

STEREO

THE C

ISSUE #21 2019



**BURMESTER'S
FIRST TURNTABLE**

HIGH-END STATEMENT

SUBWOOFER SPECIAL

**JL AUDIO,
M&K, PIEGA
AND REL**



REVIEWS: LUMIN X1 +++ DALI CALLISTO 2C +++
MONITOR AUDIO GOLD 200 +++ T+A MP 2000E +++ MOFI
ULTRADECK PLUS +++ **SERVICE:** ROOM ACOUSTICS



Burmester

B18 Loudspeaker

The new B18 loudspeaker is a universal sound talent: space-saving, yet at the same time extremely musical and dynamically thrilling. The high-frequency reproduction benefits from the ring radiator which is custom-made for Burmester and guarantees optimum clarity and resolution. The drivers for the mid and low frequencies complement the tweeter perfectly, resulting in an impressive sound performance.

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It is an often-heard truism: every hi-fi system only sounds as good as the listening room allows. Nevertheless many music lovers do not follow this insight and therefore give away sound quality. Anyone who has ever moved with his hi-fi system, knows the effect: in the new premises, the familiar system sounds completely different – if you're lucky better. Often enough, however, the listener is irritated by the new, unfamiliar and unfortunately oftentimes worse sound.

The good news: it is not that difficult to recognize and avoid fundamental errors in room acoustics. Sometimes it is enough to place a thick carpet between the speakers and the listening position to reduce discoloration and annoying reverberation due to reflections. Curtains in front of reflective windows can also have a surprising impact, while a bookshelf might be a great diffuser that can't even be recognized as such.

In this edition of STEREO Magazine we are dealing with fundamental issues of room acoustics. We examine the complex phenomenon with measurement technology and give advice on how to improve and optimize the acoustic environment of your hi-fi system. By the way, this starts already with the correct positioning of the loudspeakers, which is known to interact heavily with the room acoustics. If you make an effort, you can get a lot of improvement in sound quality, even without spending any money at all.

I wish you a room acoustics that brings out the best in your hi-fi system. If this is not the case already, I wish you the best of luck in improving it.

Matthias Böde

editor@stereo-magazine.com

All prices listed in this magazine are German retail prices incl. VAT valid at the time of evaluation.



SUBWOOFER SPECIAL

We've tested four subwoofers from 1000 Euros made by JL Audio, M&K, Piega and Rel. Let's find out how much audiophile potential there is hidden in these bass-cubes.

ROOM ACOUSTICS

Although many audiophiles ignore this fact, the acoustics of the room a system is placed in has, in fact, an enormous impact on the overall sound.



MONITOR AUDIO GOLD 200

With their „Gold“-Series, the Brits from Monitor Audio manage to produce high-end products at an affordable price.



LUMIN X1

The X1 Streamer is made by a company that is entirely new to high-end audio. However, its appearance and tonal qualities tell a different story.



T+A MP 2000R MK II

The MP 2000 has always been an excellent allrounder. Now T+A has decided to completely revise it. We've examined what has changed and if they managed to make it even better.



DALI CALLISTO 2C

Dali's Callisto 2C is one of the easiest and most flexible hi-fi solutions out there, with equally great sound. We've taken a good look at it to see what it has to offer.



MOFI ULTRADECK PLUS

The people behind the brand „MoFi“ have a great deal of experience with high quality audio – a fact that clearly shines through in their turntables.



BURMESTER 175


The first turntable from Berlin-based manufactory Burmester ticks all the boxes of a major high-end statement. Burmester's offensive into the analog-world is a force to be reckoned with.




MASTER LINE SOURCE 3

PIEGA presents the Master Line Source 3 (MLS 3). A new master crafted high end dipol loudspeaker perfected with passion. Equipped with two 180mm UHDQ drivers and with four line source ribbons, this speakers brings outstanding sound into each living room. Expect more.

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PIEGA
SWITZERLAND

Lightning protection from **McIntosh**

A slightly different „power bar“: the „Power Controller“ MPC 500 from McIntosh is not primarily about „clean“ electricity, but about lightning protection for the hi-fi system. With the help of three metal oxide varistors, the four Schuko sockets on the back of the device are protected against over-voltages. In addition, Ethernet and F sockets provide protection for low-voltage interfaces. However, the MPC is also intended to filter out electromagnetic interference.



The front display can show the mains voltage, the total current and the total power (maximum 1310 watts). The device should be on the market in the course of April.

www.mcintoshlabs.com



Roon module for **MBL-DAC**

MBL now offers an additional board for the D/A converter 1611 F, which makes the device „Roon-ready“. The DAC no longer needs to be connected to the PC via USB, but can be supplied with music from the Roon software via the home network. For the 1611 F and the combined CD player with DAC function N31 the Roon module costs 850 Euro, as upgrade kit for the 1611-model 885 Euro. The module should be installed by your trusted dealer.

www.mbl.de

Raidho: Update for 100,000 Euro Speakers

The Danish manufacturer has carefully revised its man-high D4.1 loudspeakers, which will now be called



TD4.2. The appearance has been retained, while Raidho has updated the drivers. An improved ribbon is used in the tweeter range, and the diaphragms of the low-midrange drivers are now coated with tantalum. The voice coils have been improved and more magnets were added. The inner construction of the cabinet has also been revised. The loudspeakers are developed and built in Denmark, and they cost 100,000 euros per pair in high-gloss black – in other colours or veneered with walnut root wood 125,000 euros.

www.raidho.dk

The **vinyl** single turns 70

70 years ago, on March 31 1949, the vinyl single with 45 rpm, 7 inches diameter and a large centre hole (3.8 cm) saw the light of day. It had been developed by RCA Victor – as a counter-design to the 30 cm LP of Columbia Records. Both formats wanted to inherit the shellac record and used PVC („vinyl“) as material and the micro-groove. The idea at RCA Victor was to divide longer pieces of music into several 7-inch records, which were to be sold as a set in a photo album-like packaging – hence the name „album“. The set was then played on automatic record changers.



New flagships from **Acoustic Energy**

The British loudspeaker specialist Acoustic Energy is renewing its top end, consisting of the AE500 compact loudspeaker and the AE509 floorstanding speaker. Both models are equipped with the same chassis – the small speaker as a two-way system, the floorstanding speaker with two mid-bass drivers and 2.5 ways. A 25 mm carbon fibre dome is responsible for the tweeter range, 130mm carbon fibre cone drivers are used for the lower frequencies. Both models have a nominal impedance of 6 Ohm and will be

available from May in American walnut veneer, high-gloss white and high-gloss black. The one meter high floorstanding



speaker costs 2600 Euro per pair, the shelf-speaker is 31 cm high and costs 1200 Euro for the pair.

www.acoustic-energy.co.uk

Pro-Ject makes Ringo Starr record player

After several Beatles editions Pro-Ject now decorates a turntable with a work of art that Ringo Starr himself created. The „Peace & Love Turntable“ (525 Euro) is based on a Pro-Ject Essential III, but it is equipped with an acrylic platter that allows a view of Ringo's artwork. It is equipped with an Ortofon OM 10 pickup and is made of MDF. The sale of the turntable coincides with the tour launch of Ringos „All Starr Band“ on the occasion of its 30th anniversary.



www.project-audio.com/en/

Dynaudio with new Confidence

They were already unveiled last year at the High End. In the upcoming weeks they will finally be available: the new „Confidence“ loudspeakers from Dynaudio. The series consists of the two-way compact loudspeaker Confidence 20 (10,000 Euro/pair, complete with matching stand) and the three-way floorstanding loudspeakers Confidence 30 (19,000 Euro/pair), Confidence 50 (26,000 Euro/pair) and Confidence 60 (40,000 Euro/pair). All four models work with a fabric dome tweeter with aluminum waveguide, which ensures directional vertical and wide horizontal sound radiation. The newly developed woofers have coil carriers made of up to three layers of glass fibre for optimum stiffness. With the curved cabinets, Dynaudio remains true to the design of the original Confidence series. They are available in Midnight High Gloss and Smoke High Gloss lacquer finishes as well as in Raven Wood High Gloss, Rubin Wood High Gloss and Blonde Wood veneers.

www.dynaudio.com



Focal pushes home cinema to the extreme

The new „Astral 16“ home cinema amplifier from Focal can provide no less than 16 output channels. 12 of them via Class D amplifiers with 200 watts each – even if all channels are fully powered at the same time. Four additional channels are available as preamplifier outputs to XLR sockets. All 16 channels can be freely assigned. The XLR outputs can be used to supply a stereo system in another room with music while a video is playing in the main room. Audio signals can be fed in via three coaxial and three optical digital inputs and four analogue inputs. For video signals, 7 HDMI inputs and 2 HDMI outputs are available, which support all current standards, including the 3D formats Dolby Atmos, DTS:X and Auro-3D as well as HDR10 and Dolby Vision. The Astral 16 is equipped with „Dirac Live“ for room calibration. The sound is analyzed at up to nine measuring points using the supplied measuring microphone. The program then creates precise digital filters for optimization. With the remote app for iOS, the Astral 16 can be controlled via smartphone and set up via assistant. It will be on the market in May – at a price of 20,000 euros including microphone and tripod.

www.focal.com/en



Active,
smart and
wireless



SMART SOUND FOR HIFI AND HOME CINEMA

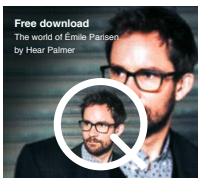
Feel the breathtaking high-end sound of the future – for goose bump moments with music and TV sound. With 600 watts of music power per speaker, the **Smart Vento 9** is a complete wireless audio system with everything today's modern hi-fi heart desires. The wireless transmission between the loudspeakers and the smart expansion options from multiroom to a complete home cinema set make these audiophile design loudspeakers perfect for impressive music, streaming and film enjoyment.

More information about the Smart Vento 9 and the entire Smart product family can be found at your Canton dealer and on our homepage at www.canton.de

Qobuz free download Hear Palmer 2018

Already for the tenth time, the Château Palmer just north of the city of Bordeaux in France hosts an unusual event: a wine tasting in which the characteristics of the vintage are interpreted and brought to the stage by Jazz musicians. This time, Émile Parisien and friends played in different symbolic settings – and Qobuz offers the concerts as a free download in Hi-Res.

<https://try.qobuz.com/hearpalmer2018-2/>



Canton goes Multiroom

The new „Smart“ series is Canton's answer to a product segment that has so far been primarily served by US manufacturers: compact active wireless speakers that can be flexibly combined to form stereo pairs, home cinema systems or a multi-room system. In wireless control, Canton operates on two tracks: speakers that are operated in the same room, i.e. as a stereo pair or home cinema set, communicate via Canton's proprietary – and extremely low-latency – radio link, which is already used in the previous „Smart“ models. A new addition to the Smart series



is the classic WLAN with Chromecast built-in and Spotify Connect. Canton uses the Chromecast protocol for multi-room operation, which is less latency-critical. To start

with, the new series consists of the compact two-way loudspeaker „Soundbox 3“ (350 Euro each), two sound bars (700 and 900 Euro) and a subwoofer (600 Euro). All Smart models can also be combined with classic Smart boxes such as Smart Vento 3, Smart Vento 9, etc. via Canton's proprietary radio link. Alternatively, they can also be radioed via Bluetooth. The music is selected on the Smartphone or in the Smart Soundbox 3 via the 3 preset buttons directly on the device, on which Spotify playlists can be stored. www.canton.de/en

Emitter revised



ASR (Audio Friedrich Schäfer) from Herborn has completely revised the „Emitter“ integrated amplifiers. The main boards were redesigned and equipped with

reinforced copper conductors, and new „High Voltage“ electrolytic capacitors were installed. The design has also been updated and new controls have been added for sub-out, compensation and input resistance. As an option, an improved battery power supply can be ordered to feed the input stage. For the „Emitter II Exclusive Battery“ version, the manufacturer specifies an output power of 2x 490 watts at 4 ohms. www.asraudio.de

Audiolab 6000 Player/ Amplifier-Combination

Audiolab now delivers the new 6000 series, consisting of the CD drive 6000CDT for 500 Euro and the integrated amplifier 6000A for 800 Euro. The player has a slot-in drive and no D/A converter of its own. It is connected optically or coaxially to the amplifier via S/PDIF and uses the latter's DAC chip ESS Sabre32 ES9018. The amplifier also offers inputs for a phono MM system and three analog high level sources. It even accepts Bluetooth signals with aptX. Its pre- and power amplifier can also be used separately via pre-out and main-in. From May, the Streamer 6000N will complete the 6000 series. Thanks to DTS PlayFi, it will offer access to Spotify, Tidal, Qobuz, etc. and is expected to cost 550 euros.



www.audiolab.co.uk

DPS 3 now also available in white

The dps 3 turntable from Bauer Audio is now also available with a silver-coloured aluminum base and a matt white top. The frames are available in walnut or white Corian. The classic versions black with walnut and black with white frame will continue to be offered. The device costs 8,600 euros including tonearm.



www.bauer-audio.de

Anniversary speaker from T+A



T+A has entirely updated the CWT 1000-8 SE solitaire to mark its 40th anniversary. The baffle of the new „CWT1000-40 Anniversary Edition“ is milled from solid aluminum after the sound guidance for each individual chassis has been calculated exactly. Thus it was possible to completely avoid all disturbing

screws, baskets or edges. The individual drivers have also been improved: the electrostat for the range above 2000 Hertz, the 8 mid-range drivers and the 4 bass drivers mounted on the side, which radiate frequencies below 200 Hertz. The closed, 1.35 metre high cabinet consists of several layers of glued wood and materials of different densities, on the outside a carbon fabric, sealed in several layers with special PU lacquer. T+A specifies a rated load capacity of 300 watts, a rated impedance of 4 ohms and a pair price of 49,000 euros. The CWT1000-40 are now available. www.ta-hifi.de/en/

Ear-enclosing, **wireless**, low noise

Denon introduced a new headset that will be available in three versions: the AH-GC30 (350 Euro, from March) with Active Noise Cancelling and Bluetooth, the AH-GC25NC (300 Euro, from April) with Active Noise Cancelling but without Bluetooth and the AH-GC25W (250 Euro, from May) with Bluetooth but without Noise Cancelling. The Bluetooth models support aptX HD, and the noise cancelling models are equipped with four micro-



phones and three switchable modes for flight, city and office. The memory foam ear cushions are covered with imitation leather. Two cables are included for wired use – one with microphone and remote control. A USB cable is also included, which

can be used not only to charge the battery but also to transport digital audio signals, for example from a PC, directly to the headphones. The three models are available in black and white. www.denon.co.uk

Mark-Levinson amplifier with DAC and MQA

Harman subsidiary Mark Levinson presents two new integrated amplifiers at the High End: No. 5805 (9000 Euro) and No. 5802 (8000 Euro). The latter offers exclusively digital inputs (USB, 2xS/PDIF coax, 2xS/PDIF optical, 1xAES/EBU), while the 5805 is additionally equipped with an analog preamplifier to which three line sources



(2xCinch, 1xXLR) as well as MM and MC pickups can be connected. Capacity, resistance and gain of the phono input are adjustable. The volume is selected via a digitally controlled resistor network. Both models process PCM signals from the PC up to 384 kHz and DSD up to 11.2 MHz via USB thanks to ESS-Sabre-DAC, and both can decode MQA files. They receive Bluetooth signals with aptX. A toroidal transformer with separate secondary windings for left and right channel feeds the electronics. Mark Levinson indicates 2x250 Watt at 4 Ohm as output power. All this is concealed behind a 1 inch (2.54 cm!) thick, solid aluminum front panel. Both amplifiers are expected to be launched in the second quarter of this year. www.marklevinson.com



Introducing

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Remember when music was something you could touch? Selekt DSM makes listening to digital music a tactile and beautiful experience. It's better in every sense. And it'll make you fall in love with music all over again.

