

ArrayProcessing Q&A.

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1. **ArrayProcessing is available for use with J-Series, V-Series and Y-Series systems, are there reasons for not including xA-Series, Q-Series and T-Series?**

ArrayProcessing for the xA-Series will be investigated later this year.

Q-Series was designed and optimized for small to medium size arrays; this severely limits improvement with ArrayProcessing. Equally, longer Q1 arrays do not have sufficient headroom for ArrayProcessing to be particularly effective. Typical T10 arrays are also relatively short; limiting the effective bandwidth to less than an octave in most applications. More significantly, typically one amplifier channel drives four T10 loudspeakers in parallel, increasing the number of amplifier channels by a factor of four would make larger T-Series solutions less economical.

2. **What length of array is needed to apply ArrayProcessing? And up to / down to which frequency (bandwidth) will ArrayProcessing then operate?**

This depends greatly on the specific geometric relations between sources and listeners. The transition between the three different effects 'virtual tilt of the entire array,' 'virtual shape of the array' and 'magnitude equalization' occurs fluently, depending on the array length, the physical splay angles, the loudspeaker size (Series choice) and the distance and shape of audience areas. Generally, the longer the array and the smaller the physical splay angles the more broadband the effects will be. Meaningful array sizes for ArrayProcessing start from six or eight elements deep.

3. **How does the target frequency response work and what is it actually good for?**

J-Series, V-Series and Y-Series line arrays share a similar frequency response above 140 Hz in a certain geometrical setup. This is known as the d&b sonic footprint. Compared to the Main

system 'outfills' or '270°' systems generally have different lengths, curvature, or for shorter operating distances, may be from a different Series. This is the reason why it has previously been really hard to precisely match the sonic performance of main and outfills, when fed with the same program. Introducing the target frequency into ArrayProcessing automatically delivers the same sonic balance from all the arrays. This greatly simplifies and improves the sonic balance in the horizontal plane of a venue being covered by multiple arrays and drastically speeds up system tuning. The coverage area and SPLmax required from an outfill or 270° system then defines the quantity and the loudspeaker Series needed for the job.

4. **Very often with a J-Series main system, J-Series is also used as outfills to match the sonic effect, rather than for the maximum achievable SPL. In this situation, does the ArrayProcessing frequency response target allow V-Series to be used as outfills instead of J-Series?**

Yes of course! This actually was one of the aims with the common target frequency response. When lower SPL demands allow for the use of V-Series as outfills, not only will this save setup-time, it will also reduce weight and, last but not least, the total systems cost. This could easily pay for the extra amplifier channels.

5. **In people's expectation, will ArrayProcessing become a new standard?**

The performance of d&b line array systems has so far been valued by users and audience as very good with a natural and pleasing reproduction of music and voices, even at very high levels. This does not change with ArrayProcessing additionally being introduced to further enhance performance. ArrayProcessing has been designed on purpose as an option that can be utilized case by case. d&b believe customers will very much appreciate this new freedom when working with their array systems.

6. Is ArrayProcessing beam steering?

No. Beam steering primarily aims for a simple but profound controllability of the vertical dispersion. This requires different speaker hardware and even more amplifier channels. ArrayProcessing on the other hand aims to adapt array performance to listening areas within the vertical angle defined by the mechanical array geometry.

7. Will ArrayProcessing make arrays become widely or endlessly controllable with software, resulting in less care and precision being needed to deploy systems?

No. The use of ArrayProcessing requires exactly the same workflow to calculate array geometry matched to a room shape as when it is not used. Though for optimum results it requires a more precise geometrical setup than before.

8. Is ArrayProcessing complicated and only for experts?

Users who are familiar with the ArrayCalc simulation and R1 Remote control software will easily find their way with ArrayProcessing for such results. The basic workflow is still just as straightforward as d&b is already well known for.

9. Is ArrayProcessing only suitable for use in touring and concert sound?

Installation situations are among the main applications for ArrayProcessing, particularly event when the positioning of the system and geometry of the space do not change. In this type of situation what changes is the type of event, the program and the seating, here a fixed system can easily be adapted to specific requirements! For example, it is possible to achieve higher speech intelligibility, well distributed and at lower levels, often highly desired in many installations. Rock and pop shows demand a different level drop over distance, when compared to a semi-acoustic event, or perhaps the balconies are not sold today. Similar event-specific benefits are of course just as valid for temporarily deployed

systems in the corporate and concert worlds.

