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LISTENING TEST

NEUMANN KH 150 + MA 1

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STRAIGHT TO THE POINT

NEUMANN KH 150 + MA 1

I still vividly remember the time when electronic correction of speakers was officially frowned upon. However, even renowned studios of that era, we're talking about the 70s and 80s, would hide graphic equalizers with sometimes adventurous settings in the machine room, which were determined by ear to facilitate an accurate translation of what was heard in the studio to the outside world. Such things were not even shown to one's own mother. Even today, some purists would never accept electronic correction of their monitoring system, as they see it as a violation of the speaker's inherent characteristics designed by the manufacturer in the lab and anechoic chamber. Well, we know that the room significantly influences the transfer function of the speakers at the listening position. This is why correction systems, whether manual or automatic, have become increasingly popular, not least because rooms in the expanding amateur market are becoming increasingly problematic. However, we also know that electronic correction is not a panacea but rather requires careful planning of room acoustics so that the corrective EQ, ideally, has very little left to do. At this point, and only there, opinions may differ on whether the unadulterated speaker is preferable to a version refined by high-quality correction.

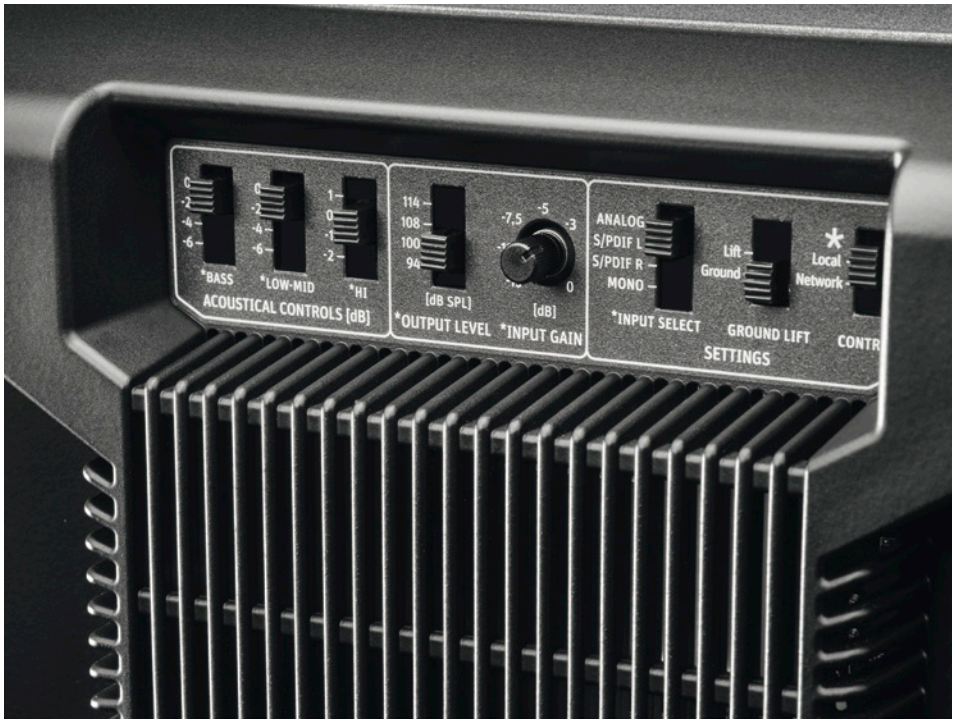
With the introduction of DSPs in studio monitors - which is also a topic of controversy - it seemed logical to not only expose standard system parameters to the user but also to create an interface for a more comprehensive filter correction that would apply a measured correction stamp to the speaker itself so that anything that is fed into its input can be listened to with the same correction. This method is superior to a plug-in solution as the questions of where the plug-in should be placed in the signal chain and where it can work across the entire system to the best effect are critical. It is useless to apply a correction plug-in to the mix bus if the reference tracks used for comparison bypass the correction and go straight to the speaker. There is also a risk of forgetting to remove the corrective EQ before the mix bounce. In this respect, hardware is the better but more expensive solution. Meanwhile, the range of built-in correction facilities in speakers is increasing, with Neumann Berlin for some time now offering a product plainly called MA 1 for its KH studio monitor series, derived from „Monitor Alignment." So far, the software-based solution allows for the correction of stereo systems with or without bass management, with up to two subwoofers, but it is likely to be expanded to immersive formats in the foreseeable future. This is somewhat irrelevant to my test, as what works well in a phase-relationship-sensitive stereo environment also applies to „larger formats" in the same way. Only currently, the software lacks the corresponding „management level" for these formats. The actual trigger for this test technically was not even the correction system itself but a new DSP-powered speaker from Neumann, which promises to sound like a „big" speaker despite its compact dimensions, whether corrected with MA 1 or not. So let's take a closer look at this promising addition to the Neumann portfolio, developed by Markus Wolff.

