology

"PAS" refers to a speaker system where each member of the band has their own speaker (or speakers) that plays back solely the sound of their instrument. Speakers are placed behind each musician, providing both audience sound and on-stage monitoring.

For the purpose of this study, Bose L1-systems were used as PAS.

The Musicians

The musicians are highly experienced, with a history of playing all sorts of venue sizes. Nobody has less than twenty years of experience as a live musician. All of them have played together in various constellations, though not in this exact four-piece.

The Study



The live performance

A small band – consisting of a drummer, a bass player, a keyboard player and a vocalist – performed a set in a small, acoustically imperfect venue large enough to seat around fifty people. Approximately twenty people attended the performance. The band performed two different songs. Both were cover songs. The first song was Norah Jones' "Don't Know Why". The second song was Tina Turner's "The Best". Each song was performed twice, once with a traditional PA and monitor system, once with a PAS. Between each performance, the audience filled out an online questionnaire. After the full live performance, I conducted semi-structured interviews with the musicians.

Due to the qualitative approach of this study, each system is treated as a complete solution. This means that rather than attempting to isolate and match individual variables, for instance equalizing the speakers so that their frequency response is as similar as possible, each system is optimized on its own terms. The goal is to capture the holistic experience of performing and listening under each system.

I acted as Front of House engineer for the live performance and tried to the best of my abilities to get the most out of each system. I have multiple decades of experience as a part-time live sound engineer on various sizes of venues.

The microphones and DI boxes were fed into a mixing console which was then used to make the FOH-mix for the PA and the monitor mixes for the monitor wedges. It was also used to feed the sound of each musician to the respective PAS speaker. Note that the bass players' PAS speaker was only fed bass, the vocalists' PAS speaker was only fed vocals, etc.

Soundcheck was conducted for both systems. For the PA/monitor system the musicians were free to get whatever monitor mix each of them wished in their respective monitor. For the PAS, the sound and level of each instrument was set in collaboration between me and the musicians in such a way that they felt like they could hear themselves properly, and that I felt like the sound in the venue was good.

Interviews

The interviews were conducted on the same day as the performance. I interviewed each musician individually, one after the other, using a semi-structured approach. Each interview was recorded using a field recorder. I also took notes during the interview and again when I transcribed the recordings.

There are a lot of similarities between the experience of the four musicians. They all have clear ideas about what instruments they want to hear in their monitor systems when using a regular PA and stage wedges. They all agree that the songs they played in this study using PA/monitors were representative of the way those kind of performances tend to sound.

All of them found themselves enjoying the PAS. To three of them, this was quite a surprise as they had quite strong preconceptions about the Bose systems. For one of them this was a general skepticism against Bose products in general, to the others more of a feeling that a PAS was a strange way to handle the stage and audience sound, and a notion that it wouldn't work very well.

"It felt like I was playing, with a band, together, in a room, on stage."

The musicians also used similar terminology when speaking about their experience. They frequently referred to the idea of them creating a common **musical room** when using the PAS. This was a clear difference compared to the PA/wedges which they experienced as isolating each and every one of them in their own **rooms**, without a shared perception of the music as a whole. Using the PAS made them more aware of the complete music mix and the way they could affect it with their playing. Generally speaking, they felt like this helped them make a better musical performance.

The vocalist in particular expressed a feeling of her own vocals as a physical experience, and that the amplified vocals came from within her, directed outwardly toward the audience, as opposed to directed from a floor wedge towards her own face.

The musicians expressed some doubt about the PAS ability to cover a larger venue and or bigger audience, while also seeing a possible solution with PAS on stage for monitoring and for covering the area closest to the stage, augmented by a traditional PA system for the rest of the room. All four musicians were positive towards using a PAS again for other performances.

"The biggest difference to the whole is the interplay."



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Questionnaire for the audience

Between each performance of each song, the audience was asked to participate in an online questionnaire about their experience. It consisted of a mix of rating questions using a five-point Mean Opinion Score scale and open-ended questions. Ten people in the audience chose to participate. The subject of the questions was about the perceived volume, the clarity of the different instruments, the auditory-visual cohesion, the ensemble interaction and the general sound quality.

The experience of the audience is a lot more varied than that of the musicians. Where the musicians showed a strong preference for the PAS, the audience was a lot more mixed. There are also plenty of discrepancies between what a person says on the open questions and what that same person says in the rating questions. (For instance, one person considered the vocals on one of the performances to be too loud to the point of hurting their ears, while at the same time rating the volume of said performance as too low.)

Some of the respondents refer in their open-ended answers to the PAS performances as having better clarity in the various instruments, but that is not clearly visible in the quantitative data. However, nobody refers to the opposite in the open questions.

Two respondents' comments suggest that the PA performances sound more like listening to a (live)recording, whereas the PAS sound like an actual live experience. This is just two out of the ten, but nobody claims the opposite. While this is nothing to draw any solid conclusions on, it's an interesting opening for further studies.

Further research

The bass player expressed some concern about how well the PAS would work with less proficient musicians. This is a concern that I would like to examine further, possibly by making a similar experiment with a group of beginner musicians. Generally speaking, more similar performances should be conducted and examined in order to be able to generalize some of what the musicians and audience experience.

Furthermore, the Bose L1 system (the PAS) is different to a traditional PA system in multiple technical ways, as well as in the way they are placed on stage. More experiments should be conducted to break down and isolate the variables to try to find out how the various parts contribute to the whole.