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www.linn.co.uk



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unique high end audio

www.mbl.de

SOPHISTICATED FROM TOP TO BOTTOM



Many streamers overwhelm the user with functions and possibilities. Lumin's stunning X1 puts its capabilities into an easy-to-understand interface.

Carsten Barnbeck

A clock-FPGA and the double mono power guidance are unique so far.

A few weeks ago we struggled with a nasty humming loop in one of our listening rooms. It crept in via one of the in-wall LAN sockets. The reason for the sudden malfunction were minor alterations to the publishing house's internal server architecture – which is not exactly simple. After all, we have to link a secure company network with a home network that supports open standards such as UPnP and DLNA, accepts streamers without login procedures and can access web services such as Qobuz regardless of firewalls. We didn't notice the buzzing until weeks after the change, which immediately prompted the IT staff to speculate about our "gold ears". We were able to fend off these offenses thanks to Lumin's X1, which played in our listening rooms for almost five weeks – basically completely on its one. You really don't need any other streamers besides a machine like this. The X1 doesn't care for LAN disturbances, LF distortions from the power grid and any similar

problems, because it galvanically decouples all signal feeds – so there was no hum at all until we switched streamers again.

Its power supply unit is located in a separate cabinet. This massive, black anodized metal block fits the Streamer perfectly and is milled from aluminum. As is usual for high-end devices, the PSU ("Power Supply Unit") contains a number of separate voltage processing units that supply analog and digital modules with perfectly tailored energy. The network player is connected to its external power supply via a nine-pole, multi-insulated cable. By the way, if you have taken the trouble to take a closer look at the power connections in the figure below, you might have recognized that there is a tenth pin. However, that is not being used. Even in the device itself the power supply was realized with maximum effort. The X1 has a channel-separated mains conditioning. Even its two high-quality symmetrical output stages are electrically isolated from each other.

The network connection is even more extraordinary: if you like, you can connect the X1 conventionally with a LAN cable. However, a second data access in the form of the professional SFP socket ("Small Form-Factor Pluggable") is located directly next to the traditional input. You may never have heard of this standard, but you've certainly seen it on pictures: these connectors are employed in professional server farms and fiber optic is used for the cables – proven technology that is offered at acceptable prices. On top of that, the optical conductors can transport data over considerable distances. Lumin packed a LAN-to-SFP converter from TP-Link (fig. right) into the box, and you can get adequate devices for around 60 euros from a well-stocked computer shop. During its whole time in the listening room our test sample was therefore isolated from the standard power and data grid. So it's not surprising that we couldn't notice the faulty LAN socket...

Let's take a look at the backgrounds of the X1. Have you ever heard of Lumin? Don't worry, neither did we. Behind the fresh brand name hides a company called Pixel Magic. Sounds a bit like an advertising agency, but the Hong Kong-based business is actually developing **smart-receivers** for televisions that are enjoying considerable popularity in Asia. The team around company owner Nelson Choi is so successful with its products that they can afford Lumin as a kind of high-end hobby, as well as a prestige and dream project: a flawless network player without any compromise!

The shape of the X1 might indicate that they initially had a prominent role model in mind. The X1 immediately reminded us of Linn's large Klimax models. There's nothing wrong with that, because as a look at Devialet and other brands reveals, they're not the only ones inspired by the Scots' iconic design. It is also priced at just under 13,000 euros, like its competitors. In this class we naturally expect perfection in haptic as well as in terms of its technical solutions – and Lumin delivers! The workmanship of the X1 is simply breathtaking. At the front of the device there is a small fine font display that shows the most necessary information about the current title. A fine circle appears next to it during operation, illustrating the position within the current song. The app can be used

We used a device from TP-Link as a LAN-to-SFP converter. The thin fiber-glass cables are ideal for fixed installations at home.



to completely deactivate the screen, which is barely readable from a few meters anyway. Its surface is then so black that it fuses with the front of the device.

Wherever possible the developers have avoided using off-the-shelf components and parts. For example, they chose two femto-crystal oscillators as clock generators. Nothing really special so far, since the high precision clocks of the manufacturer (yes, "Femto" is a brand name) can also be found in other devices. However, here both oscillators feed their signals directly into a specially developed FPGA. This is responsible for distributing the clock information to the other areas of the X1. With minimal delays, it ensures that the switching commands are sent to the media player, memory management or D/A converters in such a way that the function groups mesh with each other with the highest precision. Such a trick may sound a little bit over the top, but in the fight against the last remnants of jitter the enormous effort is indispensable.

Another special feature is the internal signal processing. More and more often we stumble upon the sound format of the SACD during data processing. Also Lumin uses a DSP to convert all incoming music signals directly after the input into the DSD format. While conventional PCM converts analog oscillations into samples and displays them as a fast sequence of amplitudes, DSD delivers its ultra-fast instructions directly to the D/A converter: a one means the slope climbs, a zero means the slope falls. Like the grooves of a record, the sound format transports a comparatively unaltered image of the original vibration. The clock frequency defines how precise this image turns out. Since the X1 works with DSD128, there are about 5.6 million information per second – that is sufficiently accurate.

In addition, with such a high data bandwidth, the clocks can no longer have a

KEYWORD

Smart-Receiver

The term „smart“ is used to describe receivers that, in addition to conventional TV channels, also bring web content, such as that from Youtube or Netflix, onto the screen.

TEST DEVICES

Sources: Audiodata Music Server MS II, Lumin L1, Melco N1A

Integrated amplifier: Audionet SAM 20 SE and „Watt“, T+A PA3100HV

Loudspeaker: B&W 800D3, Canton Smart Vento 9, Vimberg Mino

Cable: Cable sets from Audioquest, Van the Hul and HMS

WHAT WE'VE HEARD
Fever Ray:
Fever Ray



Great songwriting, breathtaking synth percussions and Karin Dreijer Andersson's unique voice make this one of the most interesting debuts of the 2000s. 100 percent Electro warranty.

KEYWORD

Resampler

While an upsampler upscales the clock rate of a signal, the resampler transforms it into something completely new. Whether from AAC to FLAC or PCM to DSD, all this is the task of a resampler.



LUMIN X1					
DSD 128	DSD 64	nativ	192kHz	96kHz	48kHz
352.8kHz PCM					
DSD 128	DSD 64	nativ	176.4kHz	88.2kHz	44.1kHz
192kHz PCM					
DSD 128	DSD 64	384kHz	nativ	96kHz	48kHz
176.4kHz PCM					
DSD 128	DSD 64	352.8kHz	nativ	88.2kHz	44.1kHz
96kHz PCM					
DSD 128	DSD 64	384kHz	192kHz	nativ	48kHz
88.2kHz PCM					
DSD 128	DSD 64	352.8kHz	176.4kHz	nativ	44.1kHz
48kHz PCM					
DSD 128	DSD 64	384kHz	192kHz	96kHz	nativ
44.1kHz PCM					
DSD 128	DSD 64	352.8kHz	176.4kHz	88.2kHz	nativ
PCM-Ausgang-Bit-Tiefe					
nativ		16 Bit		24 Bit	

Two of the Lumin Remote views: on the top left the main screen with playlist overview is shown. To the right you will find a view of the extensive resampler settings.

negative influence on the analog signal processing, and the output filter has to do less work. Lumin kills two birds with one stone!

However, the developers do not want to force anyone to use their converter system. Whoever opens the device features of the well arranged app for the first time will probably be overwhelmed by all the fine tuning possibilities. In addition to DSD resampling, signals can also be refined using a PCM upsampler. Which algorithm is used can be determined individually for each kilohertz frequency. For example, CD audio with its 16/44 can be converted to DSD128, while high-resolution PCM is processed natively at 24/96, i.e. at its original clock rate. We have experimented with the countless possibilities of up- and resamplers, and in fact you can hear fine, sometimes decisive differences in every constellation. The internal processing with DSD usually sounds a bit softer and a bit more fluid than the more biting and crisp PCM.

The difference becomes particularly clear when one listens to a bright voice that has been processed "modern", i.e. with plenty of compression. Amongst others Karin Dreijer Andersson (e.g. "Fever Ray") served us as a

reference. The Swede has an incredibly clear timbre, which always has a minimally biting note in the PCM processing. Especially when her vocals are doubled, it added up. The two resamplers on DSD64 and DSD128 noticeably softened the bite, sanded of the edges of Deijer's voice to such an extent that her intense vocals became beautifully harmonious. In addition, the stage image of the DSD variants seemed a bit more holographic and had a bit more depth.

The effect is increased by the fact that the streamer has been designed to emphasize timbres. Already at the first listening, terms like "velvety", "creamy" or "silky" were on our lips. The X1 has beguiling dynamics, plays thrillingly musically and is a master of subtlety. However, most prominent is its uniquely nuanced coloration. An ability in which it once again awakens associations with its role models. We haven't heard a streamer that can add such a noble touch to music since the Klimax.

However, there are certain fellows who react allergically to such a depth of adjustment and all the possible fine tuning. We also have good news for them: the re-sampling

The back of the X1 is not very spectacular: LAN, USB and two alternative analog outputs. Note the optical network access and the ten-pin socket of the external power supply.



and upsampling settings are hidden in a sub-level of the Lumin app. The atmospheric DSD resampling is pre-selected on delivery. So you can confidently ignore the countless options and still get optimal results. You don't have to worry about the capabilities of the streamer either.

The X1 plays all sound formats and accepts data with up to 32/768 or DSD512 via its two LAN interfaces. It processes MQA, understands Roon's RAAT format and can log in to Qobuz, Tidal and Spotify. If one of the three streaming services is added, a corresponding symbol appears directly in the top operating level of the Lumin app. Web radio is of course also on board. In short: you don't have to worry about formats or the like – this streamer is a comprehensive media center.

Meanwhile, audiophiles who don't like networks can even easily do without a separate NAS. Lumin put their in-house "Music Library" L1 (from 1100 Euro) in our listening room. The small box fits optically well to the streamer and holds up to five terabytes of music. You can tap it over the network or connect it to the X1 via USB 3. The streamer has such fast processors and enough memory to index drives of this size. Of course, this also works with drives from other brands and has another advantage: since it manages the content lists of connected USB devices itself, access from the app feels smoother. Although the X1 is also fast in the network, the complex processes behind UPnP or DLNA do not come close to the directness of a USB drive.

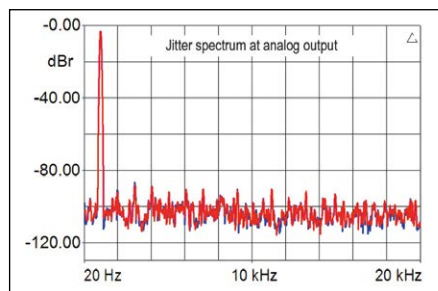
The operation via the app is incredibly joyous. It is certainly not completely self-explanatory, but as described above, it is very easy to ignore the deeper settings. The interface is divided into three sections: at the top is the playback control including a 32-bit volume control that can be deactivated. On the left is a playlist overview. Here, the X1 collects all played tracks and allows loading and saving the playlist sequences. The central area shows albums, tracks or artists and can be maximized with a button. It is convenient that you can scale the display size of the cover images using "Swipe" (pull two fingers together or apart). As already mentioned: Lumin has thought its X1 through from top to bottom! ■

Lumin X1

Price: around 13000 € (incl. power supply)
Dimensions: 35 x7 x34 cm (WxHxD)
Warranty: 2 years
Contact: Pixel Magic Systems
 www.luminmusic.com


With its colorful, uniquely noble character, a huge variety of functions and uncompromising workmanship, Lumins X1 is one of the best digital sources on the market.

Measurement results



Output resistance XLR	36 Ohm
Output voltage XLR 0 dBFS	2/6 V
Signal-to-noise ratio bez. auf 16 Bit	96,4 dB
Signal-to-noise ratio digital zero	116,1 dB
Distortion factor at -9dBFS	0,005 %
Distortion factor at -60dBFS	0,1 %
Converter linearity at -90dBFS	0,2 dB
Emphasis detection (DAC)	not ok
Rectangle	ok
Pulse	ok
Jitter	1,4 ns
Deviation from the fs	+1,2 ppm
Amplitude of the data stream	483 mV
Power consumption Stby/idle (at)	19 W

Lab Comment

Main Phase on tested device  Excellent distortion and noise values. Just the linearity is minimally off, but that is intentional: the gentle drop emphasizes its sonorous character.

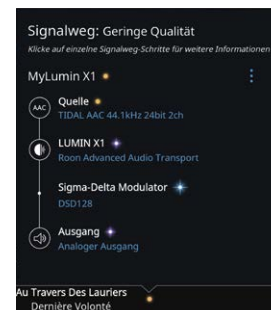
Features

UPnP/DLNA-Streamer with optical and conventional LAN, USB for data storage, two analog outputs (Cinch/XLR), digital level control (can be switched off), Qobuz, Tidal, Spotify Connect, Roon ready, Open Home, Gapless-Play and lots more ...

STEREO - TEST

SOUND QUALITY	100%
PRICE/PERFORMANCE	
	
EXCELLENT	

ROONS QUALITY CONTROL



Roon's RAAT transmission protocol is more than just an alternative to remote control. The software analyzes the signal path from the source to the D/A converter and indexes the status using its own color code. Above you can see that the software is satisfied with the X1 (blue and purple). However it doesn't like the source (an AAC stream from Tidal) at all (orange).

Its knowledge of formats makes the X1 a comprehensive media center

QUIETER AND STRONGER



In many audiophile circles, it is commonly believed that power conditioners and various other power-line accessories often do more harm than good, robbing the music of its vitality, color, and that oh-so-important, wildly intangible “boogie factor.”

AudioQuest’s **Niagara Low-Z Power Noise-Dissipation Systems** are designed to do the exact opposite. Niagara kills the noise while *honoring* the music, so that the listening experience can be exactly as it should be: compelling, immersive, *fun*.

“The difference was huge. AudioQuest’s Niagara 1000 not only cleaned up the power, it did everything that is the *opposite* of killing the boogie.... It was as if my system had gotten a heart-shot of adrenaline.”

— Herb Reichert,
Stereophile,
April 2017



audioquest®



Massive Attack

After 40 years Burmester presents its first turntable. And what a specimen it is! Thanks to best material plus clever ideas, the 60 kilogram heavy 175 is a „real Burmester“ – as well as a massive attack on the analogue establishment.

