
avantgarde
ACOUSTIC
uno SD
OUR MOST COMPACT STATEMENT.

Table of Contents.

Holger Fromme, Founder, owner and CEO

Foreword.

2021 marks the 30th anniversary of our company – and we are still doing the same thing we did at the very beginning: we manufacture horn loudspeakers - only better and better.

We started producing our first UNO model in 1991. Through continuous development and our quest for perfect sound and the perfect musical experience, each generation of the UNO design has pushed the boundaries of performance.

The G3 Series is absolutely unique in its combination of innovative technologies. Driver systems which have been meticulously perfectionated during the past 30 years and have been brought to an outstanding level of perfection. Combined with a totally controlled probagation of the sound waves from the membranes to the listener. Drivers and spherical horn resulting in specification of 107dB at 18 Ohms. Absolutely amazing.

And all this is complemented with our groundbraking ITRON technology. A technology which does not simply amplify an electrical signal, but which directly controls the acceleration of the membranes.

The G3 Series is a state-of-the-art R&D project based on a deep understanding of the acoustical principles, electro-physical regularities and elaborate German engineering.

To make air molecules vibrate so that we can hear music, that´s what the G3 Series does better than anything else. It introduces groundbreaking new technology; it refines and elevates aesthetic design; it achieves an almost perfect balance between form and function.

Built by experts – built for a lifetime and beyond.

Vision.

Our vision is to create the perfect loudspeaker, modern yet timeless,
a statement that will last for decades.

Our aim is to give listeners goose bumps, flood them with unforgettable musical experiences
that transcend the possibilities of mere audio.

Our goal is to reproduce music as perfectly, thrillingly and realistically as possible – and to do so with products
that are as beautifully designed and timeless as they are remarkable.

Values.

PASSION	INNOVATION	PERFECTION	QUALITY	CUSTOMER SATISFACTION
We love what we do - and want to inspire others to love it too.	We develop and use the most advanced technologies – our products consistently break new ground.	We are not easily satisfied – close enough is never good enough.	We don't just build speakers to perform – we build them to last: for decades!	We are our customers – if our products make us smile, we know you will too

Awards.

We have received numerous awards for our unique purist designs as well as the consistency of our brand values and identity, including the German Brand Award and the IF Design Award.

Our products regularly redefine the benchmark for measured performance, achieve “Best in Test” and glowing reviews from the most respected, experienced and influential audiophile reviewers and magazines.

But most important of all, is the constant affirmation and positive feedback we receive from our customers, proof positive of the uniquely musical musical performance and unparalleled communicative capabilities of our loudspeakers.

Member of Rat für Formgebung
German Design Council

The Avantgarde Sound.

What do Avantgarde Acoustic loudspeakers sound like?

