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MODULAR LINE ARRAY

LD-Systems MAILA

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With the MAILA system, LD Systems presents a modular line array that allows users to customize sound reinforcement systems for small to medium-sized halls and events. The system consists of compact SAT units, the COL extension and the SUB subwoofer. It is completely active and self-powered and can be assembled and parameterised very quickly and safely.

Text und Messungen: Anselm Goertz | Fotos: LD-Systems, Anselm Goertz

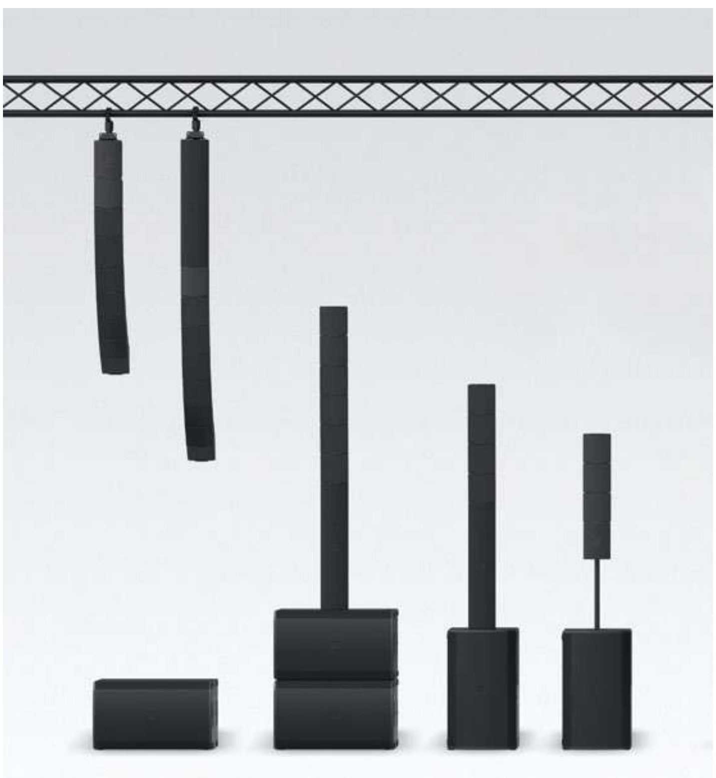
LD Systems, a brand of the Adam Hall Group from Neu-Anspach, Germany, develops and produces the complete product range of professional audio equipment for both mobile use and for fixed installations. To be precise, the brand's portfolio ranges from microphones, transmission lines and mixing consoles to controllers, power amplifiers and loudspeakers. Especially when it comes to the latter, the products LD Systems has presented in the last few years stand out for their sophisticated design and innovative technology. The MAUI P900 and Curv 500 series are representative of this. LD Systems' products, including the newly presented MAILA system, are driven by the drive to meet users' needs as well as possible both in terms of quality and design as well as handling. However, the development of acoustically sophisticated speakers is only one side of the coin. Equally important aspects for professional applications include how quickly a system can be set-up and disassembled, where mistakes can be made during the set-up, how well the system can be adjusted to fulfil the respective task at hand and, of course, how a loudspeaker visually fits into its environment. A rather low-tech and inconspicuous appearance is definitely an advantage here. Senior Product Manager Viktor Wiesner cites a corporate event with lectures and presentations followed by a party as a good example. In such an application example, high quality for voice transmission as well as sound and levels suitable for DJs are required from the same system. At the same time, the sound system should also blend inconspicuously into a designed stage set, as, if possible, loudspeakers should not stand out.

With the requirements defined, the task was now how to bring them to life in the form of a product. The result is the MAILA, which was recently presented. Subsequently, our editorial team received a complete set for testing. The measurements and an introduction to the system were accompanied by Martin Jung (Senior Acoustic Designer) and Jonas Mulfinger (Mechanical Engineering) in our acoustics lab in Aachen, Germany.

SAT and COL modules

One of the most important questions, when it came to the conceptual design of the MAILA system, was how to design a system that would be flexible enough so that it would always have exactly the right size for the respective small to medium-sized event – with a particular emphasis on exactly. The concept with a line array with variable length and flexible curving was thus a given. LD Systems had already had good experiences with the CURV 500. The CURV 500 operates as a mini line array with 4" woofers and three 1" domes placed in front of these and comes in an aluminium housing with a SmartLink connection without cables.

Both features have also been adopted for the MAILA system's core component, the MAILA SAT, and their functions have been further expanded. The elegant matt black housing is again manufactured from aluminium with almost cube-shaped dimensions of 205 x 220 x 226 mm (W x H x D). On the inside, it includes a 6.5" woofer and five 1" titanium domes, integrated in a waveguide and arranged in a line in front of the woofer. The design with a tweeter unit consisting of small domes arranged closely together proved very successful especially for small line arrays, as coaxial designs can be realised well and domes without compression chambers have good sonic properties. For the woofer, LD Systems opted for a passive diaphragm, which is located on the back of the enclosure behind the large opening, instead of a classic bass reflex resonator. The operating principle of a passive diaphragm corresponds to that of the bass reflex resonator as a ground-spring system. However, it can be better tuned especially in small enclosures and reduces or avoids problems with cabinet and tunnel resonances as well as flow noise.



The SAT units are connected mechanically and electrically via rails and

MAILA SAT with five tweeter domeswith waveguide, one 6.5“ woofer and the passive cone located at the rear of the cabinet

grooves on the bottom and top of the enclosures. As soon as the SmartLink+ connection is engaged, the paired MAILAs appear to the outside as one unit without any discernible mechanics. The audio signal for the two ways and the power supply are transmitted safely via six contacts that are integrated in the rails. The MAILA SAT units therefore require neither externally visible cabling nor a flight mechanism.

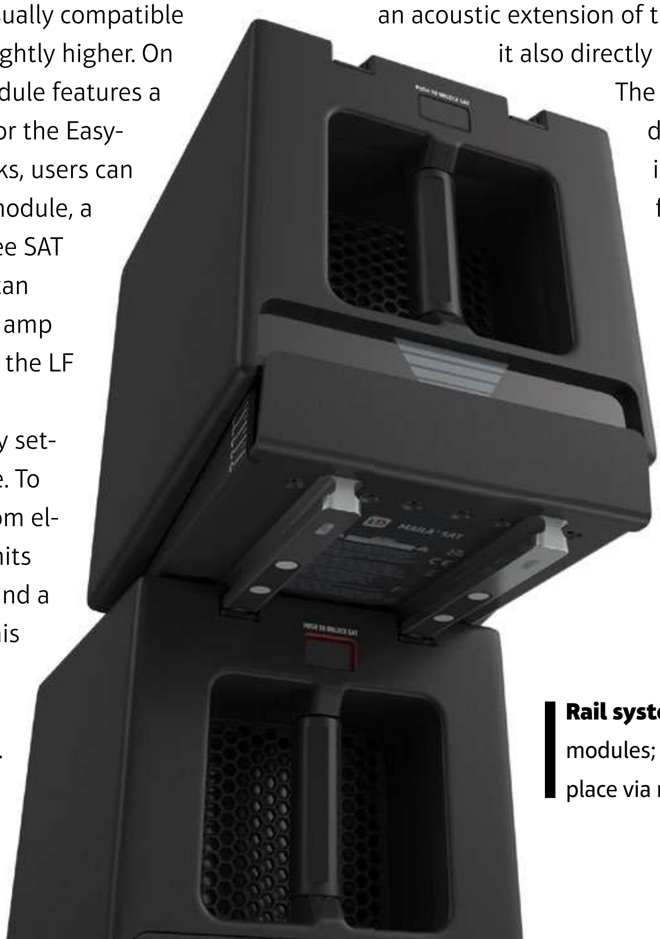
The associated power amplifiers and the DSP system are housed in a mechanically and visually compatible enclosure that – with 280 mm – is slightly higher. On the top, the MAILA SPA amplifier module features a stand sleeve and retaining sockets for the Easy-Mount flying bracket. In ground stacks, users can create configurations with the SPA module, a speaker pole and a maximum of three SAT modules. In a flown setup, the amp can power up to eight SAT satellites. The amp provides a total power of 1250 W for the LF and HF ways.