Matthias Böde

It was the surprise and the star of the High End show: the first turntable from Burmester. Well, not in 2018, but the year before. Consequently, the type designation 175 indicates the release date as May 2017 according to the Burmester nomenclature. Also in our listening room the colleagues cavorted around the polished, sparkling analog monument.

After all, we had waited long enough. The 175, with its thick aluminum planking and immaculately shimmering chrome front in the striking design of the „Reference Line“ by the Berlin-based noble-manufacturer, already played beguilingly good together with Burmester’s at the time new mono amps



KEYWORD

RIAA equalization

Virtually all modern records since the early 60s are made to the specifications of the Recording Industry Association of America, RIAA in short, according to which low frequencies are lowered and high amplified during the cutting process. The reproduction is then „equalized“ back-to-front.

Incarnation of precision: the exact geometry of the arm and pickup are perfectly aligned

and loudspeakers. Nevertheless, it was still a good one and a half years before the finished device would reach us for this exclusive test.

That was due to numerous detailed improvements as well as a further refinement of the „all-in-one concept“, which was planned from the start. The 175 is by no means intended to primarily appeal to vinyl freaks who want to unrestrictedly combine all parts of their turntables such as drive, tonearm, pickup and phono preamp. Rather, it is intended as a high-end all-inclusive offer for record lovers who prefer a perfectly coordinated solution at the highest level from a single manufacturer. This leads to a captivating simplicity in handling this internally highly complex machine and to the congenial implementation of the „Plug ‚n‘ Play“ idea, which is usually rather pursued in lower price ranges.

All you need for setting it up is a few strong arms – the platter alone, consisting of a three-layer aluminum-brass sandwich, weighs a good 15 kilograms, the entire 175 about 60 kilograms. Even the chrome-plated counterweight of the tonearm with its hard, stiff multilayer carbon tube is fixed at the correct contact force of 23 millinewtons, and the adjacent knob for antiskating is set to a sensible value. Hence there’s hardly anything for the proud owner to adjust.

He doesn’t even have to worry about a suitable pickup. The supplied moving coil type is pre-assembled. For their pickup the Berlin company did, however, not simply produce it

After removing a metal plate, the complex drive concept becomes visible. Four motors drive the massive sub plate via belts. Not only should any deviations between the motors be compensated for, but also all tensile forces on the bearing. In conjunction with the high plate weight, this should promote the stability and smooth running of the 175. Its sound certainly proves the point!

by themselves. Instead they sought cooperation with a specialist who would manufacture this jewel, which is encased in a sturdy aluminum housing, bespoke to their wishes.

It looks like it is Ortofon – Burmester doesn’t give any details – one of the first addresses in this sector. Technically, the MC impresses with an ultra-strong sapphire needle carrier that is applied „naked“, i.e. without a solder cone, that would impede the agility and dynamics of the diamond with its elaborate „Shibata“-cut. Adjustment is not to worry about either. As we quickly found out, the geometry was exactly on point, with the tonearm, which is mounted on a movable carriage, being fixed in such a way that the front edges of the arm and scanner were perfectly aligned, underlining the impression of precision in detail and demonstrating the use of expert hands.

Seeing the 175 sitting on its solid basis, which is obligatory with the components from Burmester’s „Reference Line“, its price



Attention: from the XLR-jacks comes the completely equalized signal for the following preamplifier or amplifier. Anyone who wants to operate another MC cartridge can adjust the input impedance of the integrated phono preamp in six levels.

of 31,800 Euros doesn't seem to be quite as high anymore. Especially since an important part of the analog package, which is filled to the brim in every respect, has not even been mentioned yet: the integrated phono preamplifier. Unlike a normal turntable, the 175 is not connected to a separate phono preamplifier or one integrated in the amplifier. Rather, it has its own already on board, ensuring shortest signal paths for the tiny MC currents, which are susceptible to interference. And it is just as uncompromising as the entire turntable, because it comes from Burmester's Phono-Pre 100, which combines excellent sound characteristics with low noise and minimal distortion.

Following Burmester's credo of fully balanced signal routing, the output currents are fed to a pair of XLR sockets, via which the 175 connects to the pre- or integrated amplifier like a high level device. The currents are, of course, equalized according to RIAA specifications. The processing without ground connection is particularly suitable here. After all, besides the microphone, the MC pickup is the only truly ground-free source in high fidelity, and experience has shown that the balanced mode is beneficial

The counterweight of the precisely mounted tonearm is correctly fixed in the delivery condition. A measuring plate is enclosed for the antiskating.

in terms of increased naturalness and resolution.

It goes without saying that the amplification factor of the phono board is perfectly matched to the parameters of the pickup. That's why the 175 doesn't offer any different values to choose from in this regard. The selected gain of just above 60 decibels would, however, also fit other MCs. In terms of impedance, they might, on the other hand, want to be matched higher than the Burmester pickup, which – typical for Ortofon – is satisfied with the usual 100 Ohm. A six-step rotary switch is then available, which allows matching for an MC with higher input resistances.

So, a lot of brains and effort was already invested into tonearm, pickup and phono pre. The heart of the turntable is, however, its drive, which is indeed rather special. Together with a professional partner who has a lot of experience in turntable construction, the Burmester team developed a drive that wants to surpass conventional solutions in terms of smoothness and consistency. The result is a design in which four motors surround the solid subplate. In order to compensate for tiny irregularities between them

TEST DEVICES

Turntable: Transrotor Rondino nero with tone arm 5009 and MC scanner Figaro

Phono-Preamps: Accoustic Arts Tube Phono II, Brinkmann Edison

Pre- / Power Amplifier: Accoustic Arts Tube Preamp II-MK2 / Amp II-MK 3

Loudspeakers: B & W 800 D3, Fischer & Fischer SN470M

Cables: HMS Suprema, JIB Silver Galaxy BP-006SC (Phono), Burmester XLR 3 (NF), HMS Gran Finale Jubilee / in-akustik 2404 (NF / LS)



The case of the MC-pickup consists of a solid aluminum block. The needle carrier is made of hard sapphire. The diamond has a sophisticated „Shibata“-cut.

The likewise solidly executed subplate is based on a polished stainless steel axle with a carbide ball, which in turn stands on a self-lubricating bearing base.



SHIBATA-CUT

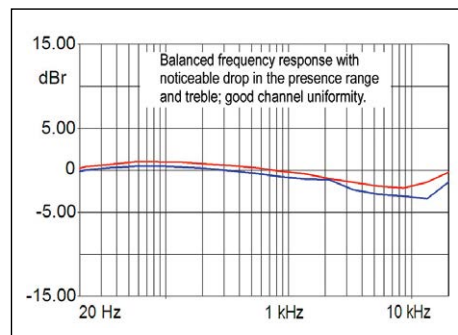
Above the usual elliptical rounding of the pickup-diamond, there are a number of elaborately faceted „line contact“-cuts, which should extract a maximum of information, especially in the high-frequency range.

One of them is this needle form developed in the 1970s for the CD4-Quadro-plate by JVC technician Norio Shibata, which is still one of the top cuts.

and, more importantly, to avoid one-sided pulling on the bearing, which is as robust as it is precise, the motor quartet is coupled to each other via short rubber belts as well as to the driven, cylindrical plate support. The synchronous motors follow a clock frequency that is digitally generated in an external power supply unit, also manufactured to the highest standards. The fine adjustment of the two speeds of 33.33 and 45 rpm is carried out via two mini-potis on the rear.

The 175 is switched on in the classic Burmester style via the toggle lever at the front right, which switches between Off, Standby and On. In „On“ the adjacent light turns green. A rotary knob with the positions Off, 33 and 45 starts the drive or switches it off without disconnecting the phono board from the power supply. This keeps the phono board „warm“ during long pauses while the plate is resting.

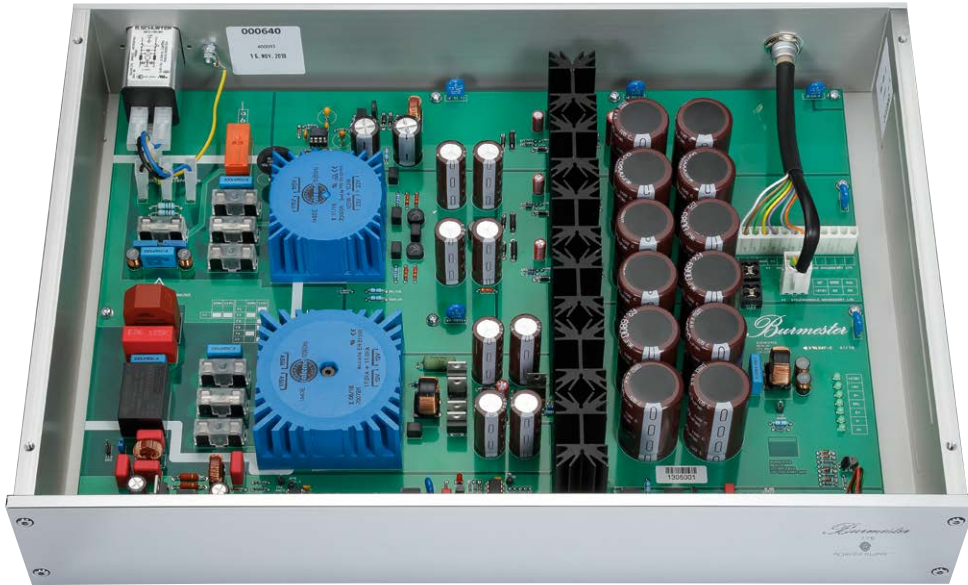
Thanks to the four motors, the acceleration time of the massive plate is short. The drive only acknowledges the effort with a gentle growl. We would still recommend to just let the plate turn during the listening session. This is easier on the belts, and it's also no problem to change the Discs this way, as their edges are easy to grip. The handling



The frequency response of the Burmester MC shows a slight drop in the presence range, which was almost non-existent to the ear.

of the Burmester is in general very simple. Rarely have I experienced that a top turntable causes so little trouble.

With the 175 comes a specially pressed „Reference Check“ record. Its one kilohertz tone and the frequency sweep from 20 Hz to 20 kHz are especially interesting for measurement freaks or for leveling. The antiskating should be adjusted with the help of an empty area, in such a way that the tonearm stands still on the rotating disk. Notwithstanding however the fact that the skating force changes continuously depending on the speed, the position of the pickup above the plate and, above all, due to the respective modulation



strength. Hence, it naturally turns out stronger in the groove due to the higher friction than if the needle „skates“ only with the tip on the smooth surface. Therefore simply turn the little antiskating control so far that the arm moves slightly outwards. Then you should have found the perfect middle ground.

That’s exactly how we did it, and it was all there was in the way between the, admittedly rather exhausting, setting up and the 175s captivating performance. Since our test device was fully broken in, the warm-up was allowed to be only briefly. We were just too curious whether the first record player of Germany’s big high-end brand would be a major success and also a „real Burmester“.

And, hooray, it is all of the above! The 175 follows exactly those sound premises for which the components from Berlin are famous and in great demand all over the world and which have been perfected in the „Reference Line“: crisp, crackling temperament in connection with forward striving timing, gnarled conciseness, radiant colorfulness as well as a filigree elegance behind the veil of casual sovereignty.

Which disc was the first to find its way on the felt damped carbon mat of the Burmester you ask? It was Anne Bisson’s fantastic, „live“ recorded 45-piece direct cut album „Four Seasons In Jazz“. In „September In Montreal“ a powerful, pulsating acoustic bass sets the accents, whose strings the 175 let vibrate with elastic tension. In general, it always presented the lower ranges sinewy

The external power supply unit offers two completely separate and stabilized supply voltages for the complex motor and signal electronics.

and perfectly defined. No trace of slowness or thickening. Anyone who had suspected that the heavy metal enclosure of the pickup would cause the bass resonance to slip off and the basses to become correspondingly muddy was most pleasantly disappointed. The 175’s heavy, rock-solid frame and base plate certainly contribute significantly to its steadfastness and precise definition of even the most complex passages.

A further result of this stability is the sharpness of the edges and three-dimensional plasticity. Not only did Miss Bisson stand exactly contoured between the speakers, no, in fact you could almost hear „around“ her. And the turmoil in the frequency cellar didn’t prevent the turntable from depicting delicate smoking of hi-hats in the background clearly and with subtle shades against a deep black background.

To be honest, the description of the 175’s admirably balanced performance between bouncing attack, deeply staggered spaciousness and natural precision inherently attracts the superlatives. It presented our discs, which were heard umpteen times, in beguiling perfection. Whether it staged the sometimes brilliant, sometimes timid orchestra in Chadwick’s „Jubilee“ or performed Diana Krall’s keyboard and vocals in the Paris Olympics,

WHAT WE HAVE HEARD

Burmester Selection Vol. 1

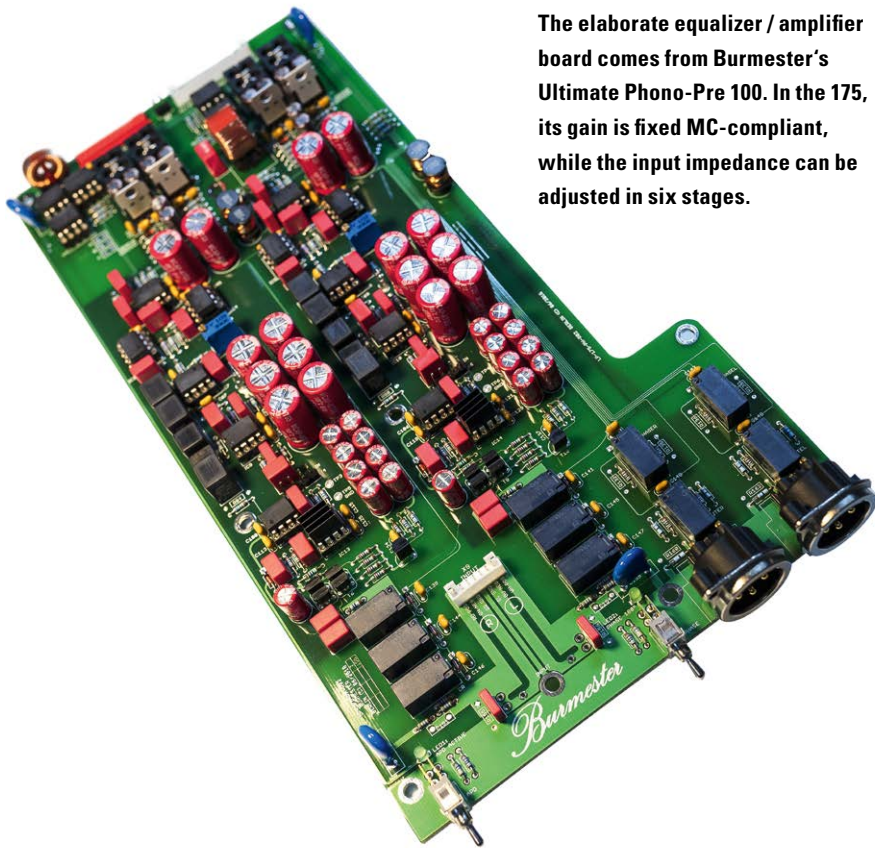


Not only on the 175 do the selected titles of this 45s sampler sound first class (Do-LP).