Overview

The KH 150 model is a two-way studio monitor in the tradition of the KH series. The abbreviation ‚KH' refers to Klein + Hummel, a loudspeaker manufacturer acquired by the Sennheiser Group in 2005, from whose portfolio the Neumann-KH series was rebuilt. The enclosure consists of a wooden frame sealed off by a front and rear made of polycarbonate composite material. With two M6 mounting threads on the back, the KH 150 can be versatilely mounted thanks to its rich accessory package. Despite its compact appearance, this powerhouse impresses with its high sound pressure level performance and wide frequency response range down to the 40 Hz register. With a new 6.5-inch precision woofer and a corresponding tuned port enclosure, the KH 150 even competes with its older and bigger sibling, the KH 310. The two Class-D power amplifiers with 145 and 100 watts of power, respectively, provide astonishing punch. With analog and digital connections, the KH 150 can be integrated into any system environment (analog, S/PDIF, AES3, AES67/Ravenna/Dante). The AD/DA conversion is done with 24 bits resolution. In the digital mode, the monitor synchronizes externally in the 32 to 200 kHz range, and the internal sample rate (for analog operation) is 48 kHz. The overall system, including mixed-phase correction equalization, is specified with a latency of 2.6 ms in analog and 2.1 ms in digital mode. This enables live recording in the control room without any obstacles. A separate delay line, for example, for time alignment, can be adjusted in the range of 0 to 120 ms. Input level adjustment can be made with a sensitivity control (0 to -15 dB) on the input, and output level adjustment with an output level switch (94, 100, 108, and 114 dBSPL, referenced to 0 dBu input level and 1 m distance) on the output side. For easy room adaptation, the KH 150 model offers three ‚acoustic switches' for low frequencies below approximately 500 Hz (0, -2, -4, -6 dB), low midrange at around 220 Hz (0, -2, -4, -6 dB), and high frequencies above approximately 3 kHz (+1, 0,

The rear view of the AES67 version features an additional network port for audio connection. The balanced analog input is mounted vertically

-1, -2 dB). The crossover frequency between the 1-inch tweeter and the woofer, implemented with a phase-corrected filter of very high order, is 1.7 kHz. A combination of soft clipper, peak, and thermal limiters has been integrated to protect the drivers, including an excursion limiter for the woofer and temperature monitoring for the electronics and power amplifier. An infrasound filter at 38 Hz with a slope of 12 dB per octave completes the protective measures. The front-mounted Neumann logo serves as a multi-color status indicator: white for normal operation (adjustable in brightness via the MA 1 software), pale red for channel identification, and red for ‚problem' indication or mute on/off status. The software also allows setting the time period after which the monitor switches into standby mode when no input signal is present. The most crucial switch for further system considerations is ‚Control' as it switches between local operation (using the settings of the local ‚acoustic switches') and network operation (where the loudspeaker follows the MA 1 software).



The KH 150 has its own control set for EQ, input/output levels, input selection, ground lift, and network or local operation

MA 1 - Automatic Monitor Alignment

The MA 1 software is compatible with Windows 10 and 11, as well as macOS 10.15 (Catalina) and above. You will need the Neumann measurement microphone, the MA 1 software, and an ASIO driver (for Windows) to perform the automatic speaker alignment. On the hardware side, you will need an audio interface (from your own stock) with a microphone input that provides phantom power, two analog outputs, or a digital

output, as well as an Ethernet switch. Conveniently, this setup saves you the hassle of having to use dedicated system alignment hardware that must be stored indefinitely. In this article, I will briefly summarize the setup and process, as I do not intend to write a complete user manual.

To begin, establish a network connection between the speakers and the studio's Ethernet switch (see Figure 1). The computer running the MA 1 software must also be on the same IP address range. In my case, I used my Windows 10 measurement laptop with an RME Fireface UFX. The speakers should be set to network mode using the appropriate selector switch. The measurement microphone must be registered in the software with a serial and code number to load the corresponding profile data. The input level at the analog speaker input should be set to 0 dB, and the output level to the equivalent of 100 dBSPL. After launching the software, the user is guided through the setup process step by step, including selecting the Ethernet driver, assigning monitor roles (left, right, sub), assisted by a „detection service" with a click on a blinking Neumann logo, and selecting the input (with „automatic" being the default setting). It is advisable to save the setup at this point so that you do not have to start from scratch in case of future measurements.