If not done electronically, line array setting is carried out by curving the line. To do so, the required angles are set from element to element, so that several units cover a small angle for long ranges and a larger angle for shorter distances. This method, also known as “intensity shading”, is the basis for adapting a line array to a respective application. In conventional line arrays, the angles are usually set using ball lock pins that are inserted into a position corresponding to the desired angle.

As the MAILA units have no external flight mechanics, a new approach was required. This is called EasySplay and is completely integrated in the SAT’s housing. On the housing’s rear, users will find an opening with a rotatable handle in the middle. By turning this handle, the base plate’s angle to the housing can be continuously adjusted for an angle range from 0° to 8°. A scale on the side of the housing lets users determine the current angle. The adjustment is quick and precise and can even be carried out under load if the array is already in a standing or hanging position.

The rule from boat building that determines a vessel’s hull speed could also be applied to line arrays. As directivity is derived, among other things, from the ratio of the radiator length to the wavelength, a sufficiently long array is required to achieve pronounced directivity at low frequencies. The MAILA system therefore also includes the COL (Column) as a direct extension to the SAT modules. The COL is equipped with four 6.5” woofers and a four-channel amplifier module. Two channels drive two of the four woofers each, while the other two take on the function of the SPA module and can drive up to eight SATs. The COL is therefore not only an acoustic extension of the array for low frequencies, it also directly provides all the electronics.

The drivers included in the COL differ from those of the SAT in that they are more powerful and optimised for low-frequency reproduction. The COL is also mechanically and electrically connected to the SAT satellites is via the SmartLink connection, including for its signal transmission and power supply. Similar to the SPA



Rail system to connect the SAT modules; electrical connection takes place via recessed contacts module, the COL can be located at the top or bottom of an array. For this purpose, the already familiar retaining sockets for the EasyMount flying bracket are included in the base plate for flight operation. However, placing the COL on a pole with the SAT on top is not possible due to its size. The COL therefore has four solid pins in its base plate with which it can be securely connected to the SUB, which is also part of the system.

Mechanism for adjusting the angle of a SAT unit

First measurements

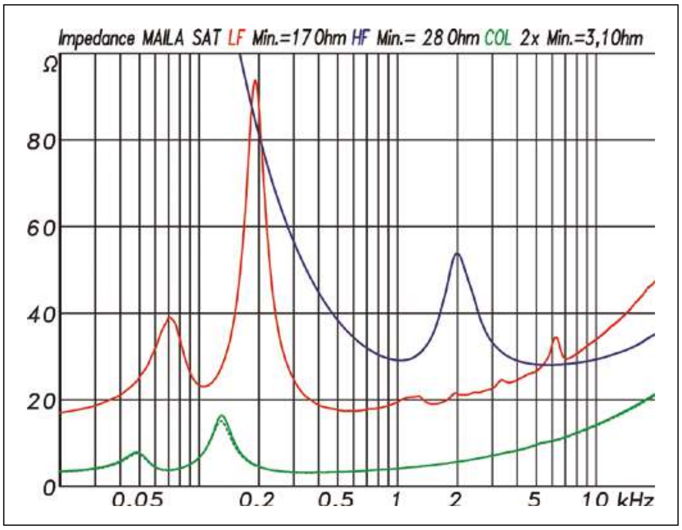
Before discussing the details of MAILA's operation, let us first take a look at the SAT's and COL's basic measurements. Basic measurements in this case refers to the measurements for the individual ways without the integrated electronics. Fig. 1 shows the impedance curves for the SAT module's LF and HF ways and for the COL extension's woofers. To allow parallel connection of up to eight SATs, the individual modules are designed with relatively high impedance.

COL extension module with four woofers and its own amplifier unit, which can also supply the SAT modules mounted on top

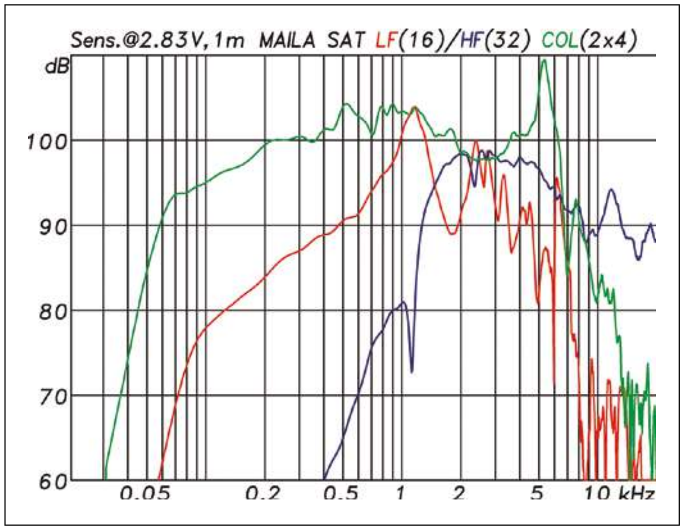
With an impedance minimum of 17 Ω in the case of the woofer and 28 Ω in the case of the tweeter, a critical value of 2 Ω is not undercut even if eight modules are deployed. The resonance frequency of the SAT's passive radiator is tuned to 105 Hz. The tweeters have an upstream capacitor and a resonance frequency of 2 kHz. The COL's woofers are connected in parallel in pairs to one power amp channel respectively and have an impedance minimum of 3.1 Ω at approximately 600 Hz. The tuning frequency is 70 Hz.