10. Does each box really have to be amplified and processed individually?

Yes, absolutely.

11. If the loudspeakers are driven in linked pairs, will this restrict the operational bandwidth of ArrayProcessing?

Linking cabinets in pairs would limit the bandwidth ArrayProcessing addresses to an extremely narrow band in the mid range. The resolution of acoustical spacing and the vertical aiming of sources necessitate individual processing and amplification for each loudspeaker. Array elements driven in linked pairs with a wide range of splay angles would limit operation to a very narrow bandwidth, while a large section of smaller angles would limit the possibilities in the far field.

12. From now on, are d&b systems not using ArrayProcessing a compromise?

No, not at all. ArrayProcessing provides a scalable system solution for combining cutting edge DSP processing with the known and proven d&b line array concept. In many situations ArrayProcessing will be inappropriate due to the number of loudspeakers employed and / or available, or other specific circumstances of the event. A core benefit of ArrayProcessing is the use being optional. Still the line array will be a d&b system with its excellent performance - which has never been a compromise.

13. Is there a good reason not to hang a straight array?

A straight hung array would have to cover a vertical area typically spanning from above its horizontal axis to 90° downwards, in other words in all directions that matter, including straight down. This would mean employing broadband beam steering up to approximately 15 kHz, which would need highly segmented individually processed HF sources. Furthermore, a straight array will never be able to serve areas behind the rigging points.

ArrayProcessing operates within the vertical dispersion area defined by the mechanical setup of the array. The mechanical aiming is one of the reasons ArrayProcessing can easily be applied to existing line arrays when using the latest generation d&b amplifiers.

14. ArrayProcessing has an additional 5.9 msec fixed latency on top of the generic 0.3 msec of d&b amplifiers, adding up to a global latency of 6.2 msec. Theoretically FIR filters with sufficient frequency resolution for the range below 1 kHz would result in a greater latency. How do you overcome this?

A clever combination of FIR and IIR filters is used; this treats modifications in magnitude differently from modifications in the phase domain.

15. How should / are delay speakers systems handled in an ArrayProcessed system?

Still a good question. To be honest this has not yet been fully researched to reach final conclusions.

16. Can D20 and D80 amplifiers be used together in the same array?

Basically yes, but it is really doubtful if planning this makes any real sense at all.

17. Can you cut out balcony fronts, or glass panels from the system coverage to avoid hard reflections from them?

A specific 'reduction zone' function is under development and is planned for a later release. The grade of realization of this function depends greatly on complex geometrical correlations of the arrays with the venue and the dimensions of the reduction zones.

18. Wouldn't it be helpful to be able to monitor what happens on stage behind the array?

Yes, a useful function to achieve this is planned along the reduction zones feature in one of the next releases.

19. Will there be an EASE export including ArrayProcessing?

The inclusion of an ArrayProcessing EASE export function is planned for future ArrayCalc releases.

20. Does ArrayProcessing require a lot of time to deploy?

No. 90% of the work is done offline during the simulation process. Properly designed systems using ArrayProcessing should actually take less time to tune and voice on site.

21. Will all d&b amplifiers and speakers offer ArrayProcessing?

Initially ArrayProcessing is available for the J-Series, V-Series and Y-Series amplified by the latest generation of d&b amplifiers and using OCA remote control.

Workflow

22. Can various arrays have Power / Glory set differently?

Basically and technically yes. This could even be useful in order to match the desired headroom levels.

23. Comparison switchover between AP slots - how fast does it switch over and can you hear it?

It is hardly audible as long as no program is running; it takes around one second or less, depending on the size of the array. However, undertaking A / B comparisons is highly critical to evaluate as the sound and the level can be drastically different throughout the entire listening area.

24. How can I reference the intrinsic or natural unprocessed level drop over distance of an array?

The dialog window displays a second slim dotted line, this indicates the intrinsic SPL over distance averaged over the ArrayProcessing operational bandwidth, as indicated below. How significantly the ArrayProcessing target deviates from this is monitored by the Realizer and displayed in the column on the right of the screen.