Opus 3 Test Record 1



The famous compilation of audiophile pearls from the noble label Opus 3 has high standards and lost none of its charm.



The elaborate equalizer / amplifier board comes from Burmester's Ultimate Phono-Pre 100. In the 175, its gain is fixed MC-compliant, while the input impedance can be adjusted in six stages.



TUNES INCLUDED

The 175's scope of delivery includes this 45 rpm cut record, which offers measuring and test signals, but also four music titles in top quality.

the Berliner always struck the right note and the right mood!

We are certain that also Dieter Burmester would have been enthusiastic about the 175, because it not only corresponds to his uncompromising approach, but also fits in perfectly with the sound philosophy of the German High End's leading figure, who died in 2015, which was to grip the listener with inner tension and live verve. It's a pity that Burmester, who had developed his first ideas for the 175 the year before his death, is no longer able to experience its performance.

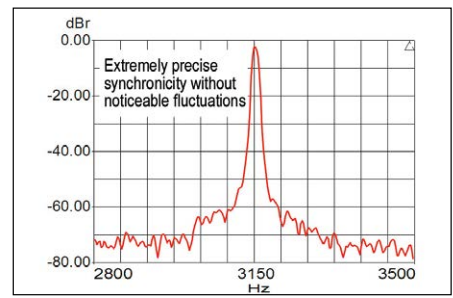
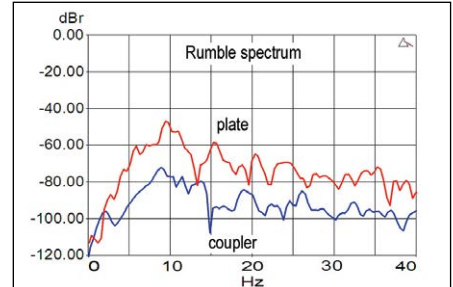
It's lucky for all other providers of fine analogue products that the 175 due to its closed concept only aims at a very specific clientele that wants exactly that. Otherwise, Burmester's „massive attack“ would probably shoot some rivals from the analogue sky. It seems to be true that good things take a while and the Berliners have made the best of the long wait. Their turntable is nothing short of a dream! ■

Burmester 175

Price: around 31,800 € (complete with MC cartridge and integrated phono MC preamp)
Dimensions: 45 x 21 x 37 cm (WxHxD)
Warranty: 3 years (at registration)
Contact: Burmester Audiosysteme
Tel.: +49 30 7879680
www.burmester.de

Burmester's all-in-one turntable consistently plays out the advantage of the perfect matching of its individual parts. Workmanship as well as sound quality is simply perfect and worthy of the ultimate „Reference Line“ of the Berlin manufacturer in every respect. The high price therefore seems appropriate. Reference status!

Measurement Results



Output voltage (pickup only)	0,3 mV
Tracking force	23 mN

Labor-Kommentar

The results are approaching the limits of what we can measure. Whether synchronicity or rumble, this turntable sets standards. For the best sound, be sure to pay attention to the correct mains phase!

Features

A balanced analog output, external power supply, height-adjustable feet, heavy metal base, phase reversal, deactivatable automatic shut-off, six-level adjustable input impedance for the phono board, speed fine adjustment

STEREO - TEST

SOUND QUALITY	100%
PRICE/PERFORMANCE	
VERY GOOD	

Brinkmann Audio Edison Mk II

Ultimate Analog Performance

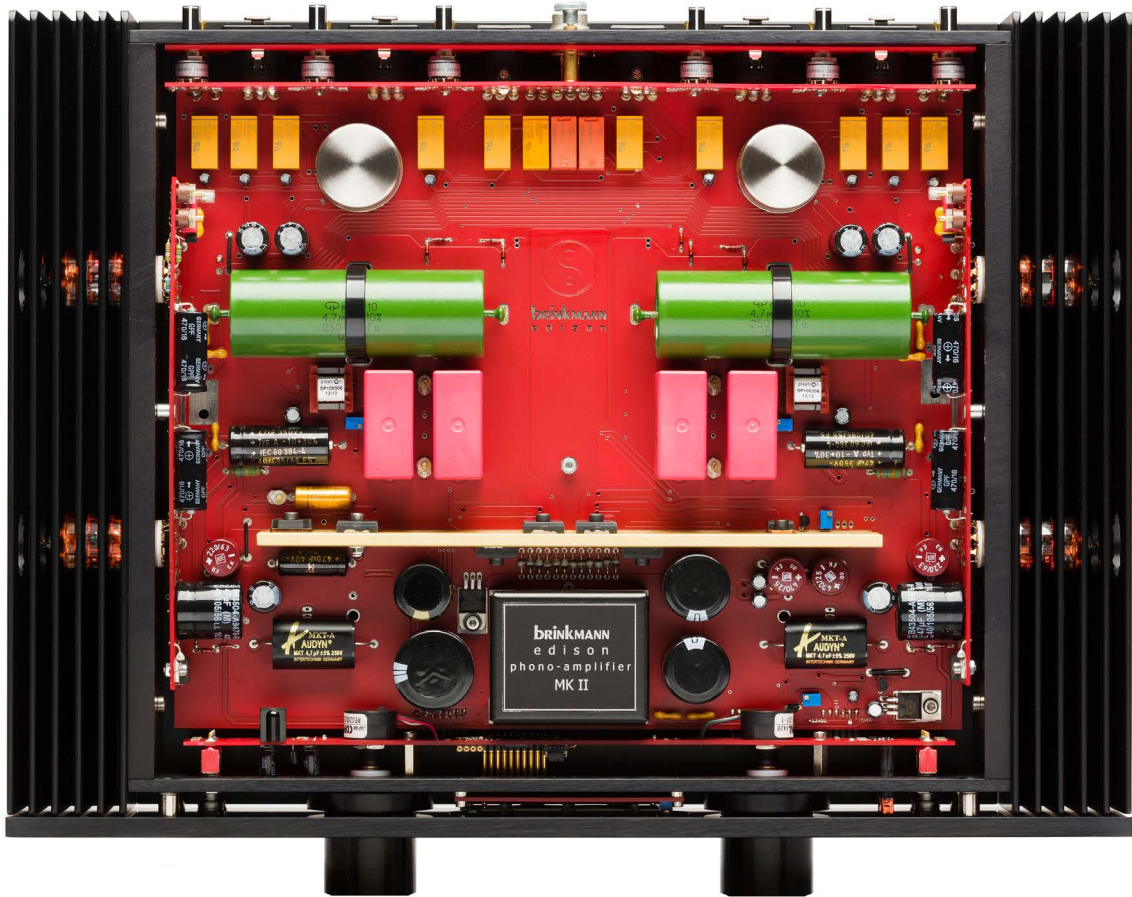


Photo © MichaelRasche.com 2018

During its eight-year production run, Edison has become the Phono Preamplifier of choice for connoisseurs who demand ultimate versatility as well as State-of-the-Art performance.

Edison Mk II is more than an enhancement of its legendary predecessor. The culmination of Helmut Brinkmann's four decades of audio design, it is our definitive statement of the analog art.

The Edison Mk II version is now available at selected Brinkmann dealers. Owners of the original Edison can upgrade their unit to the Mk II standard.

BRINKMANN

"The World's Finest Turntables ... and more!"

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Master of Contrasts



With their „Callisto“ line, DALI aims to combine tradition and modernity, simple controls and sophisticated engineering. Has it worked?

Julian Kienzle

TEST DEVICES

CD player:

T+A MP 1000E

Integrated amplifier:

Audionet Sam 20 SE

Loudspeaker:

B&W 606

Active speakers:

KEF LSX

Cables:

in-akustik; KLEI;
Lua; DALI; KEF

Having worked at a HiFi studio for some years, I have often heard sentences of the following kind: "I don't need all those bells and whistles. I just want to listen to my music." And who would blame a customer for being put off by the sheer mass and variety of modern technologies? As a result, these traditional audiophiles more often than not tend for the well-tryed and well-known "source-amplifier-passive

speaker combination" – following the age-old "never stop a running system"-principle. Unfortunately, this also means that it is often ignored how modern technologies are nowadays at least on the same level as old-school systems and have even clearly overtaken them in terms of "simplicity" – such as for example DALI's Callistos.

Anyone expecting complicated pairing, meagre sound or unstable connections will be forced to revise their image of the "digital loudspeaker" concept after their first time setting up the Callisto 2C, which is the compact sister of the 6C.

The procedure is extremely simple. So simple, in fact, that even complete novices can wirelessly connect the speakers to the sound hub within minutes. All you have to do is press one button on the hub and one button on the loudspeaker in the correct order – that's it! The only thing missing now is the music...

The easiest way to change that is to feed the tunes wirelessly into the system via the AAC/AptX Bluetooth interface or the optional Bluesound module, which adds a full-fledged and perfectly integrated streamer to the system. In both cases, the Smartphone/Tablet or the PC/Mac become the remote control for selecting and controlling music. The connection to Bluesound was incredibly fast via the hub. Without virtually any delay you could watch the volume indicator on the

On the Sound Hub you will find not only the classic analog and digital in- and outputs, but also the optional BluOs module (r.) and the button for pairing the speakers (m.).





Use the „Link Connect“ button on the back of the speakers to assign them to the left or right channel.

front of the speaker climbing and falling, while moving the slider on the tablet back and forth.

Don't worry, of course also traditional wired sources will find their place. These are simply connected to the hub, which then sends the signals wirelessly to the speakers. There are two optical (TosLink) inputs, a coaxial (S/PDIF), a cinch and a 3.5 mm mini jack connector. Due to the very low latency, a TV can also be connected.

In the loudspeakers themselves, the music is then sent through a DSP and subsequently converted and passed on to the Class D amplifiers with up to 250 watts. In the Callisto 2C, these work with a single 16.5-centimetre woofer/midrange driver made of wood fibre with an SMC magnet system as well as with the hybrid tweeter module consisting of dome and ribbon tweeter.

The latter not only looks but also sounds good, because in the upper registers the 2C plays with a stunning clarity and openness. Snare and cymbals of Nils Petter Molvær's "Khmer" hovered on the back of the stage, light as a feather and with precise speed. Simultaneously the bass went very deep and featured energetic vehemence, seemingly in stark contrast to the lightness of the trebles. When the heartbreakingly lamenting trumpet started, we immediately had goose bumps!

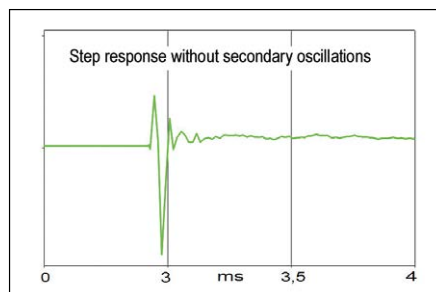
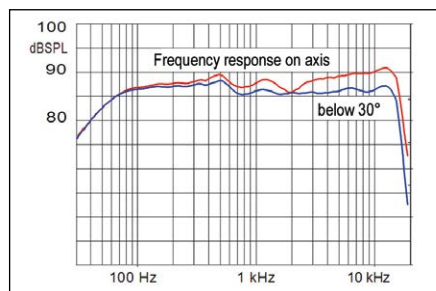
Emotions – anyway a strength of DALI – are conveyed effortlessly by the Dane, because she is courageous and has a feeling for the musical spirit. Any criticism? Only if you're searching for it. But it hardly comes to that, as you are too busy "just listening to your music". ■

Dali Callisto 2C

Price: 3950 €
 (incl. Sound Hub and BluOs module)
Dimensions: 20 x40 x31 cm (WxHxD)
Warranty: 2 years
Contact: DALI
 Phone: +45 9672 1155
 www.dali-speakers.com

With the Callisto 2C, DALI combines its refreshingly dynamic sound philosophy with sophisticated active technology. The wireless connection of any analogue or digital source ensures practicality and maximum ease of use. The fact that it is easy to handle makes the compact speaker even more attractive. The captivating sound quality completes the Callisto package.

Measurement results



Lower cut-off frequency (-3dB SPL)	52 Hz
Distortion factor at 63/3k/10k Hz	1,0/0,1/0,1 %
Power consumption stby./idle (at)	/13,3 W

Lab Comment

Convincing measurement results. At the limit, the electronics automatically lower the volume so that you can turn it up safely as far as you like. The loudspeakers are designed for positioning straight to the listening position.

Features

Wireless, digital, active loudspeakers with external control unit and radio remote control; analogue and digital inputs, subwoofer and pre-amplifier outputs, Bluetooth, optional Bluesound streaming module (around 500 Euro)

STEREO-TEST

SOUND QUALITY	78%
PRICE/PERFORMANCE	
OUTSTANDING	

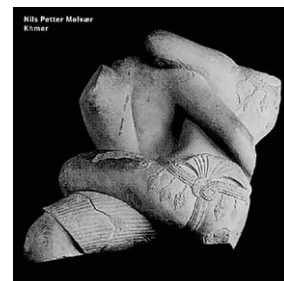
KEYWORD

Soft Magnetic Compound

A specially processed granulate patented by DALI that combines high magnetic conductivity with very low electrical conductivity to minimize distortion.

WHAT WE'VE HEARD

Nils Petter Molvær: Khmer



Highly emotional debut album of the Norwegian jazz trumpet player, who is a pioneer of the „Nu Jazz“ genre.

Raidho premiere

- introducing the new TD4.2

It is an
extreme
performer



Raidho
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www.raidho.dk

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The Experiment

Hardly anything shapes the auditory impression as strongly as room acoustics. We explain the background and suggest solutions to common problems.

Andreas Kunz

Karl Kunstkopf (name changed) is dissatisfied with the sound of his system. First he tries to tune it, replaces the cables, the power cable and the rack. When all this does not lead to success, he invests a four-figure sum in new speakers – with frustrating results. It still sounds diffuse, the basses rumble and the trebles bite. Quite a few HiFi fans suffer something similar and finally say goodbye to their beloved hobby in frustration. However, the solution to the problem is often quite obvious: if a high-quality system plays badly, then almost always the room acoustics are to blame.

Although the room has a much more drastic effect on the listening impression than, for example, speaker- or power cables, this topic is still gravely underestimated by many hi-fi fans. It seems rather obvious, because every room has its own characteristics. High-quality speakers, amps and players might be tuned (approximately) linearly, the sound waves are, however, influenced, reflected, amplified or attenuated by the room on their way from the loudspeakers to the listener.

But how to create a favorable room acoustics you ask? In order to demonstrate

this, we first deliberately start under bad conditions, which we then improve step by step. The starting point for our experiment is the situation immediately after moving into a new flat. The rectangular room, 28 square meters or almost 72 cubic meters in size, is almost entirely empty. As a test system we have put together a good mid-range chain consisting of the CD player/integrated amplifier combination "M3 SCD/M5 SI" from Musical Fidelity and two Canton Vento 896 speakers.