Fig. 2 shows the corresponding frequency responses. The most striking feature is the HF way that shows a sensitivity of up to 99 dB already at 2.83 V. Converted to 1 W/1 m for a 32 Ω system, this is 105 dB – a result that is quite close to that of compression drivers. The result for the SAT's woofer is slightly lower. However, in an array it benefits from the acoustic coupling with the adjacent SAT modules' woofers. The powerful level increase at 1 kHz is caused by the tweeter unit located in front, which acts as a bandpass chamber for the woofer. At the same point, there is a dip in the tweeter's frequency response, as the bandpass chamber acts as a resonance absorber for the tweeters. The COL (green curve) covers the frequency range from 60 Hz upwards to well above 1 kHz without any weaknesses and is

Connection of the satellites via rails with recessed contacts



Impedance curve of the SAT module's two ways (LF red and HF blue) and the COL extension's woofers (green); each operated in parallel in pairs (Fig. 1)



Frequency response and sensitivity of the SAT module's two ways (LF red and HF blue) and the COL extension's woofer (green). The sensitivity refers to 2.83 V for all ways. For the 1W/1m result, 3 dB must be added for the SAT's LF way and 6 dB for its HF way. For the COL's woofers, 6 dB must be subtracted (Fig. 2)

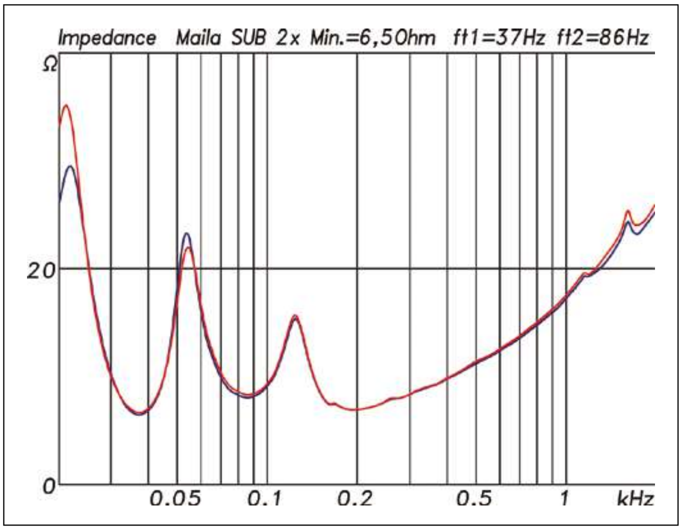
therefore well suited as a LF extension in combination with the SATs.

Bandpass subwoofer

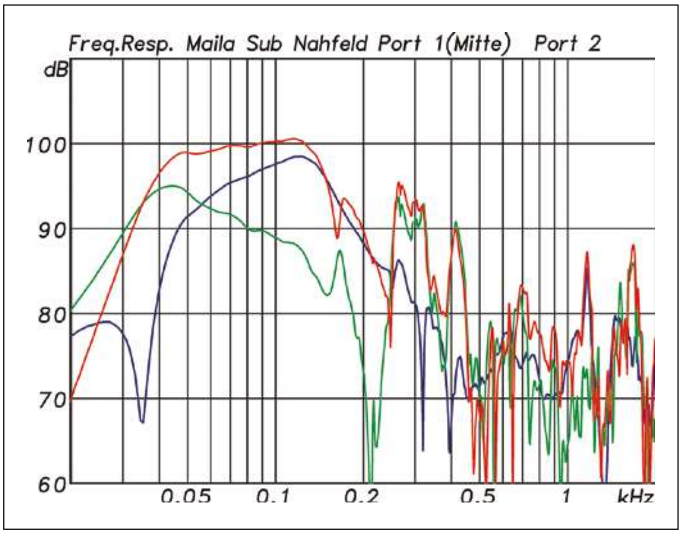
The fourth member of the MAILA family is the SUB, which is equipped with two 15" drivers that – like the COL and SAT's 6.5" woofers – are manufactured by Lavoce. The SUB is designed as a bandpass system, with the two drivers radiating against each other into a large central chamber and into a separate chamber with the rear side. The face-to-face design therefore additionally provides impulse compensation for the housing. The chambers' large openings for sound dispersion also reduce flow noise and compression effects. Overall, the enclosure is constructed in a very solid way. In addition to its thick walls, it is also equipped with plenty of struts on the inside – a design that is acoustically advantageous, but also leads to a rather high weight of 90 kg. The SUB features built-in electronics with four power amplifiers, with two driving one woofer in a bridge circuit respectively. The data sheet states the total power as 2500 W.

The impedance measurement (Fig. 3) for the SUB's two woofers shows tuning frequencies of 37 Hz and 86 Hz for the bandpass resonators. The corresponding frequency responses for separate measurements of the resonators and their sum function can be found in Fig. 4. The sensitivity related to 2.83 V is a very good value of around 100 dB. Converted to 1 W/1 m, this results in 97 dB for two 8-Ω systems.

2 x 15" subwoofer in a bandpass enclosure with large ports



Impedance curves for the SUB's two 15" woofers. The bandpass cabinet's resonators are tuned to 37 Hz and 82 Hz (Fig. 3)



Near-field measurements in front of the SUB's resonator openings (blue and green) and their sum (red, Fig. 4)

Amplifier and DSP

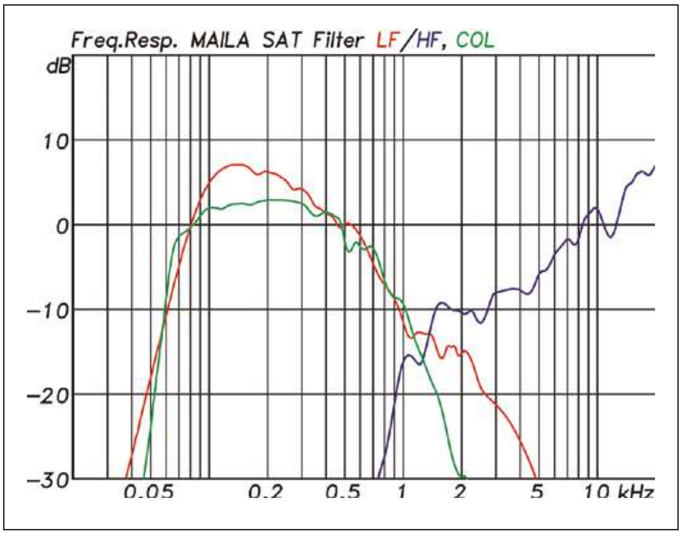
The MAILA system's electronics offer a range of functions that can be set either directly on the speakers themselves or via an iPad app. All available functions are also available directly on the loudspeaker itself and can be set here using a small coloured display and an incremental encoder. The display also rotates according to the electronics' position in a standing or hanging position, so that users do not have to struggle with annoying overhead reading. The functions included are standard volume, delay, polarity and a fully parametric 10-band user EQ with bell and shelf filters. Nothing unusual so far.

Angle adjustment on the back by simply turning the central handle

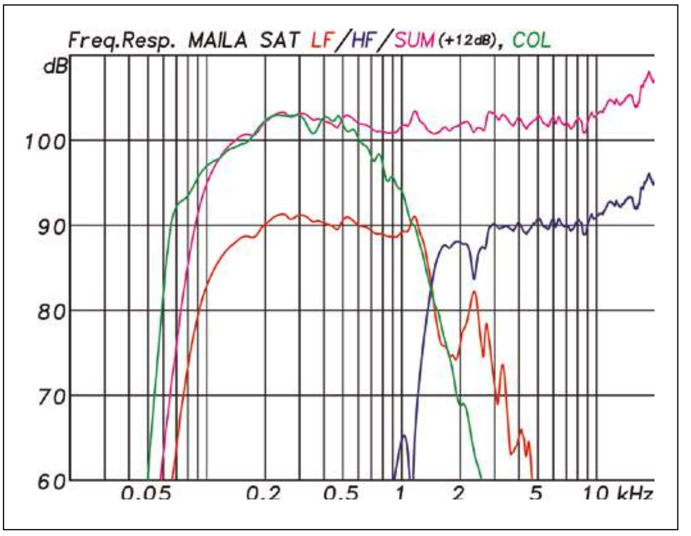
What will awaken greater interest is the auto splay and auto EQ function. To offer users fast assistance for onsite setting, the optimal angles are calculated with the help of the auto splay function; the matching EQ is also set.

