MLAS™ TECHNIQUE

Part 2

Modular Line Array System™ Technique

A White Paper

By Jon Risch

With the introduction and availability of the Crest Audio® Versarray™ PRO 112 and Mk III systems, some questions have come up, and it has become apparent that some additional guidance for the use of the Crest Audio® MLAS™ technique would be helpful to the users and installers. First, we will cover some of the more generally relevant questions, and then add some comments on typical usage situations, with some more coverage examples discussed.

Question 1: If I am flying a number of cabinets not specifically listed in the Preset files, what Preset should I use? For instance, if I am flying 5 cabinets, should I use the Preset for 4 cabinets, or for 6 cabinets?

Answer 1: The cabinet numbers should be thought of as the number of cabinets having been reached, so if flying 5 cabinets, you haven't reached 6 yet, so use the 4 cabinet settings. Same thing for cabinet numbers above 8, there is no need to provide an additional Preset for 10 or 12 cabinets, as the line array effect has been fully engaged, and thus there is no significant change for additional Presets above 8 cabinet sections.

SIDE NOTE: Using less than the actual number of cabinets for a Preset, such as using the 4 cabinet Preset for 6 cabinets, results in a slightly mellower sound. If the venue is inclined to make the nominal settings sound harsh, then dial down the number of cabinets on the Preset used for any given section.

Question 2: Should the Preset be chosen for the total number of cabinets, or for just that segments number of cabinets?

Answer 2: The Preset should be chosen for the number of cabinets in that line array segment or section, thus, if working with a 6 cabinet line array, and the first three sections are straight, and the bottom three are angled at 5 degrees, use the 3 cabinet Preset (3Cabs_Straight-Line) for the top three, and the 3 cabinet mild angle Preset (3Cabs_Mild_Angle) for the bottom three. Do not use the 6 cabinet Presets.

Question 3: What is the difference between the Presets for the same type of segment or section, but for different numbers of cabinets?

Answer 3: One cabinet hung does not make a line array. However, as the number of cabinets in the array goes up, it approaches more and more the ideal of a line array, and this is somewhat frequency dependant. As the array transitions from one cabinet to multiples, it ultimately becomes a true line array over it's entire operating range. The amount of reinforcement and destructive interference that occurs at different frequencies causes the overall perceived frequency response to vary, not only in the high frequencies, but in the midbass and near the hand-off from the ribbon drivers to the woofers. The Presets account for those changes to provide a more nearly flat response sonically.

Question 4: Why is there a single cabinet Flat setting, and why is it the default setting out of the box?

Answer 4: This default setting not only provides a "fail-safe" means of making sure the product is useable out of the box to a large degree, but it also provides for the use of the rear panel push button array adjustments, as outlined in the Owner's manual starting on page 54, the section titled:

"Using the Non Network Push-Buttons On the VR112 Rear Panel"

These push buttons offer a simple “no PC, no-network connection required” mode of operation to change the speaker systems operating parameters to meet differing line array configuration needs.

The changes in the speaker system settings when using the push buttons are broader and less specific than those supplied in the MLAS™ technique Presets, but they will allow the system to function well without the use of a PC based network and the Crest Audio® DSP GUI software.

However, use of the DSP GUI software and the corresponding MLAS™ technique Presets will provide a much better and more precise result, with corresponding gains in clarity, smoothness and freedom from listening fatigue and feedback.

DO NOT USE THE REAR PANEL PUSH BUTTONS AND THE GUI PRESETS FOR MULTIPLE CABINETS AT THE SAME TIME!

This will add the rough push button EQ on top of the refined Preset EQ, and the end result will not be a good one due to the double-EQ amounts. Use one method or the other, but not both at the same time.

Question 5: With regard to the passive versions of the 112, why can't I just use the EQ I already have set for the Mk2 version of the Versarray™ 112? Aren't the speaker components the same?

Answer 5: Actually, while the basic components (the woofer and the ribbon tweeters) are basically the same, the ribbons are operating into a different acoustic environment for the Mk III versus the Mk2 versions. The cabinet itself has a different acoustical footprint, with a grille and end caps, etc., and the waveguide is different. In addition, if used with the proper gain on the power amps, the limiting and compression have been improved over the Mk2 version, and provide a greater degree of reliability, and a higher maximum SPL before audible artifacts occur.

