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Fachmagazin für Veranstaltungstechnik

Review
from Issue 9/2013

Kling & Freitag Sequenza 5



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(...) The system is a persuasive choice in terms of its compact dimensions, particularly its width; it's trimmed for maximum performance, packing four LF and three HF drivers, including its generous waveguides, into its slender casing (...)

Kling & Freitag Sequenza 5

Compact Active Two-way Line Array System With Flying Sub-bass

The Sequenza 5 is Kling & Freitag's second line array system in the Sequenza range, and as its name suggests, the main mid/high-frequency units feature five-inch bass drivers. Apparently, one of the manufacturer's aims was to create a line array unit with a 'compact form factor' – that is, something long and slender – which would allow the construction of physically lengthy arrays with just a few units. K&F envisage the Sequenza 5 being used as a short- or mid-range PA at public gatherings such as corporate or gala events or concerts in small-to-medium halls, where the emphasis needs to be on high audio quality in an unobtrusive package. Additionally, the Sequenza 5 units may be used as fill-ins for the larger Sequenza 10 system, and if higher bass levels are needed, the Sequenza 5 W mid/high-frequency units can be used in conjunction with the associated Sequenza 5 B sub-bass modules. Slender line arrays such as this one are also ideal for use in many different applications in the installation market, ranging from larger conference and multi-purpose rooms to theatres and concert halls.

At first glance, the Sequenza 5 W doesn't even look like part of a line array. Measuring 34.8cm by 36.8cm by 39.4cm (had), and weighing in at 16.3 kilos, it's almost cube-shaped, and doesn't have the wide, flat profile of a typical line array element. Removing the front grill reveals why: you could say that each Sequenza 5 W module contains two elements of more typical line array dimensions. On the left and right there are two five-inch bass drivers per side, arranged above each other, while the waveguide with the high-frequency units is in the centre. There are actually three waveguides, derived from the design used in the larger Sequenza 10, vertically arranged at an angle of 5 degrees to each other, and optimised using BEM simulation techniques. According to Dirk Fritsche, Kling & Freitag's Head of R&D, a further challenge

was finding drivers that could be driven hard, but were of a sufficiently small size that three of them could fit on a waveguide of these dimensions at the required angle to one another. The overall horizontal dispersion of these drivers is given as a fairly standard 100 degrees. In terms of their circuit design, the three 8Ω drivers are arranged in series and are separated from the low-frequency drivers by a passive crossover. As so often, the passive filter here is used purely to divide the signal into frequencies appropriate for each driver type, without applying any kind of system-wide EQ; the latter has been left for the system's loudspeaker management controller to take care of instead (more on this later in this article). The thinking here was that because loudspeaker management is always used with such arrays anyway, any required EQ can simply be applied by that part of the system. Together with the passive crossover, this allows optimal active two-way operation for an array consisting of high/mid-frequency units and sub-bass modules. The Sequenza 5 W's low-fre-

quency drivers are seated in part behind the waveguide, permitting the construction of particularly slender, vertically symmetrical arrays. The front panel of the unit, into which the low-frequency drivers are built, is arranged vertically at five degrees to the perpendicular. If the total membrane surface area of the four five-inch drivers is calculated, it works out at around 20 percent greater than that of two 6.5-inch drivers; and of course, a line array element with two six-inch drivers would have needed to be considerably wider. On the other hand, the Sequenza 5 W is taller than a simple speaker with two 6.5-inch drivers. But whilst this is true, it's important to remember that line arrays are all about creating the right height (or length) of array for a given application. The Sequenza 5 W's 'two-in-one' construction offers the advantage of allowing you to create arrays of a given length from fewer array elements than would be needed with other systems.

It's important to distinguish between two fundamentally different design approaches here. One, cleaving closely to Christian



The Sequenza 5 W without its front grill: each Element contains four LF and three HF drivers



The waveguides for the three HF drivers are angled at five degrees to one another



"Size matters", as they also like to say in the loudspeaker game: a 12-element array, with a total length of 4.2 metres, has an impressive throw and bass response

Heil's WST theory, proposes simple line array elements each of around 35cm in height. This inevitably imposes certain restrictions when it comes to the curve of the array, which is limited to a maximum of 10 degrees. The other, as espoused by the 'two-in-one' construction of the Sequenza 5 W, can be used to create arrays with curves of up to 15 degrees without any problems, as each array element consists of two low-frequency and three high-frequency elements which are already internally angled with respect to each other. This could be decisive, especially when using the array as a fill-in system, where pronounced curves are often required. Considered in the horizontal aspect, both bass drivers are placed sufficiently close to one another that no particular sense of directionality is evident (in this, the design is aided by the two halves of the 5 W's front panel, which are angled inwards). Both LF drivers can therefore be run in parallel without the need for decoupling, as in a so-called 'two-and-a-half-way' speaker.

Sequenza 5 W: A Look At The Electroacoustics

To begin, we ran individual tests on the Sequenza 5 W's bass and treble drivers, without the internal passive crossover. The red line in Figure 1 shows the measurements taken from the four small LF drivers, which despite their size exhibited a sensitivity measurement of 91dB at 1W at 1 metre in response to a 100Hz tone. Given its nominal power rating of 350W, the maximum possible theoretical output level of one of these speaker units can be calculated as 116dB. For a minimal configuration as a line array using three such units, that becomes 125dB. Up to 300Hz, the sensitivity rises to 98dB. After that the reading fluctuates rapidly around a mean of approximately 94dB at 1W at 1 metre. Both of these observations have the same cause; the loudspeaker's construction is of the compound (also known as bandpass) type, which noticeably raises the sensitivity at some frequencies, but leads to ripples in the response. Figure 2 clearly shows the simple filtering role of the passive crossover mentioned earlier. The crossover frequency is at around 1.5kHz. The ripples in the filter response are