Next, the preparations for the measurement begin, including selecting the audio interface, microphone input, and outputs to the speakers. The serial and code number for loading the calibration profile of the measurement microphone must be entered (see Figure 2). Now, the actual measurement process begins. First, the software mutes all speakers (in my case, both KH 150) and measures the level at the input of the speaker. If the level falls within the tolerance range for an adequate measurement level, the process proceeds to the actual measurement. If the level is off, the user will receive instructions for correction in dB values. The measurement microphone should be positioned at the apex of the equilateral stereo triangle. Another level check follows to ensure a sufficient signal-to-noise ratio for the measurement setup. In my case, I had set a mean microphone gain of 40 dB. Then, the measurement occurs at seven defined points at the listening position and its surroundings. Simply follow the on-screen instructions (see Figure 3).

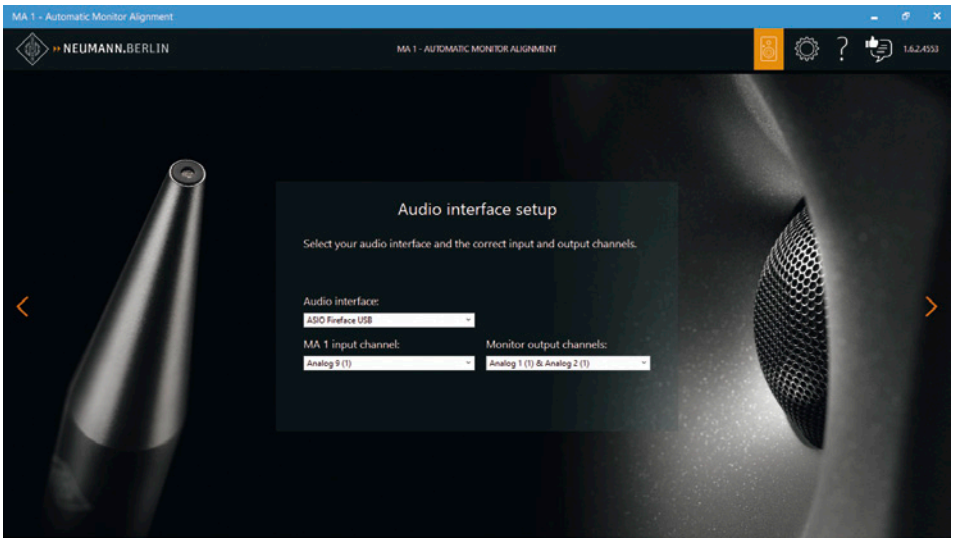


Figure 1 - The software guides through the system setup process, here showing the selection of the ASIO audio interface (Windows 10) and input/output channels

Once this cycle is complete, the result is displayed as a transfer function in the frequency domain. Without user intervention, the target curve is shown as a linear reference (see Figure 4). If necessary or desired, manual adjustments can be made to the result of the automatic correction filtering. It is recommended first to save the automatic correction as a filter set and then write adjustments to the target curve as separate filter sets. Eight parametric filter bands and two tilt filters are available for creating a target, house, or preference curve. To compare different filter sets or to listen to the before/after effect, select the corresponding filter set from the software's drop-down list or bypass the correction. Note that loading filter sets currently involves a relatively long wait time, which is unsuitable for direct comparison. The manufacturer explains that this delay occurs during the transfer of filter data to the speakers. Therefore, this behavior is hoped to be accelerated in an upcoming update. However, the quality of the results remains the same, characterized by an extremely low latency thanks to a combination of IIR and FIR filters, as mentioned before. The software features a command set that prevents the pointless pumping of energy into the frequency range of cancellations or correcting phase jumps/cancel-