As the first listening example we choose Rodrigo Y Gabrielas version of the rock classic "Stairway To Heaven" for two acoustic guitars: under good listening conditions a music that can carry you away. However, here it seems unpleasantly garish, with especially the high tones being bity, so that the dramatic increase towards the end becomes an ordeal. No, this "Stairway To Heaven" turns out to be a gravel road to hell instead. Dave Brubeck's jazz standard "Take Five" feels hardly any better. Saxophonist Paul Desmond seems to play in a tiled bathroom. Rarely have we experienced such resonance. Bass and piano sound queasy, and the rhythm

figure that drummer Joe Morello celebrates on the cymbal is far too loud. Franz Liszt's "Hungarian Rhapsody No. 2", conducted by the legendary Leopold Stokowski, doesn't ignite, so mushy is the sound of the orchestra that the racy "gypsy melodies" seem to mumble in the canyons of Transylvania. Also, the strings are too sharp in the high trebles. AC/DC's hard rock anthem "Back In Black" is almost physically unpleasant: while the basses roar, crackling voices and guitars whip the drumheads: horrible like a tinnitus.

The graph created by measuring the room acoustics confirms the terrible impression: four peaks at 45, 67, 90, and 114 Hz stand for room modes with about 10 decibels higher level than in the mid and high frequency range. This means that these bass tones are perceived as twice as loud, with an unpleasant humming effect. Another disturbing factor is the long reverberation time, which is a full second at 64 Hz and makes the sound appear uncomfortably diffuse – 0.4 to 0.6 seconds are considered pleasant for a room of this size.

The reverberation times also have a negative effect in the midrange and especially

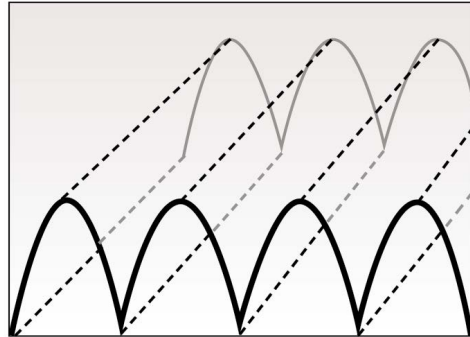
„Stairway To Heaven“ in bad acoustics: a gravel road to hell



- 1** A situation like directly after moving in: the room is empty. Acoustically this has a highly problematic effect.
- 2** When furnished, the room sounds better, but speakers should not be placed directly on the wall.
- 3** An interesting option: rotate the system and listening position 90 degrees in the room.



in the high-frequency range. Although the waves are significantly shorter here, so that they do not "stand" between the walls, direct sound that is too strongly obscured by reflections discolors instruments and voices. In the worst case, the sound becomes really sharp,



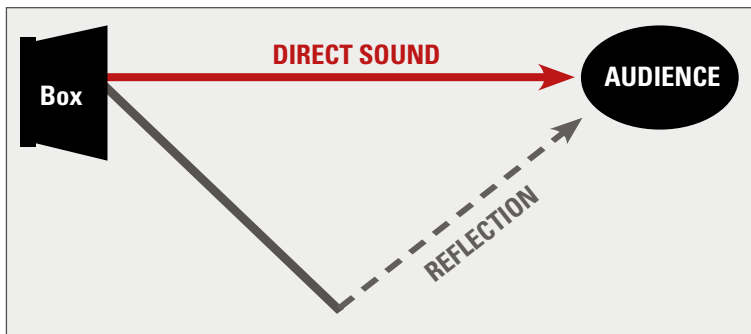
As „standing waves“, room modes in the bass range cause an unpleasant roar.

which can be traced back to flutter echoes. These occur when sound waves are repeatedly thrown back and forth between walls.

So far, so bad. To get a grip on the enemies of good room acoustics – room modes, early reflections and too long reverberation times – we have two main weapons: absorption and diffusion. Without absorption (damping), a sound once emitted would theoretically wander around the room for an infinitely long time.

At first we concentrate on the high frequency range, because the parquet floor, the windows and the plasterboard walls reflect the treble sound components very strongly. Since high frequencies are short, materials with fine-pored structures are suitable for damping. In our case, a sofa and a dense, fluffy carpet between the speakers and the listening position serve this purpose to dampen the first reflections.

Similarly important is diffusion, because diffusely scattered, the reverberation does



If the wavelengths are much smaller than the dimensions of the room, sound propagated by the loudspeaker is either absorbed or reflected (as in the picture on the left). Early reflections arrive at the listener after the direct sound and can discolor the music.

GLOSSARY

Frequency

Indicates the number of oscillations of a signal per second, unit is Hertz (Hz), 1000 Hz = 1 kHz. The higher the frequency, the higher the sound is perceived. The human ear can hear frequencies from about 20 to 20,000 Hz. Long waves are perceived as deep tones, with increasing pitch the waves become shorter and shorter..

Room modes

If integer multiples of half the wavelength fit exactly between two walls, these act like resonators. Example: at a frequency of 43 Hz, the wavelength is eight meters. At a wall distance of exactly four meters – regardless of the length, width or height of the room – this frequency is dramatically amplified. These room modes („standing waves“) cause „booming“ in the bass range.

Early reflections

When sound hits surfaces and objects, a certain part of the incoming sound

energy is reflected. If early reflections at the listening position superimpose the direct sound too much, the sound image can change color. Especially unpleasant are flutter echoes that occur when a periodic sequence of individual reflections is thrown back and forth between two walls.

Absorption

Another part of the emitted sound energy is absorbed by surfaces and objects (absorption) – which is a blessing, because you get problems with room modes, early reflections or too long reverberation times under control. High, short-wave sound components are attenuated by materials with a porous, open, fine structure (carpets, curtains, foams, etc.). In order to attenuate deep, long-wave sound components, large-volume absorbers such as closed cabinets are required.

Helmholtz resonator

Resonator with cavity, which withdraws energy in the bass range by

means of an opening in order to combat room modes (see above). Usually limited to narrow frequency bands.

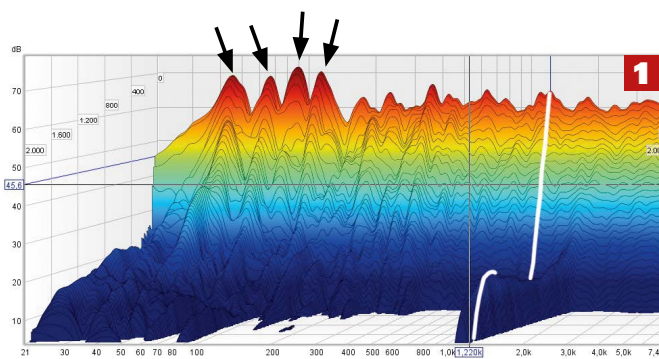
Diffusion

When sound hits objects that have a fine structure in the order of the wavelength, the sound of the corresponding frequencies is scattered in different directions, i.e. diffusely. A high diffusion is necessary to create a uniformly mixed sound field in which no isolated reflections can be perceived as disturbing.

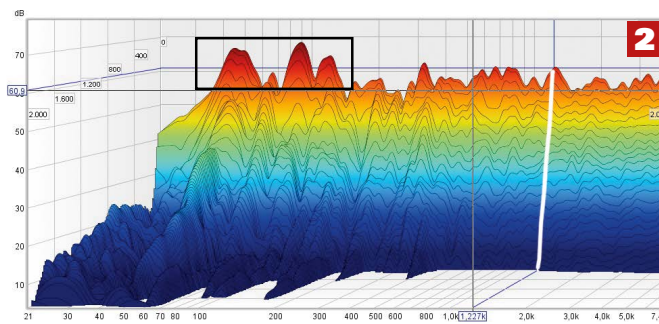
Reverberation time

Defined as the time that elapses in a room after the sound source is switched off until the energy of the sound event has dropped to one thousandth of the initial sound pressure level. The acoustically ideal reverberation time depends on the size of the room: the smaller the room, the shorter the reverberation time should be. If the reverberation time is too long, overlapping will occur and the sound will smear.

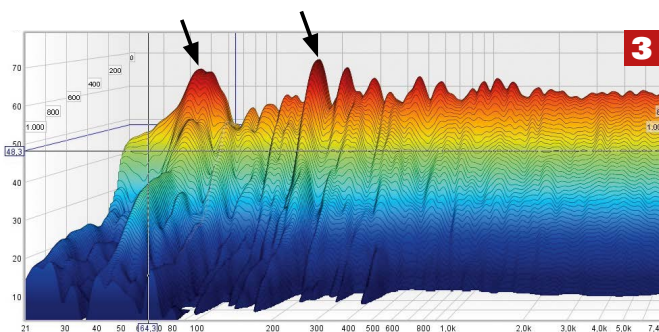
SERVICE ROOM ACOUSTICS



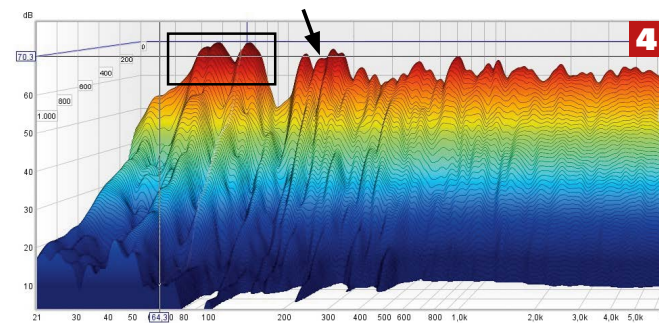
Situation 1 (empty room/bad speaker placement): four peaks at 45, 67, 90, and 114 Hz (arrows) stand for room modes with about 10 decibels higher level than in the mid/high range from about 300 Hz. The reverberation time at 1.2 kHz (white line) is an extreme two seconds.



Situation 2 (furnished room/bad speaker placement): at the problem frequency of 1.2 kHz, the reverberation time has dropped to 0.8 seconds (white line), but the bass range (rectangle) continues to cause problems.



Situation 3 (furnished room/favorable speaker placement): whereas the entire bass range below 140 Hz was previously problematic, there is now only one distinct room mode at 44 Hz (left arrow) and a smaller one in the fundamental range at 157 Hz (right arrow).



Situation 4 (furnished room/90 degree rotation): the mode at 157 Hz (arrow) has weakened, but the middle bass range between 40 and 100 Hz (rectangle) has deteriorated.

not consist of single, sharp reflections, but of many, which decrease evenly in intensity. In other words, "bad" sound components are made "harmless" by being broken down via diffuse reflectors into as many small components as possible and scattered in different directions. In order to achieve a uniformly mixed sound image, we use a shelf in which the books are deliberately "sloppily" sorted, because uneven edges promote this effect; to a lesser extent, houseplants also appear diffuse – the larger their leaves, the greater the effect.

Does this help anything? Yes! The brass players in the "Hungarian Rhapsody 2" and the bass and drums in the "Back In Black" continue to cause big problems. On the other hand, the drums cymbal in "Take Five" doesn't buzz as intrusively as the mid and high frequencies sound much more pleasant. The measurement proves why: if the reverberation time at 1.2 kHz in an empty room was an incredible two seconds, the furniture has reduced it to 0.8 seconds – a huge step forward in terms of a more pleasant sound image.

But there's more to it than that! Especially since we have violated well-known hi-fi rules when setting up the loudspeakers so far. We had placed the two Canton Vero 896 far too close to the wall directly in the corners of the room. Because the bass is jammed there, it is exaggerated, which inflates and smears the lower frequencies. Since the speakers were too far apart, the locatability of voices and instruments had also suffered. We corrected these two points and angled the cantons less in the sense of a bigger sound panorama. In addition, we placed three aluminum cylinders from Acapella under each of the speakers, leading to significantly less bass vibrations being transmitted to the floor.

The measurements are promising: while the entire bass range below 140 Hz used to be problematic, there is now only a large bump at 44 Hz. The reverberation time at 64 Hz has also decreased slightly (from 0.9 to 0.8 seconds). We can cope with the fact that we have negotiated an increase at 157 Hz, which was not there before. Indeed, the

STEREO engineer Uli Apel (right) presents the results of the room acoustics measurements to editor Andreas Kunz.



The reverberation time has dropped: a huge step forward in terms of sound quality.

effect of absorption and diffusion is striking. "Take Five" is much more transparent, which also applies to "Hungarian Rhapsody 2", even if the sound in the orchestral tutti continues to smear; even "Back In Black" now sounds tighter and less poisonously sharp. For the first time we have a listening constellation that is between bearable and acceptable. And with little effort: incredible what a proper loudspeaker positioning can achieve!

In living or listening rooms, one usually tends to place the speakers on the narrower wall. However, in our 6.50 by 4.30 meter room we were forced to place the sofa almost in the center of the room. If it had been placed on the wall opposite the system, the

distance to the loudspeakers would have been much too big. Too many reflections would then have overlaid the direct sound component, which would have resulted in a considerable loss of definition and locatability of the auditory impression. In this respect, it is worth trying to let the loudspeakers play from long to long side of the room instead.

A comparison of the measurement graphs shows an uneven picture: The room mode at 157 Hz has weakened, while the middle bass range rather seems to have worsened. The same applies to the listening situation. While in "Stairway To Heaven" the two acoustic guitars by Rodrigo Sánchez and Gabriela Quintero are now more filigree in quiet

TIPS FOR IMPROVING ROOM ACOUSTICS

Distrust design rooms

Spartan rooms with tiles and smooth aluminum and glass surfaces are usually acoustically problematic. It sounds better with furniture and sound-absorbing or scattered objects on the floor/ceiling and walls.

Dampen reflections

In order to attenuate the first reflections of the floor in the high frequency range, you should lay a carpet between the speakers and the listening position. If reflections in the high frequency range are too strong, they can be attenuated by tapestries, or curtains in front of windows.

Get the basses under control

More problems than the high-frequency range are usually caused by the bass range. In order to dampen the energy-rich deep waves, large-volume absorbers such as closed cabinets or room acoustic elements are required. Especially the acoustically problematic room corners, where several pressure-increasing edges

collide, should be defused.

Chaos provides good sound

Irregular surfaces and edges improve diffusion. When equipping CD, plate and book shelves, homogeneous end edges should therefore be avoided. Large-leaved green plants and woodchip paper (instead of smooth plastic wallpaper) support this effect.

Find the right listening position

Too close to the speakers the sound image decays, too far away the differentiation can suffer due to overlapping reflections. In a rectangular room, it may be a good idea to have the speakers play from the long side to the long side.

Rearrange the speakers

Since most loudspeakers also radiate to the rear through bass reflex ports, they should usually be moved away from the wall in order to avoid excessive bass. Experiment with the distance between the speakers and their angling.

MATERIAL EDUCATION: WHAT CAUSES WHAT IN ACOUSTICS?