not wanted features of the design and arise from so-called impedance feedback from the drivers to the crossover. A graph of the overall impedance of the Sequenza 5 W can be seen in Figure 3. This speaker unit has a nominal impedance of 16Ω, but exhibits a not entirely standard minimum of 11.75Ω. However, this should present no problems in the typical recommended combination for an array, where between three and a maximum of five high-frequency/mid-range units will be driven per amplifier channel. As might be expected from the Sequenza 5 W's combination of a five-inch bass driver and a one-inch HF compression driver, the sensitivity of the 5 W's drivers gives very different results, with the HF driver performing much more favourably. If the two responses are simply combined via a crossover function, the overall response, as shown in Figure 4, may seem somewhat odd at first glance, but after further consideration is more plausible. The CD 44 system controller designed to be used with the Sequenza system takes care of the system-wide EQ required here, and clearly, the Sequenza 5 W could benefit from a more linear frequency response. However, using purely passive filters – like those in its crossovers – to achieve requires physically large and expensive components, as well as inefficient, power-hungry operation with the loss of much energy through waste heat. In design terms, passive solutions should only be employed if the loudspeaker has to be usable without some kind of speaker management system, as in a simple 12:2 universal loudspeaker/audio system. But in the context of a line array, where speaker management of some kind is always used, active equalisation is the right approach to take. Together with the passive crossover, this is also the optimal solution from a cost point of view, as the line array, even with the associated optional sub, still only amounts to a simple two-way active system.

Sequenza 5 B

Before turning to the Sequenza's loudspeaker management system and amplifier rack, there are the test results of the Sequenza 5 B Subwoofer to consider. The latter speaker is a bass reflex (ported) sys-

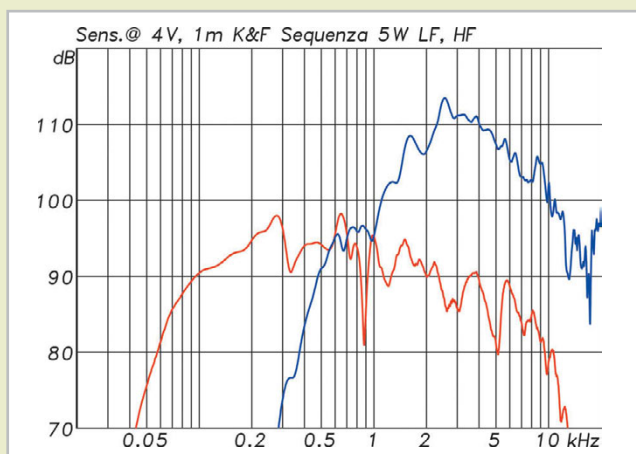


Figure 1: Frequency response and sensitivity of the Sequenza 5 W's LF driver (in red) and its HF driver (in blue)

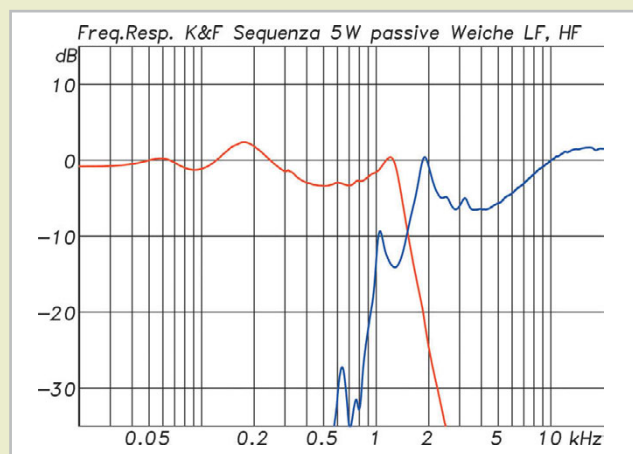


Figure 2: The filter functions in the Sequenza 5 W's passive crossover for the LF driver (in red) and the HF driver (in blue). The filters act purely as a crossover and undertake no system equalisation duties – instead, these are devolved to the loudspeaker management controller, the CD 44

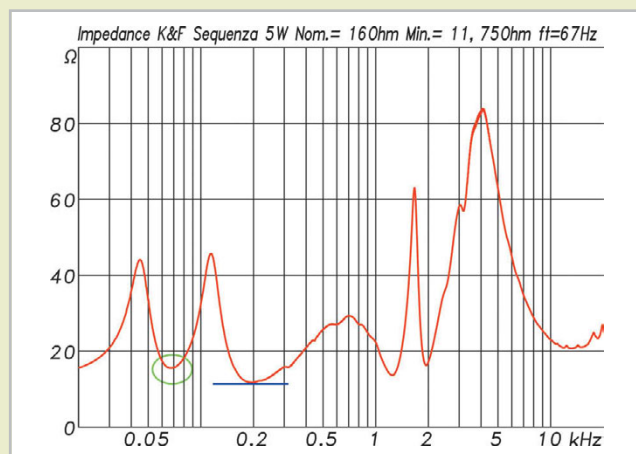


Figure 3: Graph of the Sequenza 5 W's impedance. The speaker is specified as a 16Ω system. The minimum, denoted by the blue line at 11.75Ω, is not quite at the expected value. The resonant frequency of the bass reflex or port is fixed at 67Hz (the green oval)

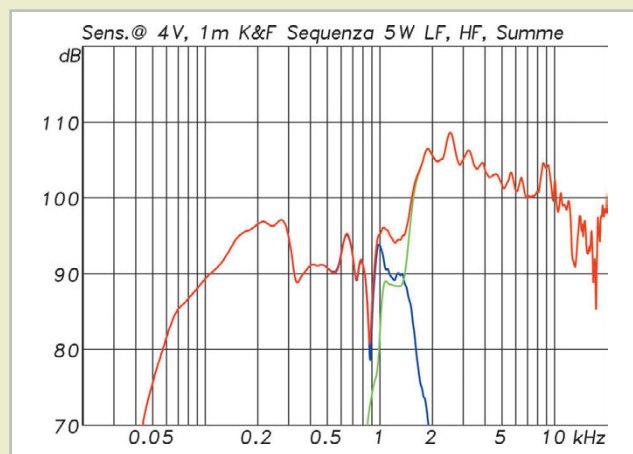


Figure 4: The frequency response of both drivers with passive filters (LF in blue and HF in green), together with the combined curve in red. The unusual-looking frequency response shouldn't be of too much concern, as proper system-wide equalisation is taken care of by the loudspeaker management in the CD44 controller

tem with a 12-inch driver, designed to fit, mechanically and in terms of its physical width, with the rest of the units in the Sequenza 5 system, and to be flown with them if required. Measuring 61.4cm high by 47.2cm deep, and weighing in at 23.6kg, the 5 B is, however, almost as large as two Sequenza 5 Ws. Impedance measurements on the Sequenza 5 B reveal it to be an 8Ω system with a resonant frequency of 49Hz, and a frequency response reaching down to around 40Hz. Despite its compact appearance, the Sequenza 5 B is a true subwoofer, only requiring support from a pair of standard 18-inch bass bins if seriously high sound levels are needed. In the rele-

vant sub-200Hz frequency range, the Sequenza 5 B attains a sensitivity of around 91dB, which, when considered with the high peak power rating of 1.6kW, is easily capable of SPLs of up to 123dB. Above 200Hz, the 5 B's sensitivity rises by nearly 10dB, but it cannot be used like this in conjunction with the 5 W in the context of a line array.