The first information the function requires is the height of the highest flying point if the array is rigged or the lowest point if the array is ground stacked. The number of SATs in the array is determined automatically. Further information required is the distance to the last audience row and whether the audience is standing or seated. Based on this information, the function calculates and displays the splay angles between the individual elements as well as the flight adapter's pick point for flown arrays. The user can then set the angles accordingly also for systems that are already flown or ground stacked. In addition to the calculation of the required angles, an auto EQ is also determined and directly set for the configuration. The data for the EQ comes from a database stored in the speaker's DSP. The auto EQ is independent of the user EQ and does not limit its function.

The standard filter functions of the SAT and the COL without array EQ can be found in Fig. 5's with the now familiar colour coding. The filters are designed as a combination of FIR



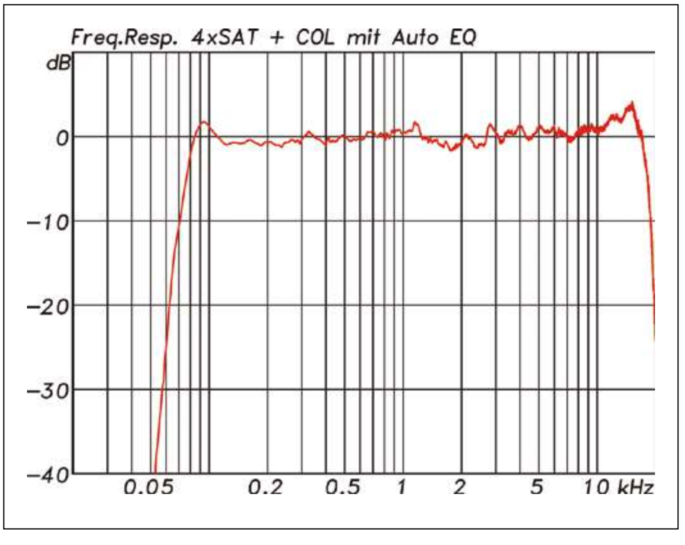
Filter functions of the two ways' amplifier modules in the SAT (LF red and HF blue) and COL extension's woofer (green, Fig. 5)



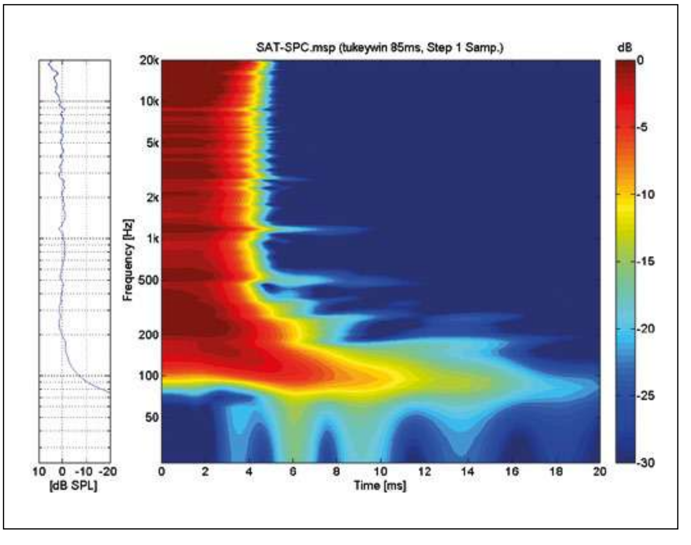
The SAT's two ways (red and blue) and their sum function (pink) measured with the integrated electronics. In green, the COL extension, which is faded out from around 700 Hz upwards (Fig. 6)

and IIR filters and therefore ensure a linear phase response for the entire system from around 300 Hz upwards. The electronics' latency measured over all is approximately 6 ms.

If we combine the measurements for the individual ways with the filters, we receive the curves displayed in Fig. 6. The SATs achieve a very even curve with a lower cut-off frequency of about 100 Hz and a slight increase in the highs above 10 kHz. This measurement was carried out for a single SAT without auto EQ. The same applies to the COL's green curve, which is phase-linearly equalised and faded out from about 700 Hz upwards. Without auto EQ, the COL matches the SATs in level with a boost of 12 dB, which corresponds to an array with four elements. The user, however, does not need to worry about how the levels match, as all settings are made via the auto EQ. Fig. 7 shows an example of the measurement setup, where one COL is combined with four SATs. The auto EQ sets a perfect frequency response for this combination that require no further discussion. If users want to make one or two tweaks according to



Frequency response for the combination of 4 x SAT and COL. The total frequency response for the combination is set to a straight over all course by the auto EQ (Fig. 7).



The SAT's spectrogram with almost perfect decay (Fig. 8)

The SPA amplifier's connections for power supply and signal feed. A stand sleeve for placement on a pole or subwoofer and the three elongated openings for accommodating the EasyMount flying adapter are provided in the base/lid

their personal taste, they can do so by using the user EQs. The good metrological impression is completed by the spectrogram in Fig. 8 that convinces with almost perfect decay.

MAILA app

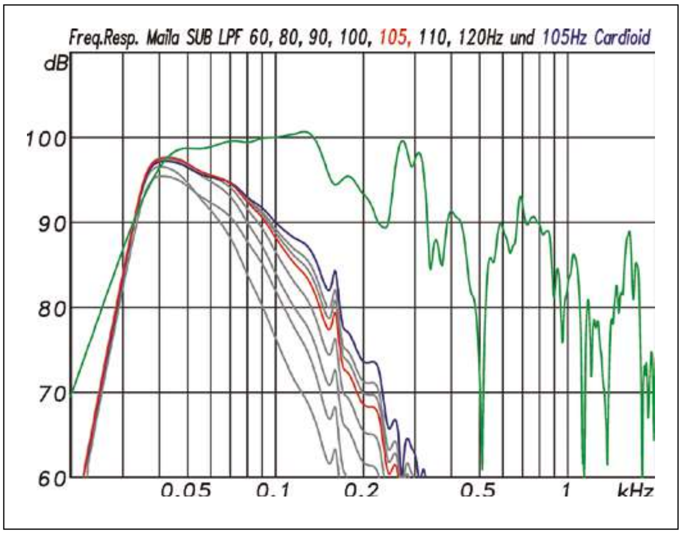
In addition to setting the speakers directly via their display, the MAILA system also comes with the MAILA app for iPads that had just been completed at the time of this review. The speakers and the iPad are connected via Bluetooth LE with the transmitters and receivers located in the SPA, COL or SUB's respective electronics. The associated antennas have been cleverly integrated into the speaker's logos (LogoLink) on the front, so that a range of up to 30 m is possible. After activating the Bluetooth interfaces, they are automatically connected. The app's AutoSplay and user EQ pages are shown in the following two screenshots. It should be noted that the app is primarily used to set up the system and not to adjust and monitor it during operation.