For those reasons, it is strongly recommended that the newer settings designed for the MK III be used with the Mk III passive cabinets.

COMMENTS: Realize that the array as configured according to the MLAS™ technique, will provide an extremely even and level presentation, and there will be no loss of detail or articulation in the midrange, or in the lower treble, as there often is with compression driver based systems. Thus, any tendency towards harshness that the mixer or other ancillary equipment may have will NOT be masked by the speaker system, it will reveal all that is going on with the signal upstream. Users have been surprised at how readily they can hear the differences between different digital mixers or with various high quality analog mixers.

Question 6: Are the MLAS™ Presets available or present in the Ease Focus 3 simulations?

Answer 6: Note that the Ease Focus 3 files for the VR112 show the response of the speaker with the nominal out of the box "flat" Preset. Thus, simulations of an array will not be able to reflect the use of the MLAS™ Presets with complete accuracy, as the EQ in the MLAS™ Presets will tend to sonically counteract a portion of the resulting cancellations that are shown in the simulation plots. So the Ease Focus 3 simulations represent a worse-case scenario, and may make the coverage look worse than it actually is. This needs to be kept in mind when running the simulations, and making adjustments based on those simulations.

It also needs to be kept in mind when utilizing the Auto-Splay function in Ease Focus 3, as the program can only calculate based on the flat response curves present in the EASE program. Typically, the coverage will work better than shown, and when using the MLAS™ Presets and the recommended line array segments, the coverage will be suitable and usable even though the Auto-Splay function may indicate some other vertical line array settings for a transition cabinet or upper or lower segment.

Question 7: I have been using line arrays for years now, and I know how to crossover and EQ a loudspeaker system, why should I use the Crest Factory settings, MLAS™ or not?

Answer 7: There are some very experienced professionals and system installation operators in the industry. There is no doubt that they are very capable and can undoubtedly set up and operate the Versarray™ 112 Pro/Mk III system in a suitable manner and get excellent results. However, time is money, and if the system is going to be set-up for optimum performance and reliability, then a time-consuming process must be followed and worked through for each individual venue situation. Some folks are also of the opinion that Factory Settings are not paid much attention to by the manufacturer, and may not extract all the potential from any given product or situation.