Controller & Amplification

K&F's four-channel Universal Systemrack is designed to control the Sequenza system and consists of the company's own CD 44 speaker management controller and a Lab.gruppen FP10000Q power amplifier. An

I/O panel giving front-facing access to all of the inputs and outputs from these two units completes the 4U rack. The CD 44 digital speaker controller's four ins and outs can be configured in any combination from four separate ins and four outs to one input feeding all four outs via any combination in between, such as two sets of single inputs, each feeding double outputs. Plenty of processing is built in to supplement the crossover functions, including a selection of parametric filters and a 31-band, third-octave graphic equaliser in each of the four inputs and a two-stage dynamics processor with peak and RMS limiting on all four outputs, together with K&F's 'Sense' auto-sen-

sing inputs which calculate appropriate gain settings for the connected amplifiers. Last but not least, there's an unusual but important feature for a digital loudspeaker controller: by feeding the loudspeaker signal back into the controller via the auto-sensing inputs, the controller can check and monitor the current amplification and load on the connected amps at any time. Should the need arise to swap one of the power amps for another model with different gain and power characteristics, users do not have to change the settings on the loudspeaker controller manually, as is usually the case, but can rely instead on the 'Sense' technology. The Lab.gruppen FP10000Q is an internationally established power amp offering 2.5kW of power per channel; a detailed review of this device can be found in the March 2007 edition of PRODUCTION PARTNER. Frequency plots for the CD 44's 'Full Range' and 'Low Cut' filter functions are depicted in Figure 7. In Full Range mode, the Sequenza 5 W still requires a little support at 70Hz. If the Sequenza 5 B subwoofer is pressed into service, both drivers overlap slightly between 50 and 100Hz and the high/mid units are relieved of the greater part of their duties in the bass region. In addition to the filters for system-wide EQ and the HF/subwoofer crossover, the CD 44 also offers many filters designed to assist in array optimisation. Figure 8 shows one of the coupling filters set to Shelving operation for array lengths of between four and 12 units, as well as three further filters giving a slight bass tip-up (the red curve), and a rather more pronounced HF enhancement (the blue curve) designed to compensate for the effect of atmospheric HF-damping over long distances. Finally, the so-called Straight Filter (the green curve) applies 4dB of cut to the mid-range at 2kHz to counteract a slight over-emphasis exhibited in this part of the audible spectrum, mostly in linear suspended arrays. All in all, the filters are clearly assigned and easily accessible to the end user. However, the actual system setup itself is not accessible by the end-user from here; all of the settings are optimised for instant operation and are non-editable. Full controller operation and monitoring functions are carried out by connecting a PC over Ethernet and running the associated CD-based Remote software, which allows access to all the features of the speaker management controller, together with full monitoring of the connected power amps via the Sense system. Users also have the option of selecting a loudspeaker definition profile for each output, which includes all of the possible filter and limiter settings. For still greater fine-tuning, appropriate array-wide EQs can be selected for each array configuration. Further functions include a third-octave-band graphic EQ, four parametric EQs, and overall level and delay settings on every input channel. Another useful function is the limiter reduction setting, which allows the limiter thresholds to be reduced globally in the interests of enhanced safety on particularly critical events

The Full System With Controller & Sub

Figure 10 shows how the Sequenza 5 behaves together with the CD 44 controller. In 'Full Range' mode, the system extends down to around 60Hz, and the bass response can be extended down to 40Hz by adding the sub. The curve is somewhat unusual in the



The Subwoofer Sequenza 5 B is also designed to be used as a riggable bass unit in the Sequenza 5 system, fitting mechanically and in terms of its width with the Sequenza 5 W

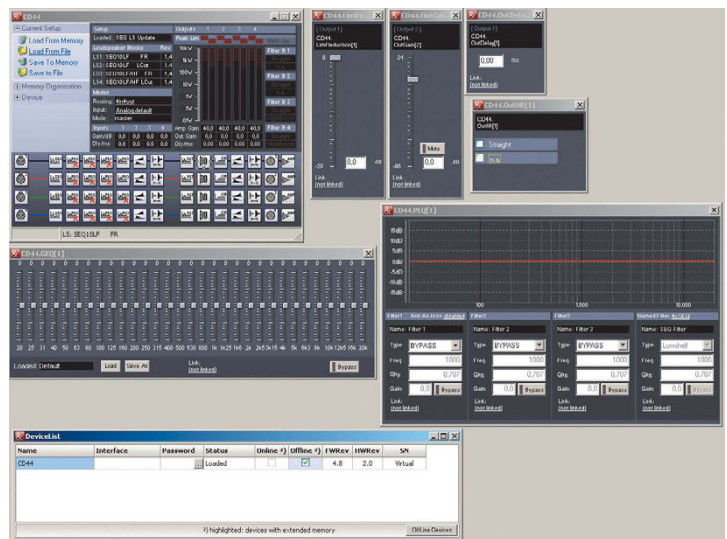


Figure 9: The main screen from the PC-based editing software for the CD 44 Controller, CD Remote

mid-range, where many ripples are evident. Apparently many preliminary measurements and listening tests were carried out to determine these filter settings, and according to Arne Muscheites, one of the select circle of developers that was responsible for testing and assessment, further refinements would not have brought about any sonic improvements compared to the current response. The phase responses shown in Figure 11, which depict the system with and without the sub, feature a 360-degree phase shift at the