Subwoofer combinations

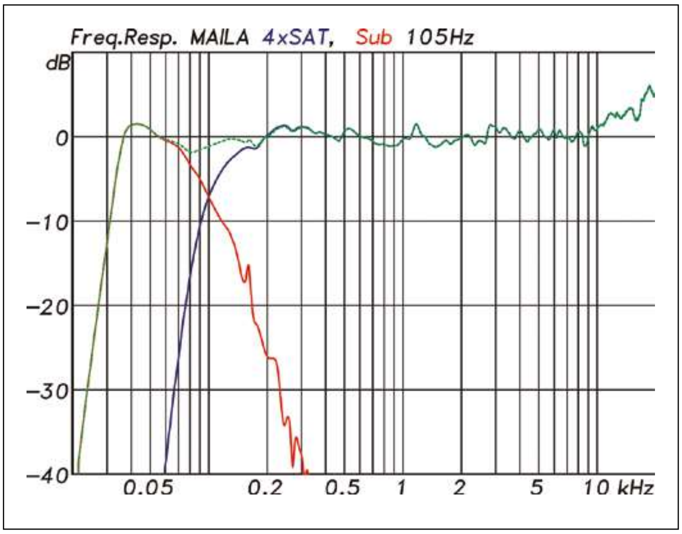
If users want to use the MAILA system for concerts or DJ acts, then the subwoofer comes into play. It can be combined with SAT modules only as well as with SATs and a COL. If the tops cannot be flown, the SUB with its solid weight of 90 kg serves as the necessary stable base. The SATs without COL can be mounted on the SUB using a pole mount. A maximum mount of three SATs is possible together with the associated SPA amplifier module. Larger arrays that include the COL extension are mounted directly onto the subwoofer and can then include up to six SATs. No electrical connection exists between the subwoofer and the array, so power and signal must be connected via link cables coming from the SUB. For this purpose, the

The MAILA app (iOS) allows users to optimally align and set the system's angles to match the audience area

The MAILA app's filter functions for the user EQ that is available in addition to the auto EQ



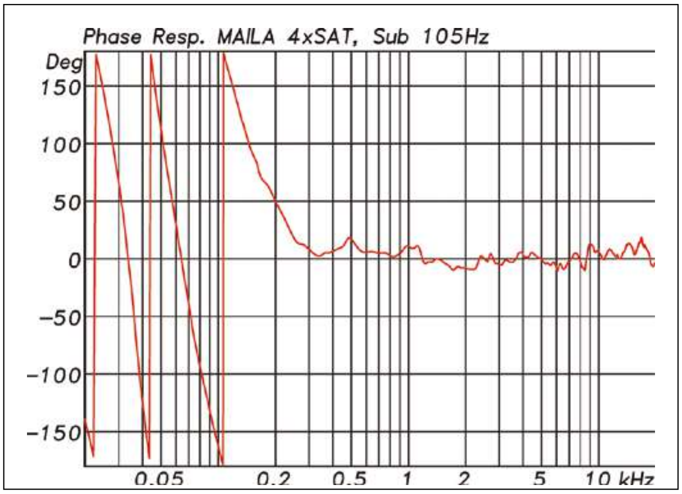
The SUB's frequency response without filter (green curve) and with the settings for the low-pass filter from 60 to 120 Hz as well as for the rear unit in a cardioid configuration (Fig. 9)



Frequency responses for the combination of an array consisting of four SATs and a subwoofer with 105 Hz LPF setting (Fig. 10)

subwoofer is equipped with corresponding link sockets for power via PowerCON TRUE1 and XLR for the audio signal. Unfortunately, no digital feed options via AES3 or Dante are possible – or maybe none yet. Theoretically, with a Dante network, LD Systems could also directly put the speakers' connection to the app on solid footing.

To match the tops, the subwoofer offers setups with crossover frequencies from 60 to 120 Hz (Fig. 9). The default setting for the combination with SAT and COL is 105 Hz. A cardioid setup for the SUB radiating to the rear is also available.



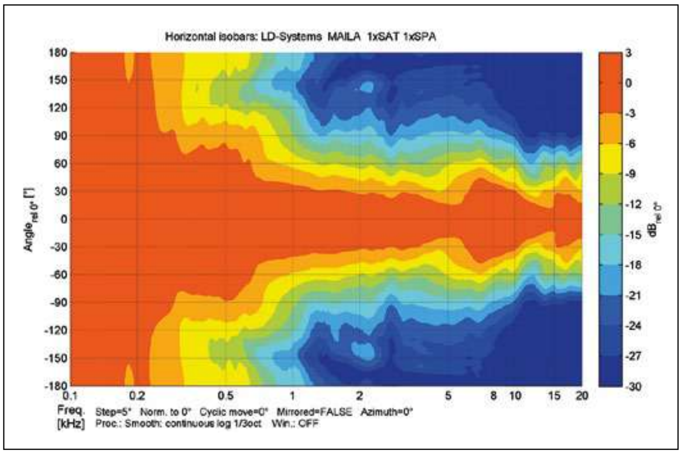
Phase response for the combination of an array consisting of four SATs and a subwoofer. Internally, the SAT operates with FIR filters and therefore achieves a linear phase response from 300 Hz upwards (Fig. 11)

Fig. 10 shows an example of how the SUB performs together with the tops for a combination of the SUB with four SAT modules. With the crossover frequency set to 105 Hz, both systems align well in terms of amplitude and phase, adding up to an overall straight curve. In this combination, the lower cut-off frequency (-6 dB) is now 33 Hz, which should please any DJ. Fig. 11's corresponding phase response displays a linear phase response for the tops from 300 Hz upwards. Below 300 Hz, the phase rotates by 360° three times due to the X-Over function and the 4th order electrical and acoustic high pass.

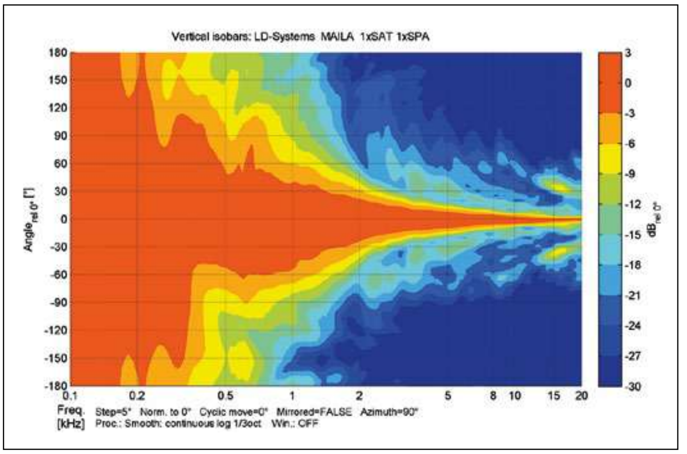
Directivity

As is the case with any line array, a system's directivity is defined horizontally by a single element and vertically by the array's combination and angulation. For the MAILA system, we therefore first measured the horizontal and vertical isobars for a single SAT.