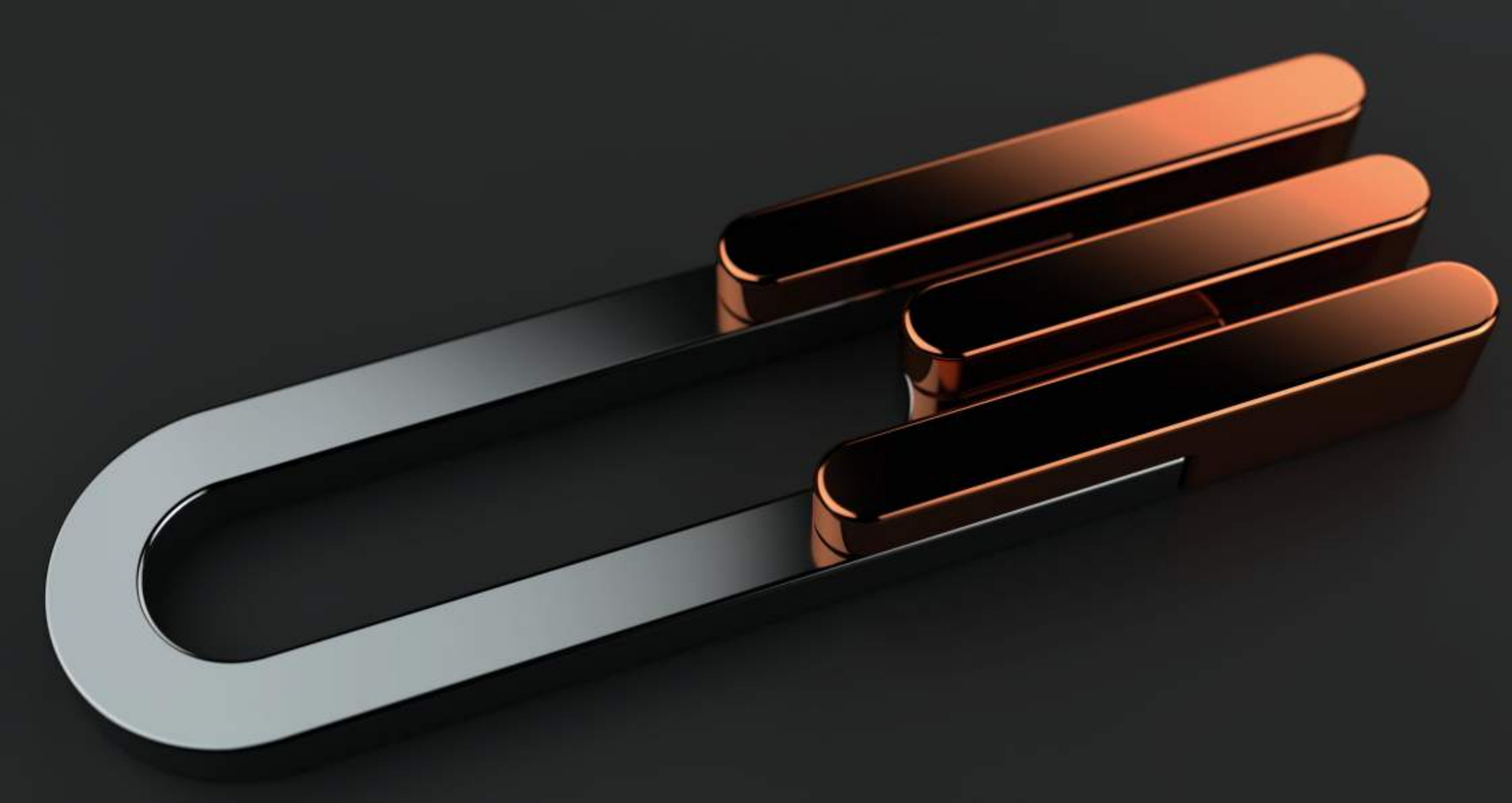
They sound like music: present and immediate – almost magical thrilling; dynamically live and three–dimensional; intimate and subtle; powerful and intense; gossamer, delicate and nuanced.

They can make walls tremble or lips quiver, they can bring you out in a sweat or bring tears to your eyes. And they can do it again, and again – and again. Our loudspeakers let you experience music is a uniquely different and direct way – just like the live event.

To fully realize this performance has taken years of dedicated research into clearly defined, fundamental principles. We call them:

The Six Pillars of Avantgarde's Sound Architecture.

- HDR Extreme^{AA}
- NanoTone^{AA}
- TimePerfect^{AA}
- TrueSpace^{AA}
- CustomFit^{AA}
- NaturalPlus^{AA}



Excellence reinvented.

G3 stands for "Generation 3", the successor and next step up from our acclaimed XD series. Starting with the original Generation 1 models in 1993, this is the second time in 30 years that our technologies and product platforms have been completely renewed.

The G3 Series takes nature horn principle to its (il)–logical extreme: sheer musical power unleashed through the use of unbridled efficiency coupled to an extended frequency range.

Optional with the iTRON^{AA} fully active modules – our patented GameChanger technology, with which we directly control the acceleration of the membranes through a perfectly orchestrated current flow. For a perfect, distortion-free, crystalline and natural sound that almost sounds like live.

Incredible detail, stunning dynamic range – both loud and soft – fabulous spaciousness and huge, customizable bass performance – that's the G3 Series.

Highlights.

