



***Paris Conservatory comparative study
of multichannel recording techniques
Dummy head & B Format
Le Grenier à Son - AES Paris 2000***

“**LGS - Le Grenier à Son**” is a French company founded in 1999 specializing in natural acoustic recordings for classical, jazz and traditional music. As a young company close to the recent technical developments, we are necessarily involved in high-resolution audio, multi-channel, DVD Video / Audio, and SACD.

Our activity is mainly based in location recordings and as such requires practical solutions to our everyday problems. A quick survey of technical solutions for recreating a natural acoustic environment, reveals three major trends:

- Wave Field Synthesis (WFS) as developed by the Delft Technical University in the Netherlands.
- Transaural and derived solutions as developed by the IRCAM and extensions from stereo techniques including spectral stereo.
- The B Format approach - Gerzon’s Ambisonic

Several systems, derived from these concepts, are currently offered by various manufacturers.

Since very good theoretical literature can be found on these topics, we will focus here on the practical aspects.

We have been experimenting with B Format techniques since they are quite easy to implement in various production and listening conditions. Unfortunately, tools are not easy to find, and choosing a simple microphone conforming to the kind of music, hall & instruments in a given recording situation is almost impossible.

Our experience began in 1998, recording a Baroque Orchestra concert in the Paris Conservatory, where we used a Soundfield Mark V microphone kindly lent by TEAC France.

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S.A.R.L au capital de 15 245 Euros

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Since the B Format is a matrixed system, we had to figure out how to decode it. Adapted equipment was difficult to find since post seventies systems were far removed from today's technical standards; and possible solutions were far beyond our financial means.

Trying to understand Gerzon's reference publications, and with help from a few specialists, we were led to "home made" *pre* and *post-Vienna* decoders for 4 and 5 loudspeakers respectively, in various horizontal layouts.

We were interested in the homogeneous character of the space recreated and its robustness. The post-production sound field manipulation possibilities were pretty exciting as well. We were less convinced by the sound itself, since stereophonic techniques were more flexible giving the engineer a choice between timbrally and spatially oriented pick up systems.

We tested general processing on the B format signal with success, adding DSP based effects (artificial reverberation, filters...) before or after the decoding stage (B & D formats). Dynamic processing revealed itself to be more delicate...

We experimented with a mix of "timbrally oriented stereo" and B Format techniques for our second try. A Heisser / Beethoven recording for Naïve was carried out last year using two Danish Pro Audio 4040 microphones in a Δt arrangement, G. Massenburg 8300 preamps and a Prism AD2 96/24 converter as the main stereo system. We wanted to test the tetrahedral DPA capsule used by Anthony Morris at AGM Digital, but it appeared difficult to talk about it to in-house DPA people... We finally used a Soundfield Mark V microphone for the B format. The post-production was accomplished using the new Soundfield decoding unit DSP 451 and the usual multitrack equipment. We obtained interesting results in both the spatial & timbral aspects. Nevertheless a piano solo in a good hall without an audience is not that convincing spatially speaking...

The last step was the Paris Conservatory comparative project. We choose to mix a dummy head system with the B Format. At first, we intended to use a transaural processing for the dummy head, but time constraints prevented us from doing so. We used a Sennheiser dummy head fitted with 130V 4003 Danish Pro Audio microphones, pre-amplified by a DPA HMA 4000 unit and converted by a Prism AD2. The B Format was recorded with the Mark V, pre-amplified by the G. Massenburg 8300. We used two Prism AD1 to convert the W, X, Y, Z signals. Once again the post production stage was achieved by mixing the dummy head with the DSP 451 decoded signals using multitrack post-production techniques. We achieved this post-production without using artificial reverberation.

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These recordings have shown us the possibility of merging different spatial approaches, that is, stereo or transaural techniques, as side strategies for decoded B format signals. It appears that it is reasonably possible to mix formats for a 5.1 reproduction system meeting the home cinema criterion. Since the frontal image is often prominent in most musical and image related applications, it does not seem to be too unorthodox. Sound designer forward-looking ambient sound might be better served by *pre-Vienna* decoded B format. Obviously, transaural processing of the dummy head would have certainly given better results.

The practical simplicity of such installations and the restricted number of tracks needed are attractive in typical recording situations. The additional expenses involved are reasonable in light of today's production constraints, and new media technologies.

We are now investigating further developments. Tools like IRCAM's Max FTS Spat software, permitting the integration of spot microphones in a coherent B format environment, offering transaural treatments and decoding modules, seems to be adapted even if progress has to be made regarding user access.

Nevertheless sound engineers are looking for flexible equipment adapted to these new situations. Second order pick up systems, adapted pan pots, transaural processors, decoding modules, ..., have to be integrated into the production chain in order to give us the exciting opportunity to "space mix".

We are currently working on a DVD Demonstration disc giving an overview of these experiments.

These tests would not have been possible without the help and advises from DDD, 44.1, The Paris Conservatory Audio Team, TEAC-TASCAM, Vidéo Plus, Soundfield England, Naïve, Jean-Marc Jot, Hervé Boissière and Jean-Pierre Loisil.

A special thanks to everybody writing interesting article on this topic.

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