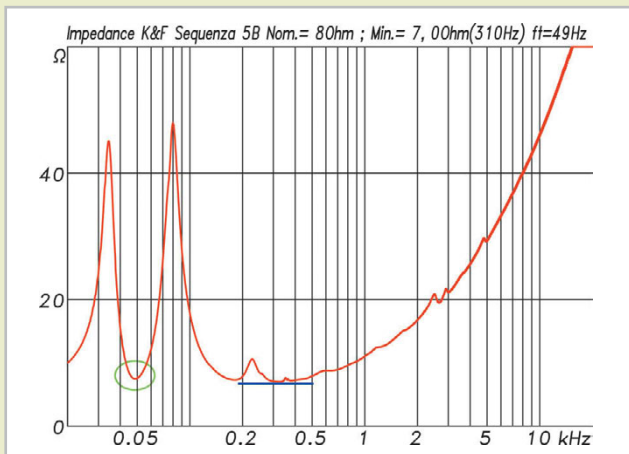


Figure 5: The Sequenza 5 B's Impedance curve. Nominally an 8Ω system, it has a resonant frequency at 49Hz. The minimum impedance lies at the expected 7.0Ω

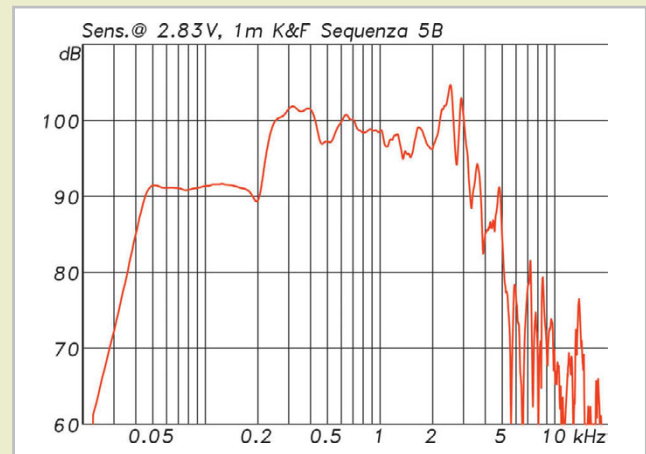


Figure 6: Frequency response and Sensitivity of the Sequenza 5 B bass unit. The lower cutoff frequency (-6dB) is at around 40Hz. Over its main operational frequency range, ie. below 200Hz, it attains a Sensitivity of around 91dB

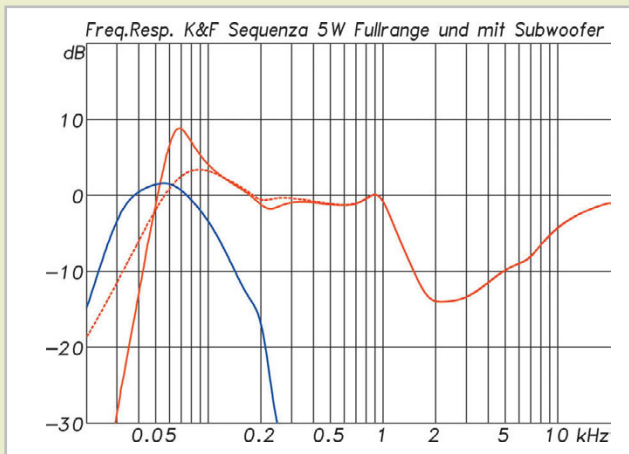


Figure 7: Sequenza 5 W frequency response curves from the CD 44 Loudspeaker Controller in 'Full Range' and 'Cut' modes (in red) and for the Sequenza 5 B when used as a low-frequency sub (in blue)

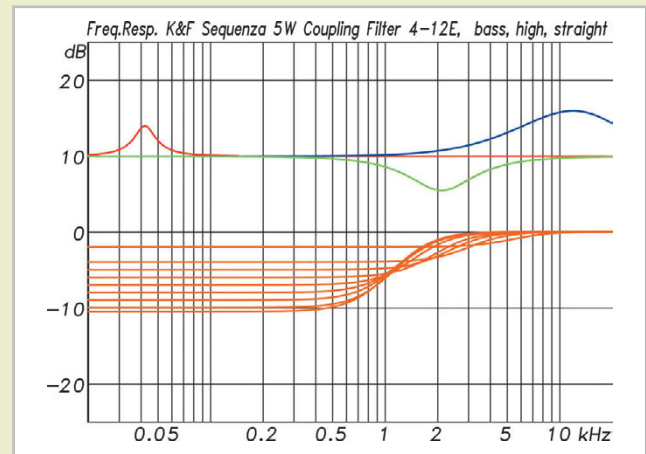


Figure 8: Filter curves for tuning arrays. The frequency response of the Bass Boost filter is shown highest, in red, the High Boost curve is in blue, and the so-called Straight curve is in green. Below, the Coupling filter is shown in orange. This is designed to tailor arrays of different lengths, from four to 12 Elements

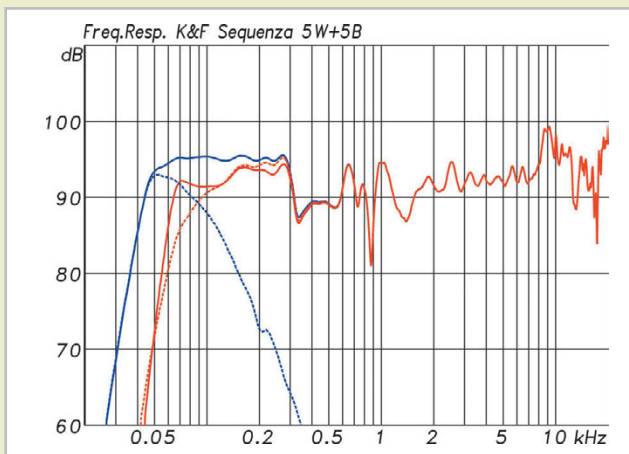


Figure 10: Frequency response for the Sequenza 5 W with CD 44 Controller in 'Full Range' (the solid red line) and 'Cut' modes (the dashed red line). The Sequenza 5 B sub's responses are shown in blue