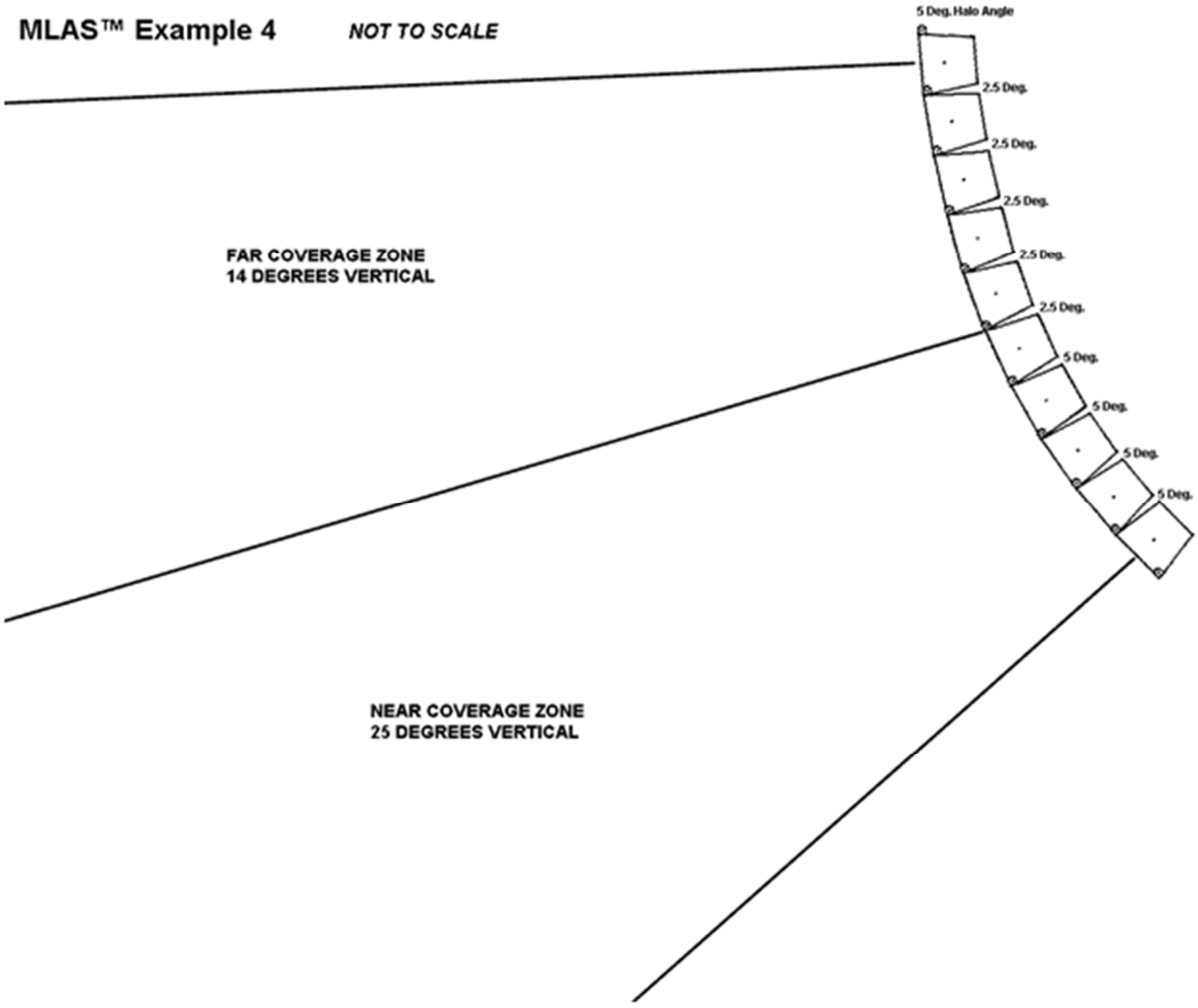
It should be obvious that the Crest Audio® MLAS™ technique was the result of a lot of serious study, effort and measurements taken correctly for line arrays, and that this results in settings that have been thoroughly examined, vetted, and field tested, as well as voiced for the unique components that make up a Versarray speaker system.

Ribbon tweeters do not behave the same as compression drivers, and do not react the same way to high drive levels, thus their behavior has special considerations beyond a typical compression driver based speaker system.

Use of the MLAS™ technique presets saves a lot of time, and provides a ready to go neutral baseline performance as a starting point, a performance point that users will often find require minimal additional EQ to provide excellent end result performance. The Bass Boost Presets are particularly useful, and provide excellent results far superior to typical AUX fed Sub practices, with less boom and minimal crossover point shift.

More Coverage Examples
Question 1, we found that when deciding on which Preset to use for a number of cabinets in-between the number of cabinets for the Preset, the cabinet numbers should be thought of as the number of cabinets having been reached.

See MLAS™ Example 4 diagram.



Here we have a set of 5 cabinet hang segments, a Mild Angle top section with 2.5 degrees between cabinets, and a Mild Angle bottom section with 5 degrees between cabinets. Since there are only 5 cabinets, and not 6, we would then use the LT_4Cabs_Mild_Angle EQ package for the top 5 cabinets, and use the 4Cabs_Mild_Angle EQ package for the bottom 5 cabinets.

The use of the LT_4Cabs_Mild_Angle EQ package for the top 5 cabinets presumes that the top portion of the array is being used for Long Throw coverage, and that the extra HF boost to compensate for the HF air loss is needed.

If the array was being aimed down more, and the coverage was not that far away (less than 80 feet or so), then the 4Cabs_Mild_Angle EQ package would be more appropriate.