FLOORS

- Parquet:** Hard reflective
- Carpet:** Swallows high frequencies
- Tiles:** Very hard reflective, high reverberation time in tiled rooms
- Linoleum:** Reflective for low and medium frequencies
- Screed:** Reflective for low and medium frequencies

WALLS/CEILING

- Concrete, lime sand and brick:** Reflective for low and medium frequencies, depending on degree of porosity treble absorber
- Gypsum:** Reflective for high frequencies; with an air gap behind, it becomes an absorber for low frequencies
- Plaster:** Hard reflective for low to medium frequencies, depending on the porosity of the finish.
- Wood paneling:** Reflective for high frequencies; with an air gap behind, it becomes an absorber for low frequencies
- Woodchip wallpaper with masonry:** Reflective for low

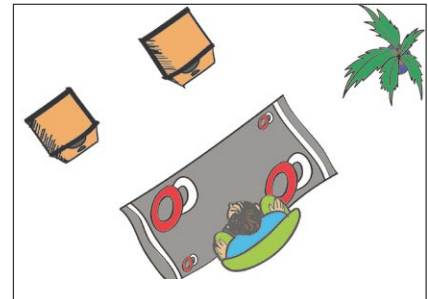
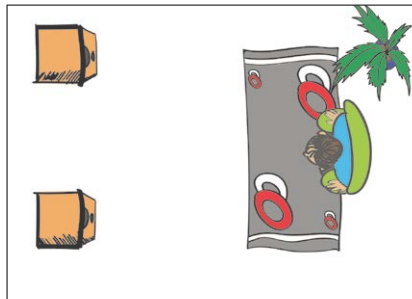
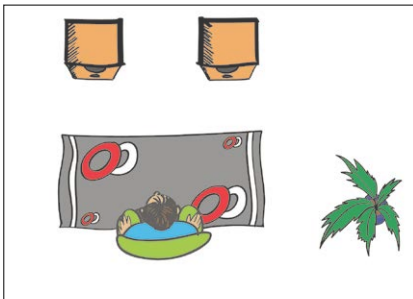
and medium-high frequencies, depending on degree of porosity treble absorber
Window: reflective for high frequencies, absorber for low frequencies

FURNITURE

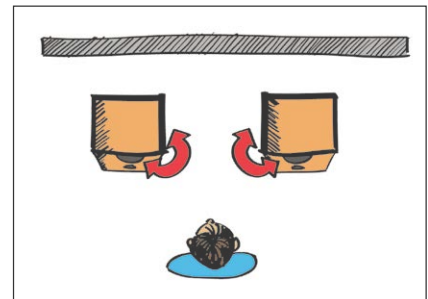
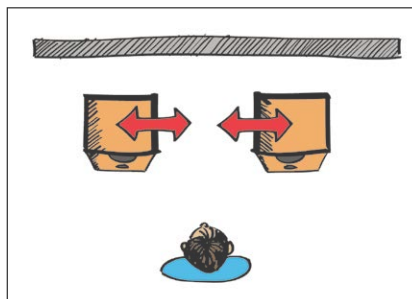
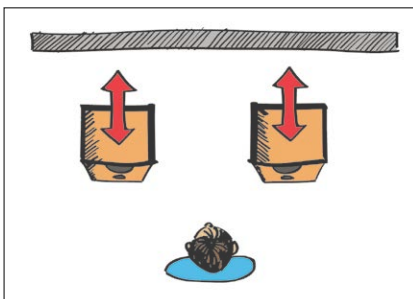
- Cupboards:** bass absorber
- Shelves:** diffusers
- Seating furniture:** treble absorber, depending on the degree of porosity
- Tables:** reflectors
- Beds:** treble absorber
- Fabrics (wool etc.):** treble absorber

OTHER

- Curtains:** treble absorber
- Plants:** treble absorber and diffusers
- Tapestry:** middle and treble absorber, depending on wall distance



If it sounds unsatisfactory, it might be worthwhile to rotate the setup 90 degrees or even try a diagonal variation.



The speaker placement begins with the search for the optimal distance to the rear wall in order to avoid bass exaggerations. Homogeneity is achieved by the distance between the speakers, while depth and focus change when the speakers are angled.

passages and the saxophone sounds more fluid in "Take Five", deep instruments are less convincing now.

After all, our experiment to turn the listening situation by 90 degrees has shown how much one can change one's own room acoustics with comparably little effort, and from the first initial situation in an empty room to step 3 – good speaker placement combined with a homely ambience – the situation has improved significantly. This underlines once again that sparsely decorated

rooms are generally detrimental to good acoustics, while carpets, bookshelves, sofas, etc. not only provide a pleasant living atmosphere, but also greater hi-fi enjoyment. Only very "plush" living rooms would be bad due to excessive damping.

Nevertheless, we are still a long way from achieving perfect acoustics – especially in the bass range. Since furniture is only of limited use here, it is worth experiment with professional room acoustic elements for this matter. ■

ELAC The life of sound.


V E L A

 **HIGH END**[®]
9.-12. MAY 2019 MUNICH

Atrium 4.1
Room F103, F102



Ready to Overtake

Monitor Audio is going in the offensive! With their Gold series they are about to become one of the most important manufacturers – also in Germany.

Michael Lang

For a long time, the British loudspeaker specialist Monitor Audio, founded in 1972, led a rather modest existence in Germany. Having been among the top 5 strongest brands in its home country for many years, the level of recognition in Germany has always remained rather low. That is even more surprising as the product range of the still completely independent manufacturer covers almost everything that delights the heart of music and cinema lovers: inexpensive entry-level models in compact and floorstanding formats, complete home cinema sets including rear and center speakers and a whole range of subwoofers as well as a large assortment of in-wall speakers. The chassis

have been developed in-house and cannot be found at other manufacturers. The range of production goes right down to the cabinets, which is more than remarkable. It is also noteworthy how the British under Andrew Flatt managed to transfer the technology of the drivers from the loudspeakers of the top Platinum II series into the considerably cheaper models of the "Gold" series presented here.

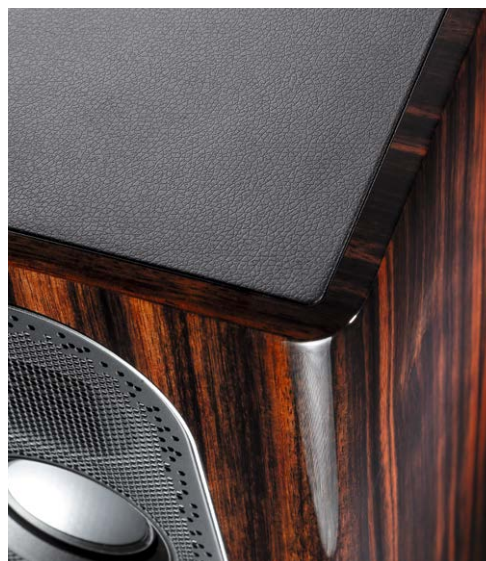
Noble chassis

The developers saved money rather inconspicuously. The cabinet, for example, which is also in the Gold series beautifully crafted, is much cheaper to produce than the Palladium models with their curved design and extreme strength, which are manufactured at outstanding expense. The AMT tweeter is protected from curious fingers by a grille, the drivers are all flush and embedded into the finely veneered baffle without visible screws and can disappear under the magnetically adhering cover if required. Instead of veneer, artificial leather has been used on the top, which the author does not consider to be an invitation to decorate with flower vases or decoration.



SOLID

The outriggers increase the stability and are height adjustable.



The carefully crafted cabinet with imitation leather on the top is visually and haptically pleasing.

Makes high end affordable in terms of sound and workmanship

WHAT WE'VE HEARD

Verdi: Requiem



Exciting contrasts in speed and dynamics. Fantastic tenors!



AMT

Abbreviation for Air Motion Transformer – a folded foil ensures precise high-frequency reproduction.

The midrange driver consists of an aluminum/magnesium/ceramic mixture, the two 16.5 centimeter bass drivers are sandwiched with an additional Nomax honeycomb layer in the middle and a stiffening carbon layer on the back. Each of them works on its own rear bass reflex port. Designed for small to medium-sized listening rooms, with a good efficiency and uncritical impedance curve, the Gold 200 is designed to be in top form even at low and medium levels, without yielding at high levels.

We put it to the test in our small listening room, which measures a good 20 square meters. The speakers were about two meters apart, had 80 cm of space to the back and to each side, with the listening position having been about 2.30 meters away. From the very first note it was clear that the sound of the „gold-speaker“ builds up from the bottom. The bass, for example in Yello's "Till Tomorrow", came out of the delicate speaker powerfully, contoured and with excellent timing. Voices and acoustic instruments, here in Verdi's "Requiem", were so real that one could fall into a depressive mood while listening to the Mass of the Dead. What was particularly striking, however, was how unobtrusive and inconspicuous the AMT tweeter played, which is usually considered rather a little cheeky, resulting in a very delicate reproduction of choirs, strings and female voices. Also keeping in mind the first-class workmanship, one can only congratulate the British on this excellent achievement. ■



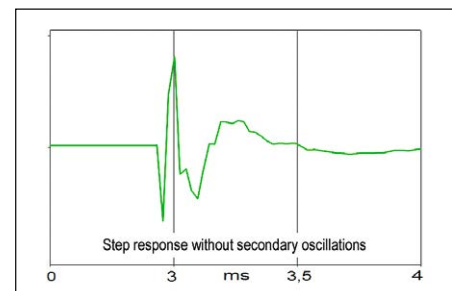
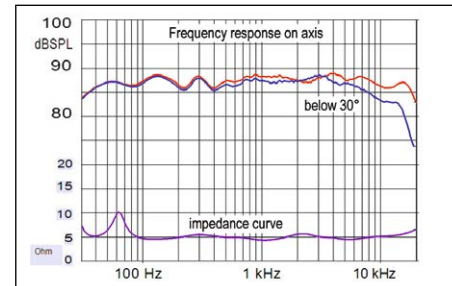
High-quality connection panel with wire bridges and height-adjustable outriggers.

Monitor Audio Gold 200

Price: around 4250 € (various finishes available)
Dimensions: 28 x100 x39 cm (WxHxD)
Warranty: 5 years
Contact: Monitor Audio
Phone: +44 (0) 1268 740580
 www.monitoraudio.com

A bulls-eye hit from the British. The Gold 200 plays powerfully from the bottom up, has a very low discoloration midrange and captivates with silky tweeter reproduction. The workmanship is excellent.

Measurement results



DC resistor	4 Ohm
Minimum impedance	4,2 Ohm bei 1100 Hz
Maximum impedance	10 Ohm bei 63 Hz
Sound pressure level (2,83 V/m)	88,8 dB SPL
Power for 94 dB SPL	7,2 W
Lower cut-off frequency (-3dB SPL)	36 Hz
Distortion factor at 63/3k/10k Hz	1/0,2/0,1 %

Lab Comment

Impedance and efficiency make the Gold 200 a pleasant playing partner for most amplifiers; low distortion, balanced frequency response and good step response; easy to adjust to listening position.

Features

Three-way bass reflex speaker with rear openings; AMT tweeter, magnetic adhesive covering; bi-wiring terminal; height-adjustable, screwed outriggers; various cabinet designs available

STEREO - TEST

SOUND QUALITY 78%

PRICE/PERFORMANCE

★★★★☆

EXCELLENT



Spirits of the deep

Subwoofers are mystical creatures and only very few people are aware of their benefits and really explore their possibilities. STEREO put four candidates to the test.

Tom Frantzen and Michael Lang

Subwoofers are a fundamentally unpopular and underestimated but also highly interesting product genre. They are regarded as ugly “blocks”, which no one wants to be looking at in their living room. Further, they have the dubious reputation of the “unskilled worker”, who is only employed as Plan B to supplement a home cinema or compact speaker setup. For some, the subwoofer is, therefore, nothing more than a “necessary evil” in order to avoid using larger floorstanding speakers.

The misunderstanding could hardly be any bigger than that. In fact, the “spirits of the deep” are very useful also beyond the purpose of supporting deep frequencies or achieving the desired „boom“ in a home cinema.

For example, when it comes to simulating three-dimensionality and to being an additional center of generating sound in order to distribute bass energy more ideally throughout the room. This is due to the fact that resonances are stimulated stronger by a single source of maximum energy than by several sourced of reduced energy. That’s why one or even two subwoofers can also be beneficial for floorstanding speakers.

Finding evidence is easy. We have put the B&W 606 – a phenomenal compact speaker in its price class – into position for this purpose. The respective active subwoofer was positioned slightly in front of them and adjusted in such a way that it only discreetly supported them in the lower one and a half octaves. Party-mode with hip-hop is of

course also possible, but that’s not what we were looking for in this case. Integration is the key.

Already with quasi-quiet passages, we notice how the atmosphere changed when switching the subwoofer between on and off – and not just marginally! The stage extended noticeably and seemed far bigger, because the human ear connects low frequencies with larger rooms and hence interprets them as such. Even small loudspeakers benefit from this „effect“, which is simply amazing.

It goes without saying that same effect appears somewhat weaker when the main loudspeakers are more voluminous and thus physically capable of more bass themselves. Then the idea of better sound distribution becomes more important, which can contribute to a considerably cleaner reproduction of the lower frequencies. By the way, most of the test candidates have 25-centimetre drivers with a large stroke, very powerful amplifiers and a rather compact enclosure for living room-friendliness and a closed cabinet for better precision. For many, this is an ideal compromise of great universality – just like the prices from 1000 Euro. Internal DSPs/Equalizers ensure that the amplifier power illuminates even the darkest deep-sea frequencies that would be completely of the charts with passive bass speakers of similar volumes. The useful bass aid workers are usually connected via cinch cables to the pre-out of integrated- or pre-amplifiers. REL has always preferred high level, i.e. loudspeaker, outputs. ■

Deep frequencies are indispensable for perfect illusions of a big room

Compact Heavy- weight

With the E series in a sealed system, JL Audio delivers an audio-allrounder par excellence.

The history of JL Audio began as early as the mid-1970s, and it is mainly related to subwoofers, to be more precise to extremely powerful subwoofers in the automotive sector, where conditions of very tight space and goals of immense power and depth are known to contradict each other most diametrically. Only in 2004 did JL Audio conquer the home audio market with its active Fathom and Gotham subwoofers based on the impressive W7 bass drivers. Chief developer and co-founder Lucio Proni continues to play a decisive role in the company's future as CEO.

With a weight of nearly 24 kilograms yet moderately compact dimensions of 36.2 x 34.3 x 41.9 centimeters, the E-Sub 110, which was introduced in 2013 as the smaller of two models, is both ambient-friendly and nevertheless heavy enough to inspire confidence. Its cabinet is entirely sealed, which promises precision due to the stiffness of the



air-cushion, but also requires some tricks due to the small volume in order to realize the measured lower cut-off frequency of an enormous 19 Hertz (!). The thick surrounding of the 25 millimeter woofer already reveals the enormously long excursion of the oscillating system, which is driven by a high-performance Class D-amplifier with up to 1200 watts for short periods of time. The built-in filter with Linkwitz-Riley characteristic separates the sub upwards between 25 and 130 Hertz with 24 dB per octave, so according to the fourth order.

While the heat sink is clearly visible, the complete operating terminal is hidden under a narrow panel. The buttons are further designed for rather delicate fingers, which reminded me of the controls of my first

**With the
JL Audio
there is no
compromise
– neither for
hi-fi nor for
home cinema**

POSITIONING

As long as we are not talking about dipole subwoofers, for which somewhat different rules apply, an active sub can indeed be positioned in a corner to gain three decibels of sound pressure through each boundary surface. That equals floor +3 dB, right wall +3 dB and left wall +3 dB. This increase in pressure level, obtained without the use of money, saves amplifier power but is no guarantee for clarity and precision. The other extreme would be a positioning in

the center of the room, where the bass will have the least „impact“. Ultimately, only trial and error can guarantee success. We would start by placing the sub in one line with the main loudspeakers or slightly in front of them. Another popular method is to place it in the listening position, then walk around the room and place the sub where you get the best sound impression. Decoupling ensures peaceful coexistence with your neighbors.