The horizontal isobars from Fig. 12 show an average dispersion angle of approximately 100° from 1 kHz upwards, which also corresponds to the specifications in the data sheet. In terms of uniformity, the MAILA SAT does not quite achieve the straight course that larger line arrays achieve, as the small enclosure simply does not have enough space. Compared to other similar designs, however, one can clearly see the advantage of the tweeters' waveguides, as there is no jump at the transition point at 1.5 kHz. Vertically, the SAT behaves as expected as one short line source. Two things



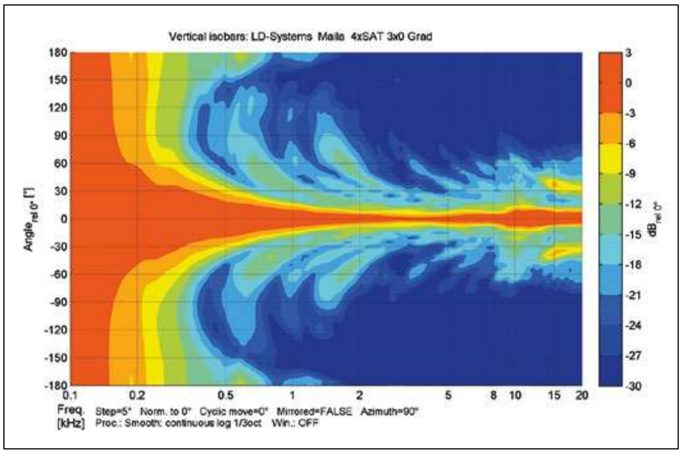
The SAT's horizontal isobars with an average dispersion angle of approximately 100° (Fig. 12)

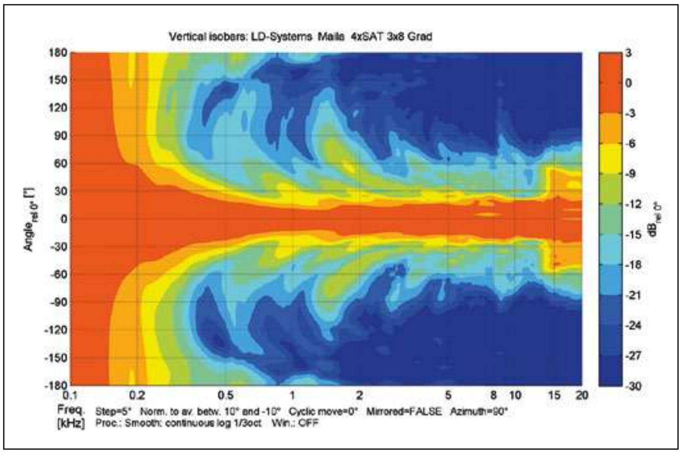


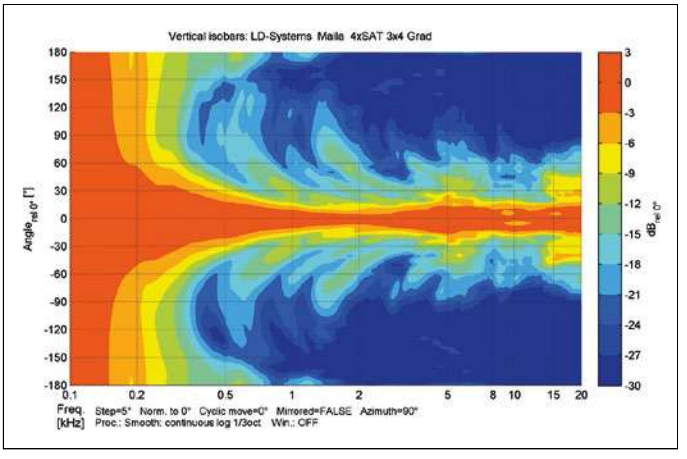
Vertical isobars for a single SAT unit. The asymmetry at lower frequencies is caused by the SPA amplifier module flange-mounted at the bottom during the measurement (Fig. 13)

stand out here. On the one hand, the composition of the line source from five individual sources is achieved very well. Lateral side maxima caused by discrete sources occur only very weakly and then only from 15 kHz upwards. On the other hand, the isobars' slight asymmetry is surprising at first as the SAT's design is symmetrical. The explanation lies in the SPA's electronics module, which was flange-mounted below the SAT for the measurement and therefore influenced the dispersion behaviour at lower frequencies.

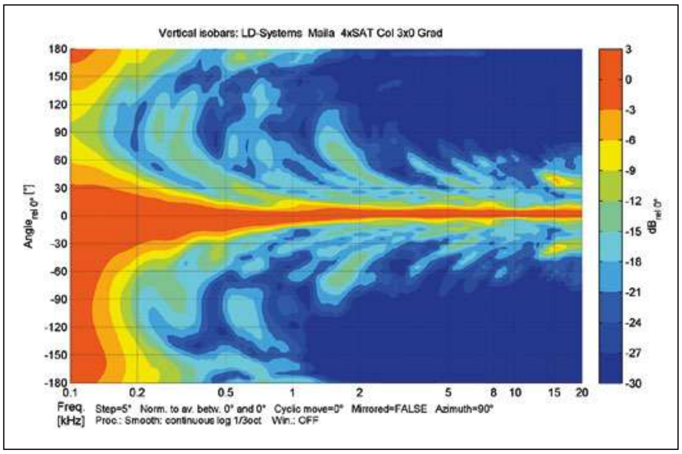
For the array measurements, an array consisting of four SAT modules plus an SPA electronics module was set-up and measured with angles between the individual elements differing. Users can adjust the angles continuously from 0° to 8°. As an example, the array was measured with angles of 0°, 4° and 8° from element to element. Fig. 14 shows the respective isobar graphs. The four units harmonise well with each other and cover the set dispersion angle exactly intended. The discrete tweeters' side maxima are again only







Vertical isobars for an array consisting of four SAT modules and element-to-element angles of 0°, 4° and 8° (from top to bottom) (Fig. 14)



Vertical isobars for an array consisting of four SAT modules with a 0° angle in combination with a COL extension. The controlled directivity can thus be extended downwards to 200 Hz (Fig. 15)

noticeable from 15 kHz upwards and therefore negligible. Last, a measurement of the four SAT modules with an angle of 0° from element to element together with a COL extension was carried out (Fig. 15). Due to the lengthening, the concentrated dispersion pattern is extended significantly towards the low frequencies, which should prove particularly beneficial in acoustically difficult applications.

Burst measurements

The first method used for the maximum level measurements was the well-known method with sine burst signals, where burst signals with a length of 683 ms are used for frequencies below 300 Hz and bursts with a length of 171 ms are used above 300 Hz. At low frequencies, greater length is required to achieve sufficient frequency resolution for the evaluation with an FFT. This measurement evaluates harmonic distortions for which maximum distortion limits of 3% and of 10% were set. The final measured result was the sound pressure level achieved with these distortion limits, referred to a distance of 1 m in the free field for the full room.