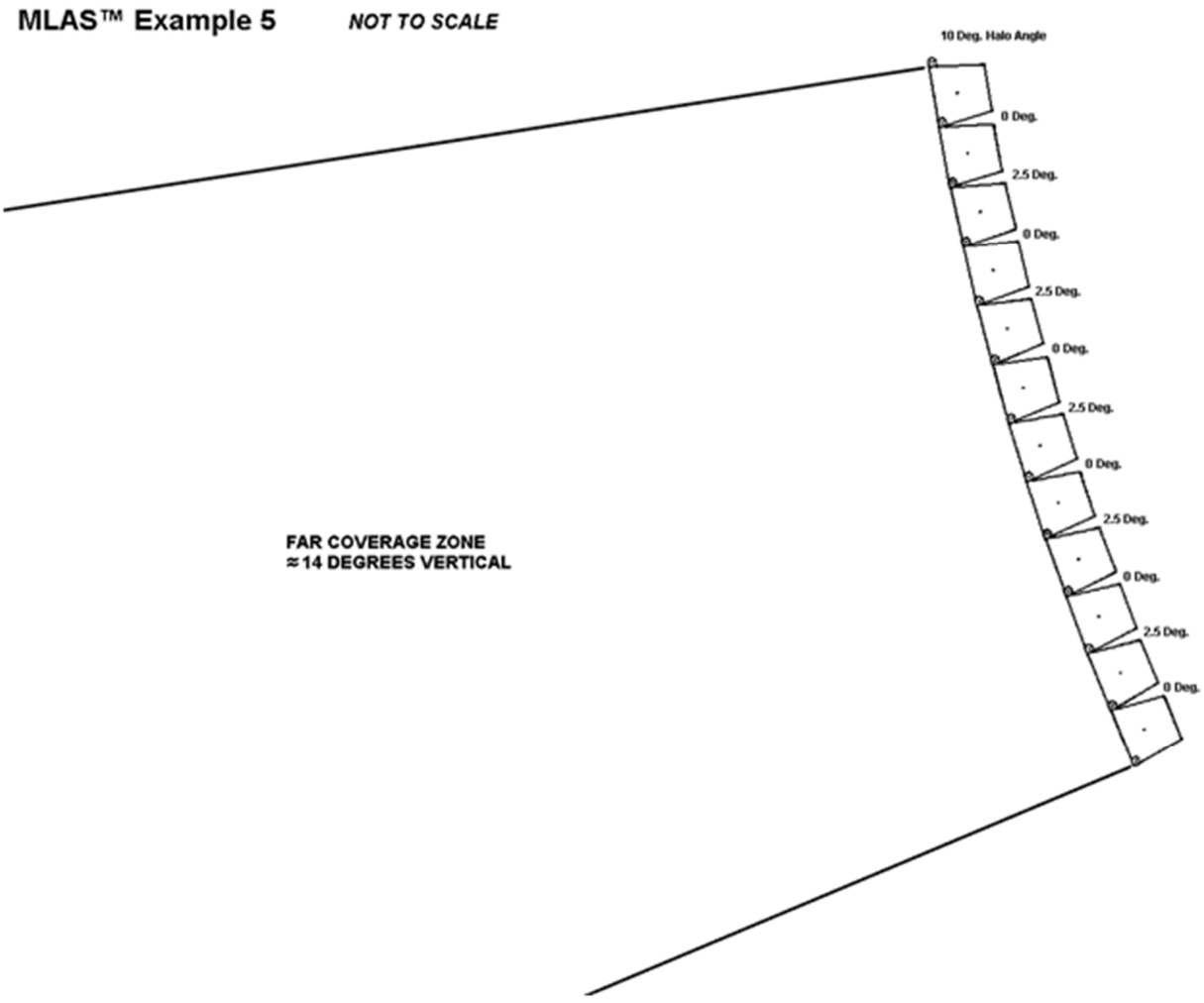
In Part 1, we talked about the classic straight-line line array as behaving like a "laser beam" for the vertical coverage, with the high frequency output seldom extending significantly beyond the ends of the line array vertical limits.

Even with the maximum number of cabinets that can be flown of 15 VR-112's, this coverage would only extend about 20 feet high, the length of the array itself.

While this would spread over a much longer floor area with a real world angle of application, it is still a very tight and restricted pattern.

One way to extend the vertical coverage and still maintain as tight of a pattern as desired, is to stagger the straight line array with a 2.5 degree angle every second or third cabinet.

See MLAS™ Example 5 diagram.



Twelve cabinets with every other cabinet angled 2.5 degrees.

This has now broadened the vertical coverage, without creating excessive gaps in the vertical pattern, and still provides a tight and controlled vertical coverage situation.

Using this technique can provide some very precise, yet flexible, vertical coverage patterns. For a narrower vertical pattern, only angle every third cabinet, for a wider pattern, keep every third cabinet at a straight (0 degrees) angle.