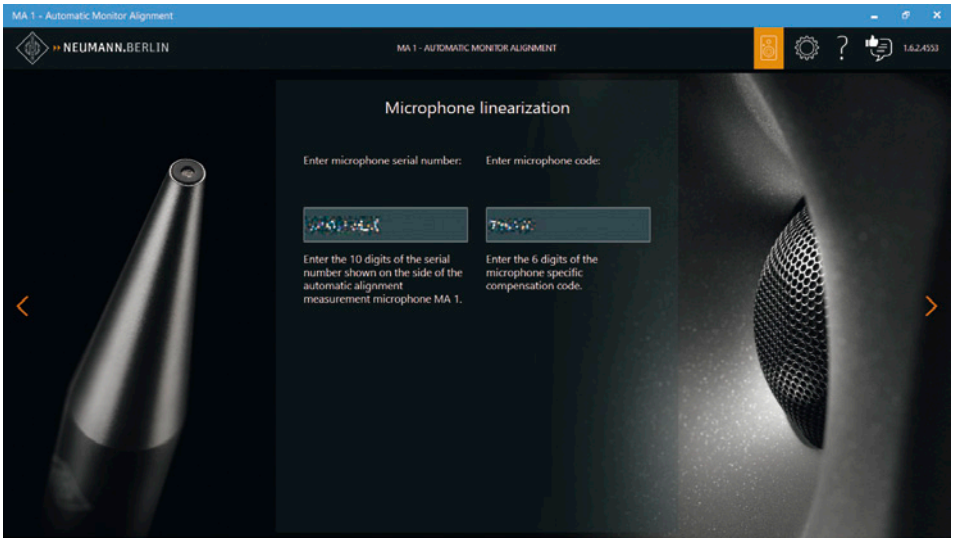


Figure 2 - Each Neumann measurement microphone has a calibration profile that is identified and loaded for measurement based on its serial and code number

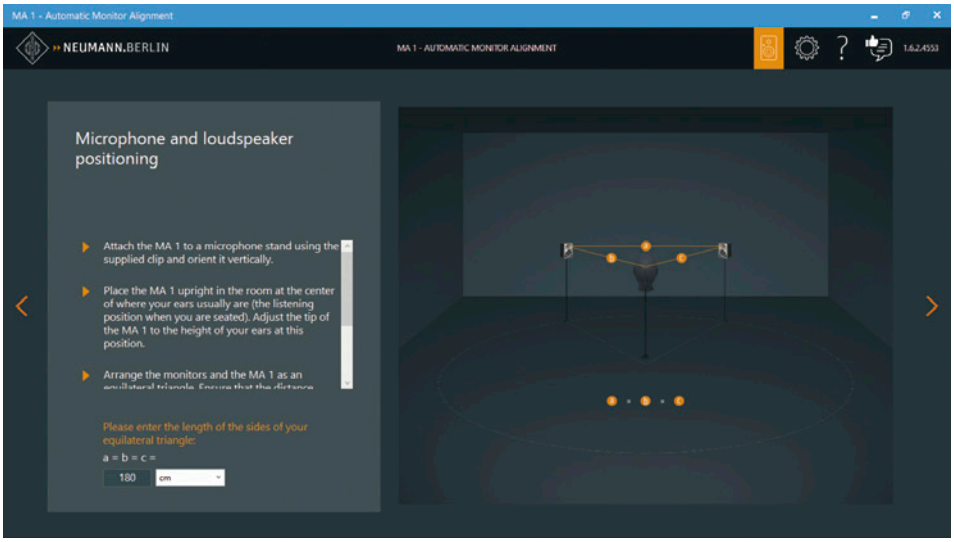


Figure 3 - The positioning of the measurement microphone at various points around the listening position is ‚moderated' by the software