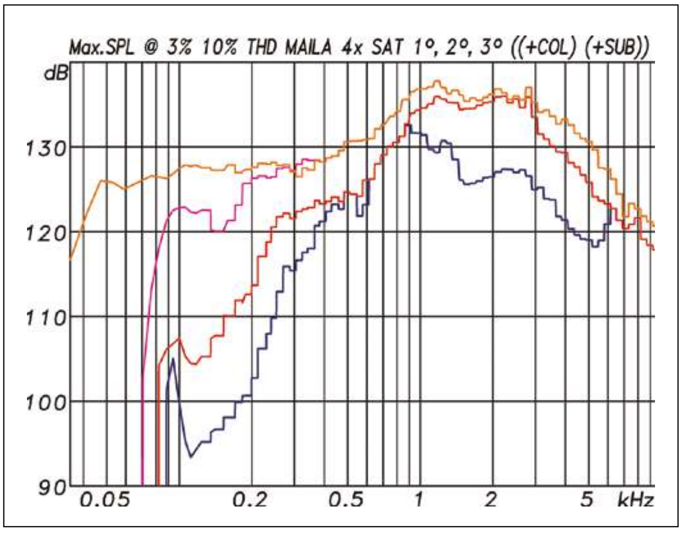
Fig. 16 shows the curve recorded with this measurement method for an array consisting of four SAT modules for a maximum distortion of 3% and of 10%. Also shown are the results for a combination of the four SATs with the COL extension as well as with the COL and the subwoofer. Only the 10% curves of the last two measurements are displayed.

Fig. 16's measured results clearly show the small SATs' potential as they achieve well over 130 dB in the midrange and even achieve up to 138 dB. Below 300 Hz, however, the level is noticeably weaker. Here, the extension with the COL helps and raises the achievable maximum level up to 122 dB at 100 Hz. This quite significant difference to the result of the four SATs alone – which also contain four 6.5" woofers – is partly due to the fact that the COL is equipped with different drivers that enable higher power handling capacities and that these are optimised for low-frequency reproduction. The SAT's woofers, on the other hand, are optimised for high sensitivity in the mids. For the fourth and final curve, the subwoofer was added, turning the MAILA system into a proper PA with 126 dB at 50 Hz and 128 dB at 100 Hz. If even more bass is desired, the system can be expanded with additional subwoofers. The combination with three subwoofers in a cardioid setup is particularly recommendable, as the directional behaviour enables more precise bass reproduction even at low frequencies.

Operation via the integrated electronics The text and images on the display can be rotated in accordance with its standing or handing position

Multitone measurement

Fig. 17 and Fig. 19 show the second maximum level measurement. For this, we used a multisine signal that has a spectral distribution according to EIA-426B for a medium music signal (green curve) and a crest factor of 12 dB. This type of measurement therefore reflects very realistic load conditions. The distortion value measured in this way captures both the total harmonic distortions (THD) and the intermodulation distortions (IMD) that arise with this signal. Together, these are referred to as total distortions TD = THD + IMD. At 1 m in the free field, the array with four SAT modules achieves an average level L_{eq} of 116.5 dB and a



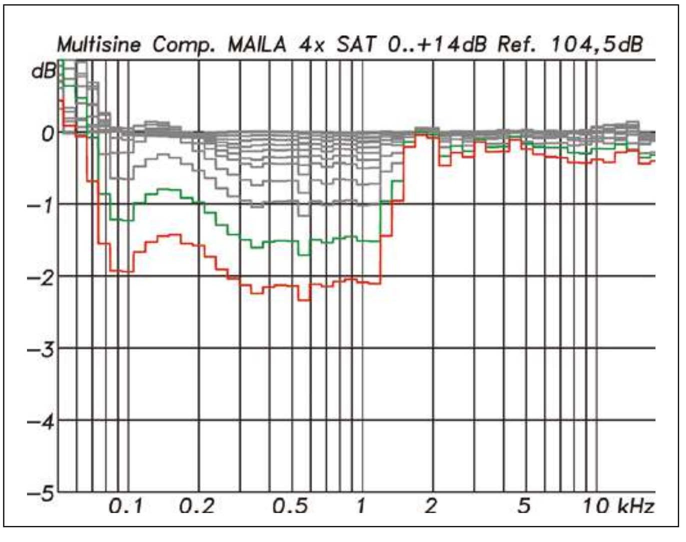
Maximum level measurement with sine burst signals for a maximum distortion of 3% (blue) and of 10% (THD). The 3% measurement was carried out only for the array consisting of four SAT modules. The 10% curves were measured for the array with four SAT modules (red) with an additional COL (purple) and with an a dditional SUB (orange) (Fig. 16)

peak level L_{pk} of 128.4 dB. In combination with the COL extension, the average level L_{eq} increases to 121.2 dB, while the peak level L_{pk} increases to 133.2 dB. In addition to a TD limit, power compression can also be examined as a termination criterion for this measurement. To do so, the measurement series starts at a low level in the loudspeaker's linear working range, at a point where no power compression occurs. From here, the level is then increased first in steps of 2 dB and later in steps of 1 dB. At a certain point, the loudspeaker will no longer follow these level increases, either broadband or only in individual frequency bands. The limit values for power compression were defined as a level loss of more than 2 dB in the broadband and more than 3 dB in individual frequency bands.

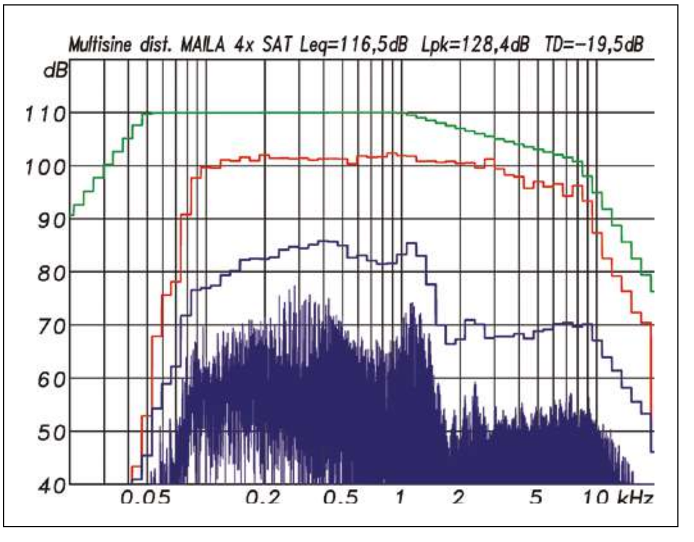
For the two measurement series shown here (Fig. 17 and Fig. 19), both termination criteria occurred at approximately the same levels. This means that the power compression reached 2 dB at the same point where the distortion limit of -20 dB was also reached. A series of measurements with a subwoofer was not carried out, as the results largely correspond to those displayed with 4 x SAT + 1 x COL in Fig. 20. With a subwoofer, the curve extends downwards by 1½ octaves, but the limitation still arises in the tops' working range.