25. Is it possible to alter HFC after ArrayProcessing has been implemented in a setup?

No, air absorption is already taken into account within ArrayProcessing. Changing atmospheric conditions are managed by calculating new data for an AP slot, then importing this into the R1 Remote control software.

26. Will CPL (Coupling) still be available when ArrayProcessing is used?

Yes of course. CPL can be deployed either in the simulation and / or used on site for adaption to the room, or to taste. All functions that affect the entire array are handled in

the same manner as a conventionally driven array. Their use is even more meaningful as ArrayProcessing makes the frequency response equal over the audience areas; all further adaptations by EQ, or by predefined functions (CPL, CUT...), have the same sonic effect for all listeners.

27. Air absorption temperature and humidity parameters, predicted or measured? How to properly define these?

As it is almost impossible to monitor changes in temperature and humidity at the relevant operational height in a venue, the solution is to prepare alternative AP slots based on the kind of climatic changes expected in each situation.

28. In ArrayCalc, why is all the AP slot information removed when the venue or array data is edited?

The AP slots for a specific array are completely dependent on the situation, a setup where all venue and loudspeaker data is precisely defined. Any change in this requires a new optimization reflecting the changes undergone. Currently this is indeed a question: a way to decouple the room data from the array's listener profile is being considered for implementation at a later date.

29. As a user I am checking my system acoustically with the Pink Noise generators in the amplifiers. Would it be advisable to recall AP slot 1 (bypass) to ensure there is no confusion caused by ArrayProcessing filters?

Yes it would.

30. As all components contribute to the general result, is there an emergency mode in case an amplifier, or a loudspeaker fails?

The AP slot #1 is Bypass by default. When in Bypass all ArrayProcessing filter functions are switched off, but the global 6.2 msec latency

is maintained to keep the entire system time aligned.

31. Can you display an 'AP enabled' message in the source widget overview page?

Yes, good idea. This is included in the wish list.

32. Will it be possible to use a mouse to control level drop over distance values, or a grab line to set the slopes?

Good idea, let's have a look.

33. What happens to the optimisation when loudspeakers in an array point into physical large gaps between listening areas?

Larger physical gaps on the x-axis between audience areas should be avoided. A solution to automatically deal with this in an easy way is planned for a future release.

34. What needs to be considered when setting the desired ArrayProcessing level drop over distance for the central area of a venue, relative to the natural slope over distance of a subwoofer array?

Level drop slopes that are too small should not be applied when dealing with Drum and Bass!

Files, Remote and R1 questions

35. Can older *.dbac project be opened from ArrayCalc V8.x?

Yes they can. Once open they will be saved in the new *.dbac2 format, there is a warning message when this is selected.

36. Can *.dbac2 files be read by a ArrayCalc V7.xx?

No.

37. Can the new *.r1p files including ArrayProcessing be read from an older version of R1 Remote control software?

No. This was already the case with previous R1 updates.

38. Can I generate an R1 Remote control project, including ArrayProcessing, without using ArrayCalc V8 *.dbac2 files?

No

39. Will the R1 Remote control software save the final system tuning data back in the *.dbac2 file?

No, the R1 project and all the final settings, tuning and layout are saved in an *.r1p file, which cannot be read by ArrayCalc.

40. Does ArrayProcessing also work with CANbus and the R70 interface?

No, OCA Ethernet control of all amplifiers is essential to efficiently handle the ArrayProcessing data transfer.

41. Will D80 amplifiers with OCA and D12 amplifiers with R70 run from the same R1 Remote control project when only the loudspeakers using ArrayProcessing are driven with D80 amplifiers?

Yes this can work.

42. Can I upload a new AP slot into the R1 Remote control software when the system is already deployed?

Yes, new AP slot data in an updated *.dbac2 file from an identical project can be imported into R1 and uploaded to the relevant amplifiers at any time.

43. What can still be modified in individual amplifier channels with the R1 Remote control surface? (Level, Mute, EQ, Grouping...?)

Basically Mute and EQ, both can also be grouped. If planning a specific EQ for one zone, particularly steep filters in the VHF region should only be implemented if absolutely necessary.