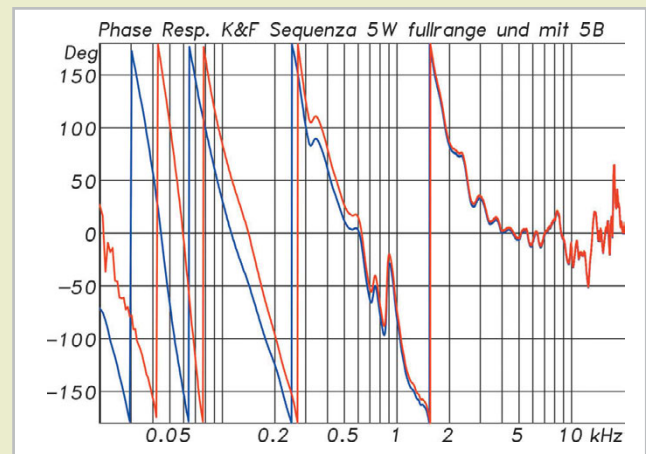


Figure 11: Phase response of the Sequenza 5 W in 'Full Range' mode (in red) and with subwoofer (in blue)

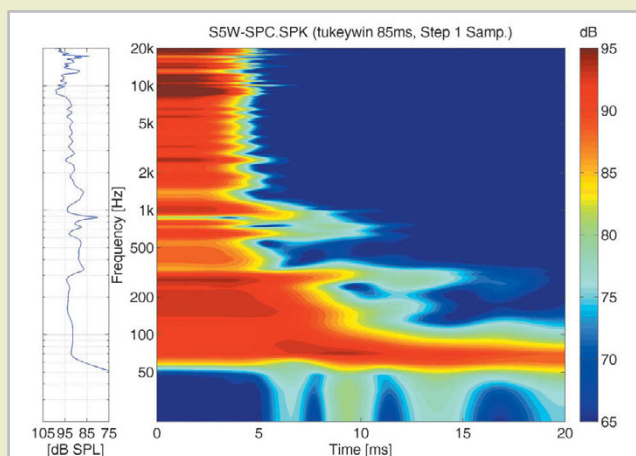


Figure 12: Spectrograph for the Sequenza 5 W; resonances in the Sequenza 5 W's LF driver may be observed at 300Hz and 900Hz

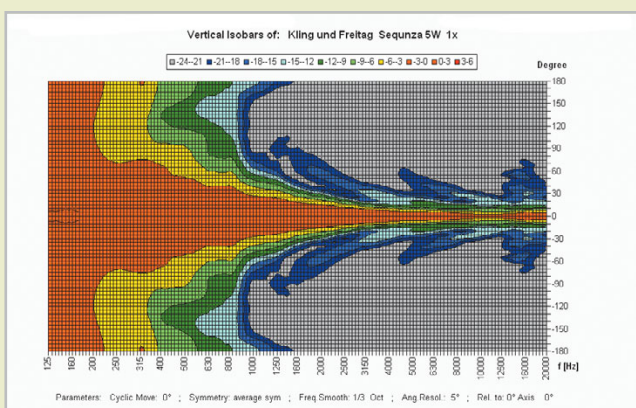


Figure 14: Vertical dispersion isobars plotted for a single Sequenza 5 W unit. The lateral lobes shown are so low in level that they hardly have any effect on the array's overall performance



The individual array elements lock into position automatically, giving the overall vertical dispersion angle chosen earlier

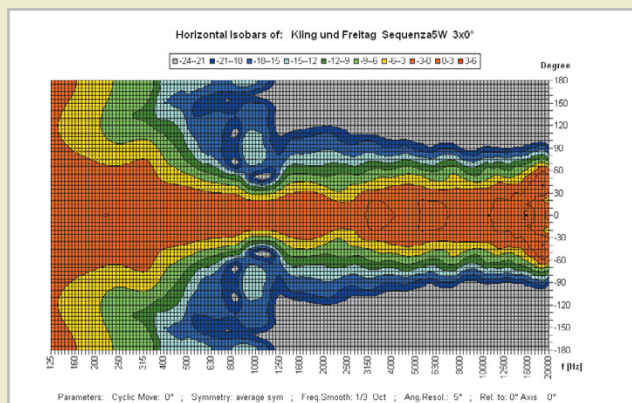


Figure 13: Horizontal dispersion isobars plotted for a Sequenza 5 array comprising three 5W units. The nominal dispersion of 100 degrees is consistently attained, with the exception of a slight narrowing in the mid-range

1.5kHz crossover frequency, with three further 360-degree shifts down in the lower frequencies. On top of the acoustic high-pass effect of the loudspeaker itself and that of the crossover to the subwoofer, these shifts result from additional high-pass filters in the controller which are designed to protect the speaker from excessively low signal components. In accordance with these pronounced low-frequency phase shifts, a spectral analysis of the Sequenza 5 W exhibits a long trail in the sub-bass frequencies below 100Hz which represents the resulting group delay time. This behaviour is no fault of the loudspeaker per se; it is inherent in all cases where a bass reflex (ported) design is additionally protected by an electronic high-pass filter, and of course this is nothing short of a necessity where PA technology is concerned. Another reason for the marked low-frequency phase shifts lies with the additional use of all-pass filters, which are employed to match the phase of the Sequenza 5 to that of the larger Sequenza 10 system when the Sequenza 5 W speakers are being used as fill-ins; hence the small but noteworthy resonances on the frequency response curve in Figure 10 at 300 and 900Hz. These probably arise as a result of the proximity to the LF drivers of the bandpass enclosure created by the HF horn driver. In this respect, the HF unit with the 1-inch drivers operates almost perfectly in line with expectations.