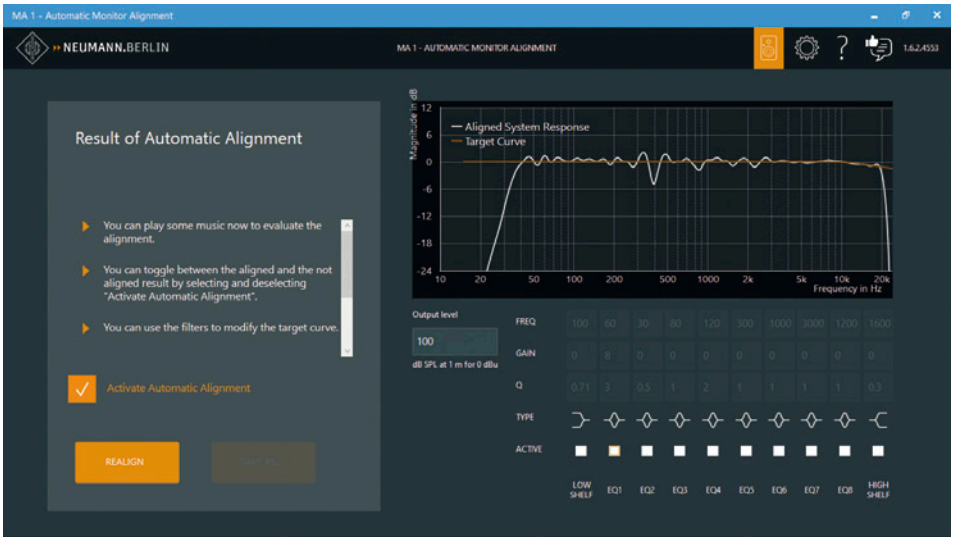


Figure 4 - Result of a test measurement that can be adjusted with a multiband EQ

lations caused by table reflections, for example. In the example measurement, a jump at around 400 Hz can be seen, caused by a table reflection that the system apparently did not address. The automatic measurement process can be stopped after the first measurement at the listening position to determine an optimal position for the speakers in the room or to assess the effects of table and rack positions. Then, with automatic correction deactivated, the uncorrected behavior can be displayed on the screen as a frequency response curve. This somewhat cumbersome process can be repeated as often as desired until the best possible conditions for automatic correction are found. This way, a suitable position for a subwoofer can also be determined, although this will not be further elaborated here.

Practice and Listening

Except for the load times to transfer filter sets to the speakers, handling the MA 1 software is straightforward and easily manageable. As software is constantly in development and never truly finished, we can hope for regular improvements in the future, such as, if I may suggest, a separate evaluation measurement process for optimizing speaker positions and room setup or immediate preset switching between different correction filter sets. However, let's now focus on the primary candidate in this listening test, the KH 150, and give it the attention it deserves. I had prepared everything in the studio for calibration but first wanted to listen to the speaker without correction, as it was intended by the manufacturer, with the three ‚acoustic switches' in the neutral position. The high precision of the stereo image is immediately noticeable. The phantom center is sharply defined and well-integrated in the stereo field, with the soundstage extending deep into the rear. This in-

Figure 5 - Measurement result including correction at the listening position for the main listening test

dicates excellent time response, which I must keep in mind during a later calibration session. I really like the tweeter, as the highs are clear and relaxed, even down to the ‚ringing' range at 3 or 4 kHz. Very pleasant yet accurate. Those listening to the compact Neumanns for the first time might be searching for the supposedly hidden subwoofer, especially when placed near a wall, as I typically do for speaker tests in my room. The initial setup was an experiment, using my table-mounted meter bridges as easily accessible test positions. The table reflection measured in Figure 4 is caused by this position, and as you can see, the system sensibly chose not to correct it. One might expect artificially boosted lows from such a compact enclosure as the KH 150, with bass reflex ports struggling to expel hot air. Not so with the KH 150, as its lows are tight, well-defined, and even effortless. It works surprisingly well. The entire spectrum is equally well-balanced, delivering a clear and tidy sound stage. Now it was time to listen to the speaker with correction applied. The correction mainly targeted the overly emphasized lows caused by the close proximity to the wall, and the previously more pronounced lower mids, which made the KH 150 sound even more refined and transparent after correction. I have set up and listened to many correction systems in my control room, including the Trinnov MC. It is well known that room correction systems can result in a more balanced spectral energy distribution, and in most cases, the corresponding positive effect is evident. Of course, it depends on how challenging the room is and how many ‚problem areas' that cannot be effectively corrected can be eliminated through repositioning or additional room acoustics measures. So the focus of my second listening session was primarily on how the correction affected the time domain and whether the precision and depth of the stereo image were maintained. The result of the calibration is shown in Figure 5. The spectral smoothing of the transfer function and the inclusion of a cautious taste correction actually further enhanced the precision. The phantom center remained sharply defined, the sound stage deep, and the transients pronounced. I would definitely prefer the calibration to the ‚bare setup,' perhaps because I am used to hearing this precise and energetic balance every day.

Conclusion

With the KH 150, Neumann has taken a critical step in its compact class, building on the playback precision of its flagship model, the KH 420. Furthermore, thanks to the continuous development of the MA 1 Monitor Alignment, the KH 150 is capable of producing the sound of a ‚large' monitor system in smaller control rooms, even without a subwoofer. But even more important is the time precision of this compact studio monitor, which delivers a transparent stereo image that provides clear information about the ‚sonic and spatial state' of a mix. Currently available at a retail price of 2,979 Euros (incl. VAT) for a stereo pair, or as a highly recommended bundle with the MA 1 (calibrated Neumann measurement microphone and software) for 3,199 Euros (incl. VAT), the KH 150 offers a truly enticing proposition for a precise, well-crafted studio monitor with solid bass performance and DSP capabilities. I see clear potential for it to become a ‚bestseller' in the market.