Connection and control panel are separated on the JL. The black „luster terminal“ serves as high level input.

receiver, the Onkyo TX-20. However, since you won't have to deal with it all too often, this is not to be judged negatively. In addition to "On" and "Off", the main switch of the JL Audio has an "automatic"-position, that awakens it as soon as a signal is applied. That is a practical feature, especially if the sub is placed in a rather inaccessible position in a private home theater.

We also think it makes sense to have a switch that can be used to remove the protective earth in case of having problems with hum, which is quite a common and useful feature in the professional field of studio and stage technology. **Absolute phase** and polarity (0-280°) can be adjusted separately – whether that is useful or confusing has to be judged subjectively.

Undoubtedly primarily intended for low level control via Cinch/RCA cables (one mono input or two stereo inputs), the E-Sub from Miramar, Florida also offers an alternative plug which, like a kind of luster terminal, also accepts – albeit relatively thin – loudspeaker cables and thus high level signals. The low level audio signals can also be passed on via Cinch.

Takes your breath away

In the listening room, the JL Audio presented itself from its absolute best side. Deep black and rumbling it descends into the bass-catacombs below 20 Hertz where only very few subwoofers reach, let alone still make an impact. When I read 25 Hertz as the specification of the lower crossover frequency I had already mumbled "show-off" quietly to myself – apparently prematurely.

Watching the thick beaded driver working is definitely more fun than you might expect. With Phono we recommend to treat the JL to a subsonic filter in the previous signal path.

JL Audio combines the home cinema enthusiast's desire for pressure, abundance and explosive-spectacular punch with the audiophile's urge for musicality, flow, rhythm and precision, therefore providing a universally valid answer – and it isn't 42, but E110!

That's exactly what it is. Whether you want to support compact speakers or small to medium-sized, possibly even slightly larger floorstanding speakers, the JL Audio is your man. This subwoofer has stamina, and probably won't get out of breath easily – but will take it away from any listener!

While in "Four Seasons" it contributes more to the overall picture and is only immediately present when the larger string instruments and tutti come into play, in Bach's organ legacy "Toccatà" it makes the amazing opulence of this instrument tangible and comprehensible in its entirety. Just as vibrant as sometimes threatening, the same character shines through with Yello, AC/DC or Ray Brown, and can be called no less than astounding. ■

JL Audio e110

Price: around 2000 €
Dimensions: 34 x37 x43 cm (WxHxD)
Warranty: 3 years
Contact: JL Audio
 intl.jlaudio.com

Compact active subwoofer from one of the most renowned specialists. The e110 features a long-excursion 25 centimeter woofer with enormous capabilities in low bass and dynamics. While being spectacular in home cinema, it also plays fast and is easy to integrate into high-quality music systems.

Measurement results

Power consumption *Stby/idle* (at) _____ /20 W

Lab Comment

19 Hertz as lower cut-off frequency and electronics that do NOT change the level with the crossover frequency are excellent.

STEREO - TEST	
SOUND QUALITY	85%
PRICE/PERFORMANCE	
★ ★ ★ ★ ★	
OUTSTANDING	

KEYWORD

Absolute phase

In nature, a sound is always „in phase“ and should therefore be reproduced electroacoustically with the diaphragm moving forward. Depending on the spatial distance and electronic delay, however, it may make sense to operate the subwoofer in reverse phase to synchronize it more harmoniously with the main speakers.



DUCK AND COVER

The JL also cuts a fine figure with cover. However, then you sadly can't see the driver anymore.

Music and Cinema



M&K Sound has earned itself a top reputation in studios and cinemas already since 1976.

The M&K convinced with great performance at a reasonable price of 1100 Euro

Miller & Kreisel, for which M&K is the abbreviation, are regarded as the inventors of the sub/sat system and almost simultaneously of the active subwoofer. The „Volkwoofer“ is said to have been the very first of its kind with a built-in amplifier. The Danish manufacturer M&K Sound constantly played an important role in cinema and film studios. For example the Star Wars Prequels and the Young Indiana Jones Chronicles were mixed using them, as well as the Blu-ray adaptation for Star Wars I-III. With M&K Sound Hollywood respectively demonstrated the superiority of new sound standards.

SETUP

For this task it is best to have a second pair of hands available, because then one person can hear in the listening position, while the other – unless there is a remote control – sets the parameters on the subwoofer. These are polarity, crossover frequency and level. The polarity is then set correctly when the maximum bass level arrives at the listening position at an otherwise equal, medium level. Often you only have the choice between two positions 0 and 180°, which is usually sufficient. However, sometimes you can also choose stepless, whereby the optimum is more accurate, but also much more difficult to determine. The crossover frequency is chosen according to the speakers playing along. If these are large and have a potent bass themselves – indicated at about 35 Hertz at -3 dB – the crossover of the sub should be set rather low. If, on the other hand, compact speakers are in use, which are specified at e.g. 70 Hertz at -3 dB, one should use exactly this specified frequency for the sub's crossover. And since the professional often adjusts the bass a little too strongly and the newbie usually much too strongly, you should take time for the level of the subwoofer and readjust it critically over the next few days and weeks. In fact, for a good integration the subwoofer should not be heard individually at all. Rather, it should hardly be noticeable and integrated seamlessly into the overall picture.

Further, also M&K's reputation as a music label (RealTime Records) has anything but a bad reputation for developing professional equipment and marketing it to a most demanding clientele. Our subwoofer here is part of the V-Series portfolio and is the medium of three – V8/10/12 – models that M&K Sound developed to delight home cinema and hi-fi fans alike. The numbers in the names represent the diameter of the drivers in inches, i.e. 25 centimeters for the 10 inch V10 model.

„Super Fast Deep Bass“ is emblazoned on the control panel, so the direction the engineer chose is obvious: a long-stroke, fast, powerful and indestructible bass driver with



There are no high level/loudspeaker inputs, but everything else, such as an automatic switch-on, can be found on the M&K Sound V10.

robust suspension sits in the sealed cabinet of the V10 and is powered by a 250 watt unit for top performance.

A feature called „Headroom Maximizer“ is meant to prevent clipping and compression as well as maximize the depth. The measurement shows a full 24 Hertz (-3 dB) as the lower cut-off frequency, which is absolutely excellent for such a relatively compact design – the subwoofer weighs just over 16 kilograms. Already in the STEREO laboratory, the enormous efficiency of the design was noticeable, which generated a full 108 decibels sound pressure at only 200 millivolts input, which is 10 dB more than many competitors with superior amplifiers. The M&K does not have a „ground lift“, because it doesn’t use the protective earth at all, so the mains socket stays bipolar.

Miracle of Precision

The primary goal of this manufacturer is „Accuracy“, which we interpret as precision, balanced neutrality and naturalism, as well in terms of energy distribution, but also as the aiming for a balance between the brutal honesty of professional studio equipment and the often rather forgiving tuning of home loudspeakers.

The benchmark is the natural sound event that is to be reproduced as free of loss, discoloration and distortion as possible.

And, in fact, the V10 manages this nearly as perfectly as the description promises in our STEREO listening room, together with the compact B&W 606 and the floorstanding Monitor Audio Gold 200.

The Dane, with its black finish, was indeed very fast and drew surprisingly precise and easy to follow textures in Supertramp’s „School“ (Blu-ray „Live in Paris“).

Its ability to integrate is superb, as it blends in discreetly and with excellent timing, while never getting carried away. This leads, if at all, to a very slight advantage of the M&K Sound V10 in music and transient reproduction, but also to a minimal disadvantage in rendering film effects such as dramatically rumbling explosions, which could possibly benefit of a touch more pressure and power.

Certainly everybody has his own preferences in that regard, however in this shootout these small differences come very close to hairsplitting, because we are talking about finest nuances. The value offered here for 1100 Euros is substantial, even in home cinema, of which the author was of course able to convince himself first hand. Very impressive performance! ■

M&K Sound V10

Price: from 1100 €
Dimensions: 32 x41 x38 cm (WxHxD)
Warranty: 5 years on registration
Contact: M&K Sound
www.mksound.com

Discreet and very audiophile active subwoofer that works quickly and perfectly integrated, but also very efficiently. Perfect for use with compact speakers in hi-fi and home-cinema applications.

Measurement results

Power consumption Stby/idle (at) /8 W

Lab Comment

24 Hertz lower cut-off frequency and good electronics (around 200-250 Watt), no level spikes with change of cut-off frequency

STEREO - TEST	
SOUND QUALITY	75%
PRICE/PERFORMANCE	
★ ★ ★ ★ ☆	
EXCELLENT	

KEYWORD

Automatic switch-on

Mode that ensures the subwoofer to switch on as soon as a signal is applied.



COVER

The black (or white) satin design ensures elegant inconspicuousness in the living room – especially with the cover on.

Cubic Art

Due to the laterally mounted chassis, the Piega looks very elegant



Aluminum is Piega's material of choice – also for the PS 101 subwoofer.

Quite voluminous, but nevertheless pretty and attractively shaped the Swiss subwoofer presents itself. However, simply labeling it as a beauty-queen or a design piece would be ignoring reality. Even though the very well finished and cleanly varnished MDF cabinet, which is reinforced on the top and bottom with aluminum panels, can admittedly give this impression. For cost reasons the contenders used traditional cabinet materials, as with aluminum the desired retail price would not have been possible. As far as the bass driver

is concerned, the developers from Lake Zurich have invested lots of effort in order to combat the accusation of having developed a women's speaker. So they prepared a requirement profile and discussed it with their favorite chassis supplier. The result was an arrangement with two very stiff bass-membranes, each measuring 22 centimeters and being attached on the sides. The carbon-stiffened paper-membranes have a large stroke and a very potent drive, which is why they manage with the relatively modest continuous amplifier power of around 150 watts generated in AB mode. There is enough „horsepower“ to shine in hi-fi as well as home cinema setups, for both of which there are connections available. If you have an AV receiver, you can therefore bypass the sub's crossover this way, while also loudspeaker/high-level inputs can

be found to receive signals from an integrated- or power amplifier, thus passing on the sound character of the amplifier to the subwoofer. The connected satellites can be cut-off downwards in three stages between 60 and 100 Hertz. Here, trial and error is the best way. There is certainly enough leeway for compact as well as floorstanding loudspeakers. We would recommend to cutting the load on compact speakers a little earlier, i.e. already at higher frequencies – then they usually play much more dynamically and cleaner.

The other connectivity options correspond to what you'd expect nowadays: level control, a crossover control to adjust the 101's upper cut-off frequency, a phase toggle switch, and an automatic switch-on function to immediately awaken the subwoofer as soon as a signal is recognized.

The instruction manual, however, is a weak spot of this subwoofer. Apparently the company from Horgen assumes that their customers won't deal with delivery and installation themselves, but leave this to their experienced dealer. We ourselves are not so sure about this assumption and would therefore appreciate it if we could find detailed instructions with practical tips and possibly even a test CD included in the scope of delivery. That way, with a little time and patience, customers could determine the perfect setup in their listening room all by themselves with a manageable amount of effort. And



The connectivity of the Piega is prepared for almost everything; the banana sockets are, however, not of the highest quality.

Piega PS 101

Price: from 1950 €
Dimensions: 36 x43 x43 cm (WxHxD)
Warranty: 6 years; 2 years for electronics
Contact: Piega
Phone: +41 44 725 90 42
 www.piega.ch

The Piega subwoofer plays powerfully and with a substantial depth. Its adjustment possibilities are limited, so careful positioning is all the more important. Optics and workmanship are great.

Measurement results

Power Consumption *Stby/idle* (at) /8,4 W

Lab Comment

Unconditional pass from the lab. Very low distortion up to the limit. Lower cut-off frequency 24 Hz. Practical adjustment possibilities and only minimal secondary oscillations in the pulse behavior.

STEREO - TEST	
SOUND QUALITY	83%
PRICE/PERFORMANCE	
★ ★ ★ ★ ☆	
EXCELLENT	

although the nearly 25 kilos might indeed seem to be an obstacle, we are sure that a serious music lover wouldn't mind that much to move the sub back and forth a little here and there.

In some countries a subwoofer is sold for almost every loudspeaker, while in this country they are only regarded as indispensable by home cinema freaks. However, anyone who has ever had the pleasure of listening to their jaws dropping when the first tones sounded from a perfectly integrated subwoofer is certainly going to ask themselves why. The „more“ in space, dynamics and serenity, which can immediately be felt even by beginners, combined with a significantly increased transparency for fine details in the fundamental frequencies, is absolutely spectacular. Such a spectacle does, in fact, cast doubt on the usefulness of some other accessories.

The Piega did very well with both the small and affordable B&W 606 as well as Monitor Audio's Gold 200. Connected to Audionet's SAM using speaker cables and Piega's high level inputs, it proved that it can generate almost unlimited pressure, without slightest traces of distortion. ■



OPTICS

The cover is removable, the reflex opening points to the front.

The Specialist



Adherence to the company's credo ensures credibility

REL's business model is as simple as it is unusual: they only build subwoofers. These are, however, also of the highest quality.

The specialist from the USA, who has its subwoofers built by an appropriate supplier in China and subjected to an additional final inspection in England, has so far resisted all temptations to build something other than subwoofers. This chutzpah of stubbornly sticking to a concept that has been recognized as the right one is rare. Especially as in economically turbulent times this can lead to considerable fluctuations in revenues and profit. But John Hunter, head and heart of the company,

kept focused. He lost his heart to subwoofers many years ago during a demonstration, when he realized that, if they are properly matched and reproduced with proper timing, deep frequencies mean so much more than additional pressure hitting the stomach area. Several decades have passed since then in which Hunter could not be dissuaded from his course: the drivers are built of as high a quality and as reliably as possible and they can only be found at REL; use of extremely stable cabinets; renunciation of an automatic calibration by means of extensive equalizer and DSP functions, as they have become so en vogue in recent years. Also no traditional bass reflex port is employed but instead a large passive membrane with a diameter of 30 centimeter that radiates to the floor and supports the 25 centimeter long-stroke bass. The fixed feet guarantee the desired



Lots of options for connectivity including Speakon and Bluetooth but rather limited settings

distance to the floor. On top of all that, REL also goes its own way for the setting up and connecting its subwoofers – the unambiguous recommendation is: place your subwoofer in the corner of your room and take advantage of the resulting nine decibels of volume increase. The manual also provides some well-founded information on how to adjust the volume. First determine the correct phase setting: the one that makes the bass sound louder at the listening position is correct. The next step is to adjust the working range of the sub and satellites, using the crossover control so that the two overlap audibly when the program is bass intensive. Then use the level control on the sub to adjust the volume to the same level as the satellites. Then check the phase again – louder wins. Now pull the sub slowly and evenly out of the corner of your room until it sounds louder, deeper and more powerful. The fine tuning is done by turning the sub, again until the highest possible level is reached. These are all the most important points. However, also the fine tuning of the crossover frequency and the volume of the S3 is explained in detail in the manual: the higher the subwoofer runs, the lower the level should be, is the rule of thumb – absolutely exemplary and unfortunately not a matter of fact. Another indisputable recommendation from REL is: whenever possible, tap the signal at the speaker terminals of the amplifier to let its sound character flow into that of the subwoofer. For the cases where this is not desired or possible

for whatever reason, the very detailed manual offers illustrated information on alternative connections. A ten meter long cable is included, which is connected to the subwoofer by means of a Speakon connector. An option for connection via Cinch is also on board, as well as even a wireless variant, which is, however, dependent on an in-house wireless module. „This was the only way to meet our quality standards,“ REL says. The standby function can be completely bridged. In terms of sound, none of the other participants can top the American. Once the instructions in the manual have been put into practice, the bass reaches very low, sounds crisp and precise with good punch, while blending in well with the overall sound. The REL can also play quite loud, so that home cinema applications should be no problem. Their tips for setup and positioning are by the way worthwhile trying out with other subs – the more care you take in advance, the less you’ll have to try “saving” with DSP equalizing later. The REL initially requires a bit more work, but then rewards you with really convincing sound. ■



OPTICS

The cover is removable, the handles on each side are suitable for carrying if necessary.