Directivity

The Sequenza 5 W's data sheet describes it as a system with a horizontal dispersion of 100 degrees. This relatively wide angle is well-suited to the typical situations in which compact line arrays tend to be used, in which sound has to be propagated widely, but over a relatively short distance (particularly when the speakers are used as fills). The nominal 100-degree dispersion is very closely observed in the measurement depicted in Figure 13. At just over 1kHz, there is a third-octave-wide narrowing of the dispersion to around 70 degrees, but that is all. In the vertical plane, the kind of tight dispersion characteristic associated with other, similarly tall line array elements is not a fair expectation for the Sequenza 5 W, because the HF driver is com-

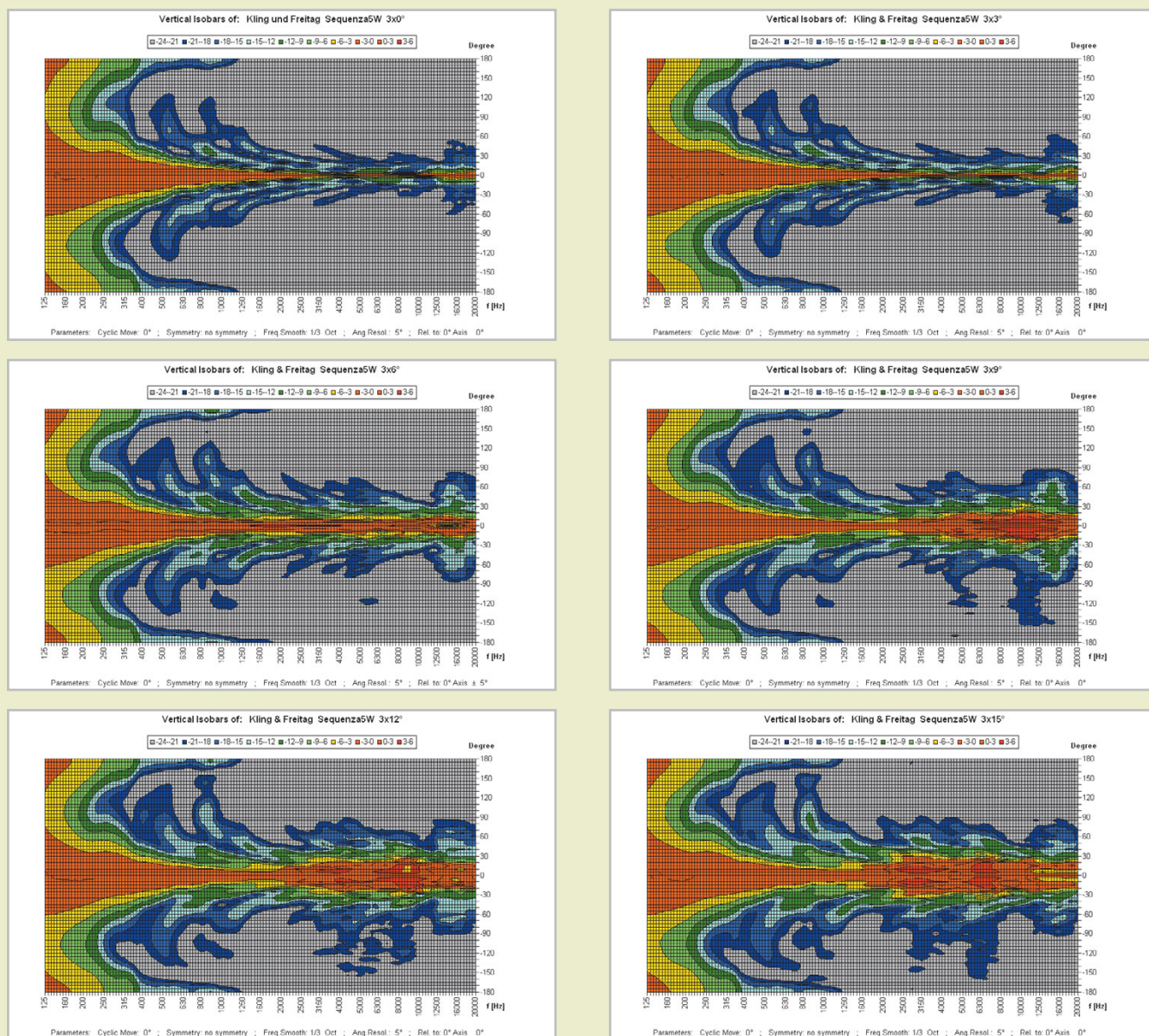


Figure 15: Vertical dispersion isobars, plotted for an array comprising three Sequenza 5 Ws angled at 0, 3, 6, 9, 12 and 15 degrees with respect to one another. The Sequenza 5 Ws cover the entire range extremely well

posed of three elements that are already curved with respect to one another inside the casing. The wavefront that emerges is therefore slightly curved from the moment it comes into existence, and contributes to the wide vertical dispersion that can be achieved between two elements – anything from 0 to 15 degrees. Just how far this can be taken is well illustrated by the series of measurements depicted in Figure 15. To create these dispersion graphs, three Sequenza 5 W elements were measured at angles of 0 to 15 degrees, in three-degree increments. The

smallest inclinations, those at 0, 3 and 6 degrees, give particularly good results here, creating almost perfect isobars with extremely slight lateral lobes.

From 9 to 15 degrees, the HF unit continues its almost ideal behaviour; only at around 1kHz is there a pronounced narrowing. This is the part of the audible spectrum where the angle of dispersion is determined mainly by the extent of the radiating surface, and no longer by the curve of the array as such. The Sequenza 5 W also performs surprisingly well at the highest frequencies; even with an

angle of 15 degrees between each of the elements, a slight breakup of the wavefront only starts to become noticeable at just above 12kHz.

Distortion & Maximum Levels

In order to make measurements of maximum levels, a single Sequenza 5 W was first tested individually, then a three-element array was used in 'Full Range' mode and finally the two Sequenza 5 Bs were added as subs. The K&F Systemrack was used to

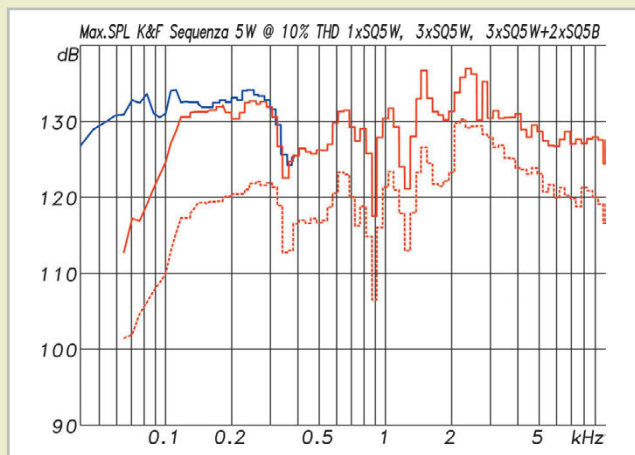


Figure 16: Maximum output levels at 10% THD for a single Sequenza 5 W unit (the dotted red line), for an array of three Sequenza 5 Ws (the solid red line) and for an array comprising three Sequenza 5 Ws and two Sequenza 5 B subs. The inclusion of the Sequenza 5 Bs leads to a powerful rise in output below 100Hz. A slight weakness is visible in the mids at around 500Hz