Audio test with versions

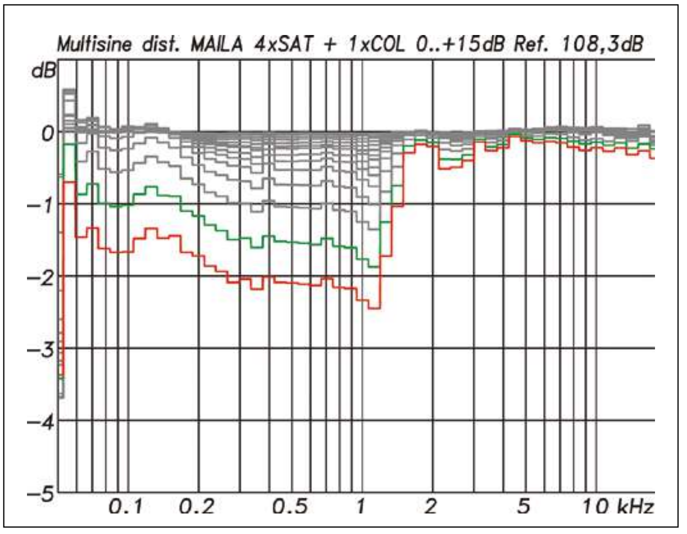
The audio test took place in the anechoic room, which is well suited for the MAILA system due to its size and allows a comparable evaluation under acoustically neutral and con-



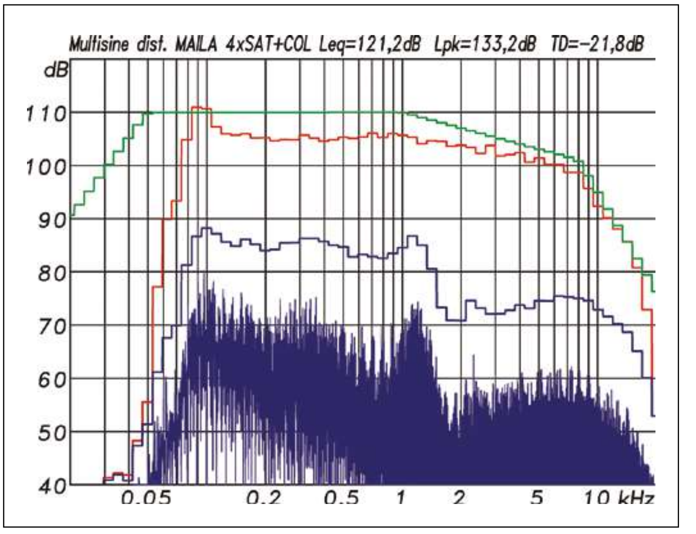
Signal compression for an array consisting of four SATs, measured with a multitone signal with a start level of 104.5 dB (1 m free field). If one allows a deviation from the linear behaviour of a maximum of 2 dB (green curve), then an L_{eq} of 116.5 dB and an L_{pk} of 128.4 dB are achieved. The total distortions measured here are -19.5 dB. (Fig. 17)



Multitone measurement for the array with four elements
An L_{eq} of 116.5 dB and an L_{pk} of 128.4 dB are achieved. The total distortions measured here are -19.5 dB. Both termination criteria (max. 2 dB compression or max. 10% distortion) were achieved. The measurement was evaluated against Fig. 17's green curve (Fig. 18)

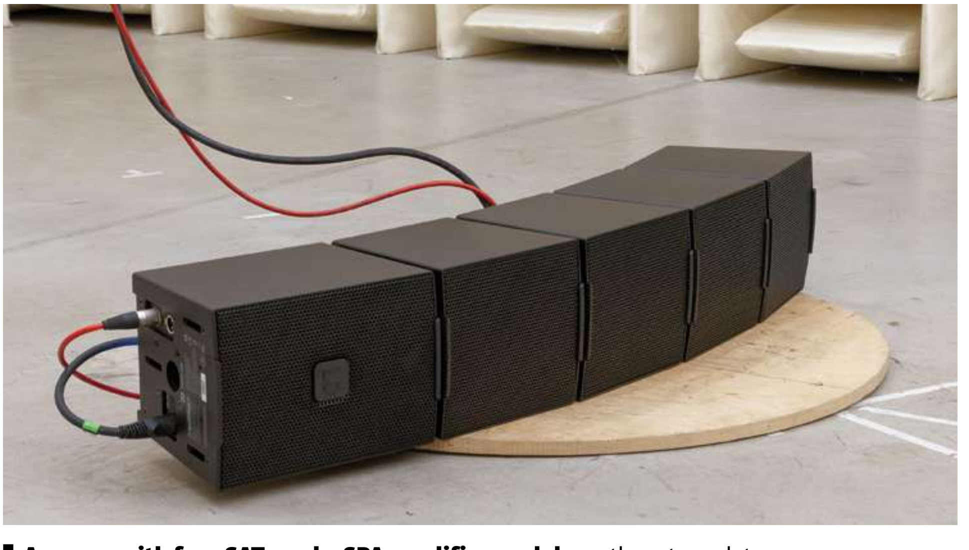


Signal compression for an array consisting of four SATs and the COL extension, measured with a multi-tone signal at a start level of 108.3 dB (1 m free field). If one allows a deviation from the linear behaviour of a maximum of 2 dB (green curve), then an L_{eq} of 121.2 dB and an L_{pk} of 133.2 dB are achieved. The total distortions measured here are -21.8 dB (Fig. 19)



Multitone measurement for the array with four elements and the COL extension An L_{eq} of 121.2 dB and an L_{pk} of 133.2 dB are achieved. The total distortions measured are -21.8 dB. The measurement was evaluated for Fig. 19's green curve (Fig. 20)

stant conditions. For the test, we set up and listened to a stereo set with four SAT modules each, which were optionally supplemented by one COL each or by one COL each and the SUB. The resulting audio impression reflects the measurement results. A system consisting of only the SAT array is well suited for speech and music with little bass or as a fill system. If the COL is added, the MAILA system takes a big leap towards becoming a full-range system – and turns into a full PA when expanded with a subwoofer. By itself, this is nothing unusual. What is noticeable, however is the very pleasant overall sound reproduction, which is maintained even at high to very high levels – regardless of the configuration. In all probability, this characteristic is a merit of the domes and the SAT module's good mid-woofer unit. In addition, the MAILA system also shows precise equalisation including phase response thanks to FIR filtering. It also manages to reproduce individual sources – where voices are clearly located in the mids in a limited space and do not come across the full width – very well and in a differentiated way. As always when it comes to audio tests, some less good or highly compressed recordings were also listened to on purpose. These can quickly become unpleasant at high volumes if the system adds further distortion, but this was not the case here at all. To sum up, the MAILA system can be described as a well-scalable universal PA with the sound characteristics of a hi-fi system. Users therefore need have no fear of deploying it even for demanding concerts or clubs.



An array with four SATs and a SPA amplifier module on the rotary plate

Four SATs above one COL as the next expansion stage

MAILA array above the subwoofer The lashing strap visible at the back only served to secure the system during the measurement in the inclined set-up

Summary

The development of the MAILA system started with an ambitious goal, which currently also acts as the headline for the MAILA subpage on LD Systems' website: "Some jobs require a big line array. For everything else, there is MAILA." With the system, that – thanks to SAT modules, the COL extension and the subwoofer – can be scaled in very wide ranges, LD Systems has indeed achieved exactly this. From sound reinforcement for a small round of talks on stage to a concert with an audience of 1,000 people, a suitable MAILA setup is always available. Added to this is its unobtrusive, elegant appearance without a lot of wiring and flight mechanics. The MAILA system can therefore also be integrated well into visually sophisticated environments, both in the case of mobile and permanently installed systems. Especially when it comes to mobile use and changing locations, operation is simple thanks to auto splay and auto EQ functions. On the mechanical side, the same applies for the Easy-Mount flight adapter and the EasySplay angle adjustment on the SAT housings. All in all, the MAILA system is an all-round success, with which audio engineers can reach their goals reliably, quickly, safely and with an audio solution that is pleasing both in terms of sound and appearance. ■

EasyMount for truss rigging the MAILA arrays; the adapter can be attached to the SPA amplifier module as well as to the COL extension