REL S3

Price: around 2000 € (in white or black)
Dimensions: 37 x43 x43 cm (WxHxD)
Warranty: 3 years
Contact: REL Acoustics
Phone: +44 (0) 1656 768777
www.rel.net

A subwoofer for people who have less confidence in automatic calibration systems than in their own ears and who don't mind experimenting a little with the positioning. Perfect sound and very good workmanship.

Measurement results

Lower cut-off frequency (-3dB SPL)	23 Hz
Power consumption Sby/idle (at)	/17,2 W

Lab Comment

Low distortion, sensible adjustment options and a clean step response – the REL also made a good impression in the laboratory.

STEREO - TEST	
SOUND QUALITY	85%
PRICE/PERFORMANCE	
★ ★ ★ ★ ★	
OUTSTANDING	



IN ADMIRATION OF MUSIC

**“The way we listen to music has been transformed.
But the reason we listen remains the same”**



At DALI, we believe that digital music should deliver convenience and choices without compromise on sound quality. That's why we've re-imagined hi-fi for the 21st century with the CALLISTO Wireless Speaker System.

Stream, beam, and control music from almost any source and enjoy the stunningly detailed, transparent reproduction DALI is celebrated for.



Everything **new**

When an already excellent product is thoroughly overhauled – like the T+A MP 2000R Mk II – , the word „updated“ gets a whole new meaning.

Tom Frantzen

**T+A combines
top CD, DAC
and streamer
in just one
device!**

The digitalization of the world is relentlessly progressing and taking ever larger steps forward. Not even network-capable high end devices are immune to this evolution. Whether due to their hardware/software or due to changes in the periphery – such as for example developments of streaming portals – updates and sometimes even upgrades are required on a regular basis. Consequently, T+A from Herford decided to thoroughly revise the MP 2000R music player. A revision that ultimately turned out so significant and that managed to improve upon already brilliant solutions to such an extent that it established a whole new generation of devices. According to chief developer Lothar Wiemann,

in the „Mk 2“ „only the proven CD drive remained untouched“.

For example, a completely new T+A Streaming Client with additional functions had been added to the device. This ensures that popular streaming services such as Tidal, Qobuz or Deezer and access to them are directly implemented – more will follow. From now on the player is also „Roon-certified“, and the database for internet-radio has been improved. T+A is proud to have the entire software part of the streamer in its own hands, hence being able to add new features in the future. It is exemplary that also the owners of the first MP 2000R were able to benefit from all updates including Roon support.

On the hardware side, a completely new digital board with optimized, shorter signal paths and more complex voltage stabilization are the most important parts underneath the bonnet. Thanks to plug-in modules, a possible upgrade to an even more powerful streaming processor will be easier in the



Looking for connectivity? Here you go! The T+A is equipped with balanced/unbalanced outputs, plenty of digital connections, LAN/WLAN.

future – a bullet-proof solution for upcoming years! Also it gives a reassuring feeling, bearing the investment of almost 6000 Euro in mind. However, for the money you get a top CD player, a top DAC with a self-developed quad converter module for PCM and DSD sources (up to DSD512) as well as an HD streamer that doesn't have to fear much in terms of sound apart from its siblings of the HV series.

The USB receiver has also been redesigned and is now even less prone to jitter. The same applies to the clock, which has increased the overall precision of the signal processing even further. The D/A converter and analog section have been brought up to date according to the latest development knowledge and the power supply has been enlarged and consistently improved. As a typical "R"-component, it, of course, has remained perfectly stylish.

The now even smoother app for both Android and IOS is called „MusicNavigator“. Countless other optimizations down to the level of individual component have taken place, which can impossibly all be listed.

It is a device for the demanding music fan, the famous all-rounder that can do everything. It is the audiophile, high-end counterpart to the Leatherman: precise, versatile, virtually perfect. While the MP 2000R was already the cream of the crop and was right on the heels of the MP 2500R, the engineers from Herford have now added the icing on the cake, and in terms of sound it remains at the top.

Tonally, the sum of improvements is still noticeable, while, thanks to its universality, even the price is ultimately blurred – great work! ■



A look below the "bonnet" reveals a picture book circuit design with top components and short signal paths.

T+A MP 2000R Mk II

Price: around 5900 €

Dimensions: 46 x9 x40 cm (WxHxD)

Warranty: 3 years

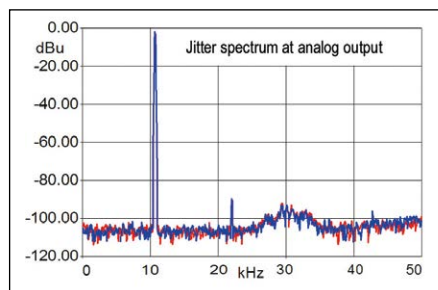
Contact: T+A

Phone: +49 5221 76760

www.ta-hifi.de

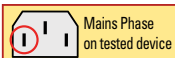
The Mk II version of the MP 2000R is the youngest offspring of the legendary R series, a picture book universalist and device to dream of. Technically even more future-proof and with top sound quality, it is a high end CD player, streamer and DAC all in one – and therefore worth the money.

Measurement Results



Signal-to-noise ratio digital zero	110,1 dB
Distortion factor at -9dBFS	0,004 %
Converter linearity at -90dBFS	0,1 dB
Jitter	1,6 ns
Deviation from fs	-36,1 ppm
Amplitude of the data stream	557 mV
Reading time	8 s
Output resistance RCA/XLR	60 Ohm/75 Ohm
Output voltage RCA/XLR	2,2 Volt/4,1 Volt
Power consumption Stby./idle (at)	/,3,3 W

Lab Comment

 As you would expect from Herford, this MP is technically flawless. All values are approaching the limits of what is technically feasible.

Features

CD player, PCM/DSD-DAC, Internet radio, streaming/network client with literally all connectivity options, operation via remote control and in-house MusicNavigator app

STEREO -TEST	
SOUND QUALITY CD	93%
SOUND QUALITY STREAMER	92%
SOUND QUALITY DAC	92%
PRICE/PERFORMANCE	
★ ★ ★ ★ ★	
OUTSTANDING	

KEYWORD

Roon

User interface (software); audiophile music server system and powerful database, which can work together with streaming services like Tidal/Qobuz and searches for photos, artist biography and other information about music.

Music in its veins

MoFi's UltraDeck plus is black as a raven. However, while playing it gets red cheeks. STEREO met a record player that has musicality running through its veins.

Matthias Böde



A promise but also a commitment at the same time: some of the guys who have for decades been responsible for the "Half Speed Master" re-releases of famous albums in ultimate vinyl-quality have had their hands on the MoFi turntables. In fact, the "Mobile Fidelity Sound Lab" enjoys legendary status amongst record listeners and has once spurred the reissue wave.

So the Americans should have a pretty good idea of how music is supposed to sound. For the technical implementation of their two turntables, of which the here tested

UltraDeck is the larger one, additional help in the form of analog guru Allen Perkins from Spiral Groove was sought. He not only determined the choice of materials, but also the production processes and even fine-tuned the resonances of the aluminum enclosure of the matching MM-scanner, which was supplied by the Japanese specialist Audio-Technica.

It is called "UltraTracker", offers an elliptically cut diamond and costs on its one nearly 550 euros. As a set with the Ultra-Deck, however, it only increases its price by

The people from the „Mobile Fidelity Sound Lab“ should have a good idea of proper sound!



KEYWORD

Inverse bearing

The tilt point is at the top instead of at the bottom. The plate does not stand on top of the bearing, but hangs in it. Thus the center of gravity is lowered, which avoids tumbling and disturbance.

200 Euro – that’s a bargain you should’nt miss. Especially since there is absolutely no reason for that, because – thanks to Perkins! – the MM fits seamlessly into the general sound concept.

Before we devote ourselves to this concept, a few more words about the MoFi and its seemingly simple "deck". In fact, this consists of an MDF/aluminum sandwich, whereby both materials are supposed to complement each other ideally in their characteristics. The chassis rests on four trapezoidal arranged feet with springs that filter out vibrations surprisingly effectively.

These feet can also be found in the smaller StudioDeck, however, here they are tuned differently, since the big brother is heavier. Its plate is also made of the low-resonance plastic Delrin, but the one on the UltraDeck is thicker, and instead of a Teflon mirror, it comes with an especially abrasion-resistant ruby for the inverse bearing, which is lubricated with special grease.

The ten inch long aluminum tonearm has high precision needle bearings for vertical movement. The round tonearm bearing enclosure is made of metal instead of plastic. There is no scale on the counterweight, but a white line on the rear arm tube. Bringing the weight very close to where it is supposed

to bet set with the optimal support force of close to 20 Millinewton for the StudioT-racker. This works quite well, but we still recommend the use of a precise tonearm balance during assembly.

Other than that there is little to be considered, apart from the correct phase position at the mains input (see diagram) – otherwise it sounds narrow and flat. The pickup was precisely pre-assembled, and the included phono cable is better than most usually included cables. Nevertheless, we recommend to replace it with something "proper" at some point.

You can't really make any mistakes while operating the turntable. There is only one yellowish illuminated on/off button, that starts the belt of the same color with a soft squeaking. The speed is selected by running the rubber belt on the smaller (33,33) or larger (45) pulley.

The UltraDeck, which gets a "plus" attached as a complete set with the mentioned MM-cartridge, doesn't want to distract from listening to music in any way. That would be quite difficult anyway, because the rather reserved looking turntable quickly turned out to be have a sure musical instinct in our listening room. The UltraDeck plus played the live version of "Chocolate Girl" by the



LITTLE ONE

In many details, for example in terms of its pickup, MoFi's StudioDeck plus is constructed simpler than the larger model. However, it nevertheless captivates with musical impetus and exuberant joy of playing. Complete price: around 1300 Euro.

TEST DEVICES

Turntables: Acoustic Solid Classic Wood MPX, Music Hall mmf-9.3SE

Phono preamp: Brinkmann Edison, Clearaudio Basic V2

Integrated amplifier: Mark Levinson No.585.5, Symphonic Line RG14 Edition

Loudspeaker: DALI Epicon 6, Fischer & Fischer SN470M

Phono cable: Silent Wire NF5 Phono



The anti-skating of the ten-inch arm works via weight and thread. A white line indicates the position of the counterweight (top left). The dark yellow belt must be placed by hand on the other pulley in case of a change of speed (top right). The feet have a spring mechanism that is matched to the weight of the UltraDeck. Since they are not adjustable in height, the turntable should be placed on a horizontal surface.



The UltraTracker features an Audio-Technica MM-pickup. Its aluminum body has been tuned for resonance (above). The included phono cable (below) is better than usual.



cult band Deacon Blue as broad as expansive, generously traced the dimensions of the concert hall, diligently separated the shouts from the audience from the foreground, and let frontman Ricky Ross act full of joy and life.

The MoFi's well contoured, but above all bulbous and full bass and the almost wasteful handling of timbres helped it a lot. Both give the performance opulence and taste. For long-fingered nitpicking you got to search elsewhere. This turntable is straightforward and brings to full glory what is already started in the StudioDeck.

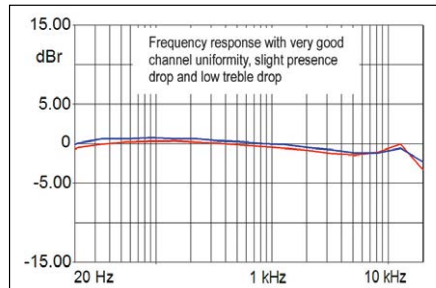
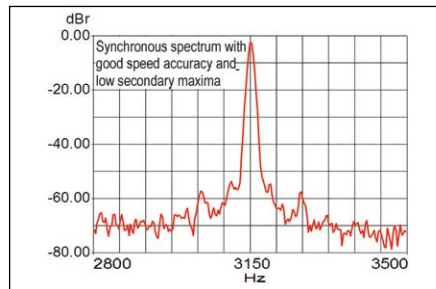
The fact that all of this happens without uncleanliness or exaggerations increases the fun of the rightly called UltraDeck. With a lot of verve it threw itself into the fortissimo-turmoil of Chadwick's orchestral suite "Jubilee", however without losing sight of it. It turned out to be a tough rocker during the hard riffs in Rush's "Jacob's Ladder". Generally: the more groove there was in the music, the stronger it seemed to play out its talents. Nevertheless, it also gave introverted singer/songwriting a fitting and intimate touch. It really has the music in its veins, the bigger MoFi. ■

MoFi UltraDeck plus

Price: around 2200 €
 (complete with MM pickup MoFi UltraTracker)
Dimensions: 50 x11 x37 cm (WxHxD)
Warranty: 2 years
Contact: Mobile Fidelity Sound Lab
 www.mofi.com

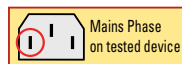
It is apparent that this turntable comes from a manufacturer with a musical background and was co-developed by an analogue specialist. The sound is extremely fluid, colorful and relaxed, and the reproduction is pleasantly „non-technical“. The very good MM pickup completes the round MoFi package.

Measurement results



Output voltage: 5,6 mV
Tracking force: 18 mN

Lab Comment



The frequency response of the MoFi pickup is balanced. The turntable impressed with its high speed accuracy when measuring the very small synchronous fluctuations. That is important, because the UltraDeck has no fine adjustment for the speed. The rumble measurement (not depicted) also showed very low values, which confirms the quality of the drive.

Features

Antiskating, spring-loaded damping feet, dust cover

STEREO-TEST	
SOUND QUALITY	77%
PRICE/PERFORMANCE	
★ ★ ★ ★ ★	
OUTSTANDING	

The large MoFi has rich sound images whose impetus and energy are fascinating



ON TOP

Together with the UltraDeck we also received MoFi's 370 gram „Super Heavyweight“ plate puck that is filled with granulate. The rack and damper specialist HRS developed this, and it made the sound more sonorous, cleaner and smoother, and on top of that provided even more order in the spatial reproduction – also with other turntables. Price: around 250 Euro. Strong recommendation!

STEREO®

STEREO-MAGAZINE.COM

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