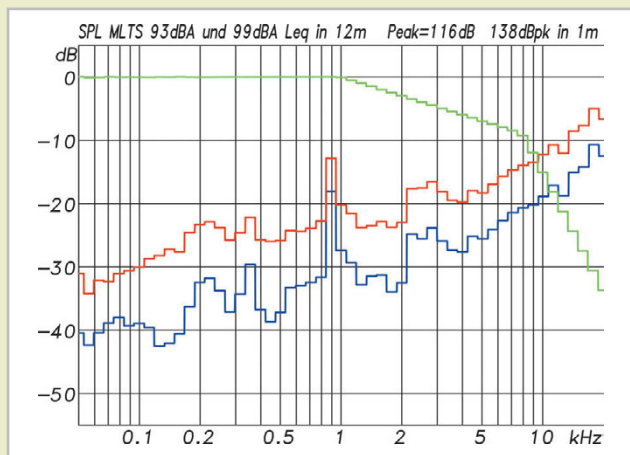


Figure 17: Harmonic and intermodulation distortion, measured with a signal composed of multiple sine waves at different frequencies, and with a 12dB crest factor, in accordance with the EIA-426-B standard. Curves plotted at mean levels of 93dBA and 99dBA (Leq), at a distance of 12 metres and under anechoic conditions. The test array comprised three Sequenza 5 W units and two Sequenza 5 Bs

drive the test arrays, with the three mid/high elements being fed by one channel of the Lab.gruppen FP10000Q, and the two subs sharing another amp channel. This is also K&F's recommended standard configuration, whereby a single System-rack can drive a small stereo system. If the loudspeakers are not running at maximum output, up to five 5W units may be connected per amp channel. The traces in Figure 16 were created by firing the usual 185-millisecond-long sine-wave bursts through the speakers, up to the design limit of 10 percent THD. A single Sequenza 5 W unit treated in this way reaches the kind of output levels that are to be expected based on calculations from its sensitivity and approximate 400W power rating. For the three-element array the overall level rises by exactly the possible calculable amount – 9dB. Two small irregularities are noticeable. Firstly the measurement for the output level of the individual Sequenza 5 W is a little too weak in the bass region, which is not the case in the three-element array. Below 200Hz, the difference between both curves is greater than the expected 9dB. Secondly, in the HF region, the 9dB increase is not entirely achieved by the three-element array in comparison with the single

Sequenza 5 W, as the three elements in this case aren't entirely coupling acoustically at the high end, but are instead providing coverage for a greater area. When both subs are added (the blue curve in Figure 16), levels in the bass region are considerably enhanced, and at 50Hz output is already at 129dB. At this point the subs are working pretty much alone with a small and easily overlooked contribution from the mid/high-frequency elements. Reckoning with a sensitivity for a single sub of 92dB at 50Hz, then both Sequenza 5 B units can be said to be converting over 1kW of power directly into the ideally attainable maximum SPL, without any power compression. At slightly higher frequencies, where the HF elements and the subs are acting together, output levels of 133dB may be attained. The second set of measurements showing the non-linear behavior of the loudspeaker concerns intermodulation distortion. To generate this, the test loudspeaker(s) are passed a combined sine-derived signal comprising 60 sine waves at sixth-octave intervals. The spectral combination of such a signal corresponds to that of an average musical signal as defined by the international EIA-426B standard (the green curve in Figure 17) and gives a real-world crest factor

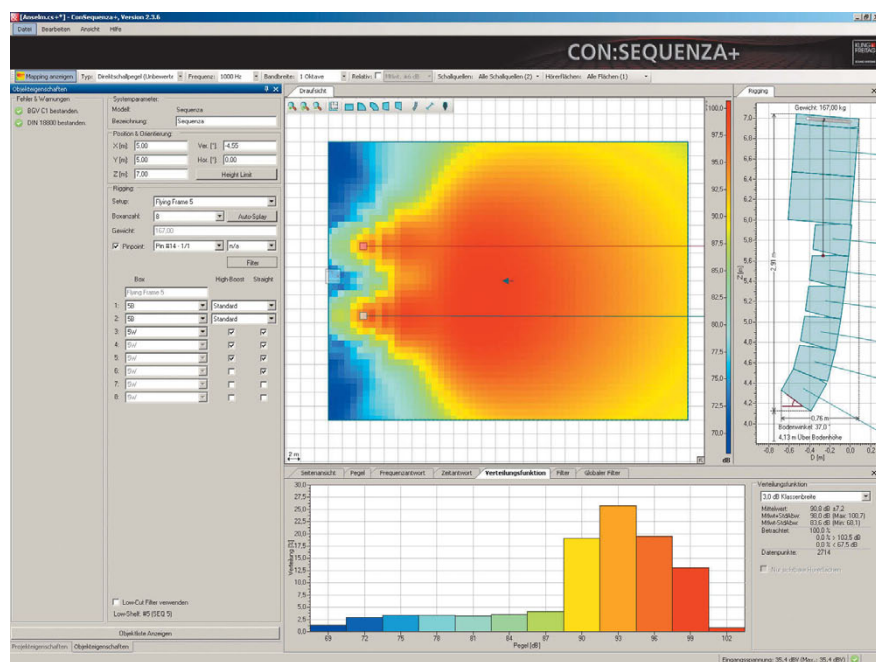
of 12dB. The point of this test is to measure the distortions created by the loudspeaker itself – that is, those components in the output that were not present in the input signal. This will include a measurement of any harmonic distortion of the original sine-wave signals and any intermodulation products. The measurements were carried out using mean levels 'Leq' of 93dBA (the blue curve) and 99dBA (the red curve), in order to simulate a listening distance of 12 meters under anechoic ('free-field') conditions. This corresponds to an 'Leq' level of 120.6dBA at one meter, and a peak value 'LZpk' of 138dB. The total distortion achieved using the 93dBA measurement lay at a very minor 2.7 percent and at full load at 99dBA, measured a still very decent 6.5 percent. Examining the curves across the full frequency range, the HF driver seems to reach its limits first, whereas the sub seemed still to have certain reserves in store with this kind of input signal.