If you need the extra cabinets for the Long Throw coverage, but need some nearer coverage of a Medium Throw, then for the bottom set of cabinets, use the segment as per the bottom portion of MLAS™ Example 4.

What Preset would be used with this type of alternating straight and minimal angle segment? There are four logical options:

1. Use the X Cabs_Straight-line EQ package

2. Use the X Cabs_Mild_Angle EQ package

3. Use the LT_X Cabs_Mild_Angle EQ package

4. Mix Option 1 with Option 2 or 3 on a per cabinet basis

Don't use Option #4, this will not blend the cabinets together as well as keeping them all at the same EQ.

We recommend using Option 1, as the cabinet number settings account for the line array build-up, and include a touch of air attenuation compensating HF EQ. That would be the 8Cabs_Straight-line EQ package Preset.

Options 2 or 3 could also be used, with increasing amounts of HF energy compared to Option 1. These would usually not be the best choice for an indoor venue.

Conclusion
Using all the Crest Audio® MLAS™ technique options and segment Presets in conjunction with the FlyQWIK™ rigging system provides a very powerful, quick and precise method of setting and using the Versarray™ 112 PRO/Mk III system's coverage.

For the latest information and data, as well as up-to-date copies of the Versarray™ 112 PRO/Mk III series Owner's Manual, DSP GUI software, Preset files, visit: https://peaveycommercialaudio.com/versarray/

IMPORTANT NOTE REGARDING RIGGING AND FLYING THE VERSARRAY™ SYSTEM:
Since the initial release of the Crest Audio® Versarray™ products, additional testing has shown that the FlyQWIK™ rigging system can handle more VR112 cabinets than stated in the original Owner's Manuals. In case you do not have the latest revision of the OM's, we provide the following information regarding the maximum number of cabinets that can be flown from a Versarray™ Mk III Halo:

Working Load Limit: 544 kg / 1,200 lbs. for Ultimate Strength Design Factor of 10:1
(This meets PLASA North America criteria and typically exceeds local USA safety requirements.)
Working Load Limit: 453 kg / 1,000 lbs. for Ultimate Strength Design Factor of 12:1
(This is in compliance with the European Union mandated Safety Factor)

Maximum Number of Versarray™ 112 Mk III passive cabinets:
15 for North America (PLASA)
14 for European Union

Maximum Number of Versarray™ PRO 112 Powered cabinets:
15 for North America (PLASA)
12 for European Union

Maximum Number of Versarray™ PRO 215 Powered Sub cabinets:
7 for North America (PLASA)
6 for European Union

(Note: Versarray™ PRO 215 cabinets do NOT articulate or angle, they must be hung at a zero degree angle. Therefore, we recommend that they be hung at the top of a line.)

Maximum Combined Number of Versarray™ 112 Mk III or PRO 2-Ways and Versarray™ PRO 215 Powered Sub cabinets, when used with the Sub Support Frame Adaptor:

MIX OF SUBS VERSUS VR PRO 112		
SUBS	**VR PRO 112**	
	EU	**North America**
0	12	15
1	9	11
2	7	9
3	5	7
4	3	5
5	1	3
6	0	1
7*	X	0

MIX OF SUBS VERSUS VR 112 Mk III		
SUBS	**VR 112 Mk III**	
	EU	**North America**
0	14	15
1	10	13
2	8	10
3	5	8
4	3	6
5	1	4
6	0	1
7*	X	0

*North America (PLASA) ONLY!

Maximum Combined Pull-Back Angle, Two or less Subs in the hang: 30 degrees

Maximum Pull-Back Angle, more than 2 Subs in the hang: 15 degrees.

WARNING!
Crest Audio® is not liable for any injuries or damages that could potentially occur if the specified Working Load Limit is exceeded for any of the Versarray™ FlyQWIK™ rigging components or system configurations.

If there is any question about the capacity of a given configuration of rigging hardware and cabinets, you should consult with a certified structural engineer or a qualified rigging professional.

NOTES: The ultimate strength for the Versarray™ Mk III loudspeaker system rigging points was determined utilizing calibrated and certified pull tests.

Maximum number of cabinets was determined using all loading and safety criteria, not just the simple weight of the cabinets versus the WLL of the Halo.

Design and specifications subject to change without notice.

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More information online at
www.peaveycommercialaudio.com/versarray
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Features and specifications subject to change without notice.

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