System Mechanics & Rigging Options

Compact line arrays shouldn't just be designed for easy suspension, they should also be capable of being easily used on



The array frame, shown with its stabilisers



K&F's free-to-download Cons:Sequenza+ software

smaller stages or as fill-in systems. The Sequenza 5 is designed to be used in various ways:

- as a flown array comprising only Sequenza 5 W mid/high elements on an array frame (to a maximum of 15 elements in total)
- as a flown array with Sequenza 5 W mid/high elements and Sequenza 5 B subs
- as fill-in speakers for the larger Sequenza 10, using K&F's 'downfill adapter'

- as an array using a VariMount Adapter and up to three high/mid units on a pole
- as a racked array with Sequenza 5 W high/mid units on an array frame with stabilisers
- as a racked array, on an array frame if required, with Sequenza 5 W high/mid units and Sequenza 5 B subs

The array frame and VariMount adapter can be fitted with a TV stand bracket or a junior clamp for mounting; all in all, it's a very flexible system. Three-element flight-cases are also available which allow you to

transport the high/mid units, pre-cabled and already adjusted to the correct curvature. Putting an array together from one of these is child's play. The loudspeakers in these cases come supplied on the back of the case's lid, attached to swiveling joint plates with ratcheted fastening bolts. The suspension hardware at the rear can then be adjusted, using a ball-locking bolt, to give the required splay relative to the adjacent speaker element. An additional spring bolt then locks the element at the correct angle relative to the adjacent speaker unit when the array frame is raised. This technology saves the need to spend time raising and lowering the array to add further elements, and has been worked out with the health and safety of rigging staff in mind; awkward wrangling of the adjustable elements at the rigging phase is no longer necessary.

Simulation Software

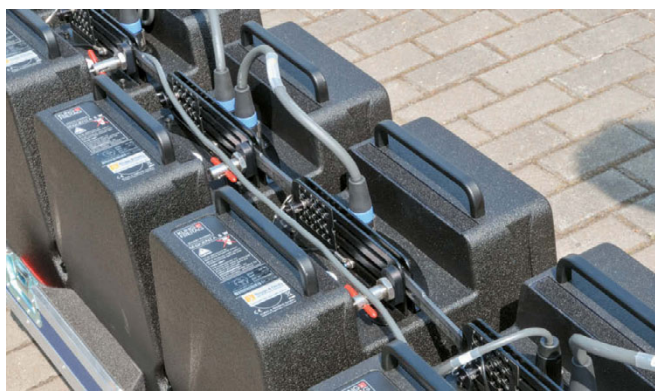
Exactly how the assembled system will behave acoustically, once its precise mechanical configuration has been chosen, can be determined in advance with the aid of K&F's Con:Sequenza+ software. The current version 2.3.6 is the successor to the well-known Con:Sequenza, which has been completely reworked and is now much faster to set up. It offers more options when drawing and defining your own listening environments, and more clearly organized report generation. Sequenza 10 elements can be modeled here alongside Sequenza 5 units, either singly or in combination, to add to simulations of almost all conventional loudspeakers and bass arrays. The Speaker Library also contains all of the current K&F range, including all the subs and array elements. The Con:Sequenza+ application is available for free download from the K&F web site, and the associated loudspeaker model data contained in is held in the convenient and modern EASE GLL format, meaning that it can also easily be used in EASE simulations without further ado.

Listening Test

To give the Sequenza system a proper listening test, we were invited to Erkelenz near Mönchengladbach by K&F's sales &



The flightcases allow Elements to be removed in groups of three horizontally, or put in vertically



The Sequenza's suspension mechanism allows the curve of the array to be adjusted while everything is still on the ground



As soon as the array is raised, the elements click into place at the required angle to give the overall curve of the array

marketing manager Lars Heinrich. On the premises of the local company Ton in Ton Event Services GmbH, K&F's local reseller Rogge & Derks from Kempen on the Lower Rhine were able to install the system and demonstrate it running freely in various different configurations.

Firstly, an array was auditioned with six high/mid elements and two optional subs, then we moved to a 12-element array with no

support from sub-bass units. Thanks to the easy-to-use flyware, rigging the arrays and subsequent alterations proceeded speedily without problems. The listening test, undertaken with a range of well-known audio material, established three important aspects.

- With just six mid/high-frequency elements, the system offers excellent dispersion over an uncommonly wide area, with very even coverage throughout.
- Even without its dedicated sub, the Sequenza 5 system offers good bass reproduction, but this improves further with the 12-element system thanks to the improved acoustic coupling and directionality. Together with two Sequenza 5 B subs, the six-element array may be considered a fully fledged PA.
- The Sequenza system is tonally neutral and offers a pleasant, appealing listening experience, direct but not aggressive.

Given its discrete appearance, the Sequenza 5 is best suited to public events of all types, where high-quality, pleasing sound is a priority. Due to the system's size, rock and roll is not really its main market, but nobody would really expect that of it in any case.

Conclusion

Six years after the introduction of K&F's first line array, the Sequenza 10, the smaller Sequenza 5 comes to market, a perfect example of the maxim 'if it's worth doing well, it's worth waiting for'. The system is a persuasive choice in terms of its compact dimensions, particularly its width; it's trimmed for maximum performance, packing four LF and three HF drivers, including its generous waveguides, into its slender casing. Thanks to the gently curved arrangement of the waveguides and bass drivers in the speaker, the Sequenza 5W achieves the balancing act of achieving an element-to-element vertical spread of between 0 and 15 degrees, despite a per-unit height of just 35cm, and does so without making audio compromises, as our measurements show. The levels achieved by the Sequenza 5 stand comparison with those of considerably larger systems, and should not stand in their shade. A solid 130dB, extending down to 50Hz if the dual subs are added; this is an extraordinary achievement for a three-element array of this size.

A further highlight of the Sequenza system is its flyware, which is not only extremely flexible in terms of rigging options, but also enables very fast, effective and safe mounting and derigging. The rest of the K&F system is exactly what you would expect, with high signal processing quality, the use of top-quality materials and drivers, the well-admired and powerful K&F Systemrack with its four-channel Lab.gruppen power amplification. Last but not least, the price is reasonable without being excessive in the least.

◆ **Text and measurements: Anselm Goertz**
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