- New generation Evolution drivers for increased dynamics, lower distortion and even purer sound.
- Innovative XT2 and XT3 tweeter with new ‘Long Throw’ Horn, extended supertweeter frequency range and record–breaking distortion values.
- Co–planar arrangement for the acoustic centre of all drivers, for stunning musical and spatial coherence.
- NatureCap[AA], Avantgarde’s unique, proprietary super-capacitor, with outstanding specs and incredibly delicate sound.
- Equipped as standard with the E-Fuse circuitry, an electronic fuse for an even more precise dynamic reproduction.
- Optional patented and fully active iTRON[AA] Current Drive, for perfect control of driver output and the ultimate sound.
- Iconic and instantly recognizable design language, combined with future–proof modular technology for easy, future electronic upgrades.
- Piano lacquer finish of the bass cabinets and new elegant colour and design options for an even more individual configuration of your dream loudspeaker.

UNO SD Concept.

OUR MOST COMPACT STATEMENT.

SEMI-ACTIVE HORNSYSTEM

107 dB sensitivity
18 ohm Omega midrange driver
500 mm spherical midrange horn
Soft mesh membrane
Midrange without passive freq. crossover
100V PolarisationPlus circuit
1 x 10 inch bass driver (152 mm voice coil)
500 Watt subwoofer amplifier
Digital sound processor with EQ

The UNO is a scaled–down version of the classical DUO system. The objective was to accomplish the clarity and power of its "bigger" brother in a significantly reduced enclosure.

The 500mm spherical midrange horn covers a wide bandwidth down to 300 Hz. Midrange and tweeter drivers are equipped with Omega voice coils. With this high impedance technology we improve the interaction of membrane movement and amplifier signal. The result is 18 ohms impedance combined with 107 dB system sensitivity.

The Evolution^{AA} XM1 is a 127 mm midrange horn driver optimized for large, linear excursion. Its new "Soft–Mesh–Compound" membrane uses a stable grid carcass as its structural foundation. The microscopic apertures of the grid are sealed with a proprietary synthetic elastomer coating. The combination of a stable grid structure with a flexible lining effectively reduces partial resonances of the dome itself and absorbs distortions.

For the UNO SD we completely redesigned the tweeter assembly. The XT2 tweeter's lighter, annular diaphragm extends its frequency range up to 22,000 Hz with 107 dB sensitivity, ensuring greater clarity, focus and harmonic resolution, a fuller and more natural sound.

The UNO SD is combined with a powerful subwoofer module, utilizing our new powerful XB10 driver in a bass reflex configuration. We have increased the voice coil from 100mm (of the old UNO) to 153mm. This gigantic 6–inch diameter motor structure achieves astonishing levels for force factor and power handling, while at the same time significantly reducing thermal compression.

The G3–500 bass amplifier of the UNO SD has 500 watts and is equipped with an advanced digital sound processor. The new user interfacce allows for a simple adjustment of the sound to individual preferences and for a seamless integration of the system in different rooms.

UNO SD

OUR MOST COMPACT STATEMENT.

Opposites are simply fascinating us:

A compact horn speaker with a capital sound performance. A distinctly reduced product design with downright lavish and sophisticated technology inside. That is the UNO SD.

The entry into the cosmos of our classic horn loudspeaker designs, and yet already a statement that knows only few competition.

G3 MODULAR TECHNOLOGY
- Modular technology with Multipin Power Connector
- Subsequent upgrading with additional modules possible
- Future built in by simply upgrading to new technology

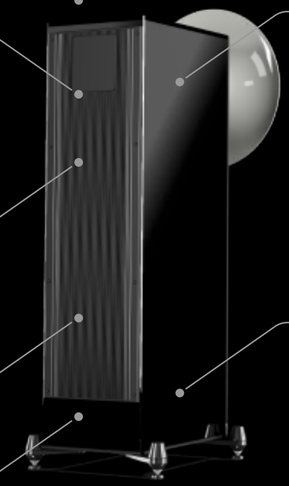
G3 FREQUENCY CROSSOVER
- Spheric Low Cut Technology
- AirGate sound filtration chamber
- new NatureCap capacitor
- 3rd generation PolarisationPlus circuitry

optional

ITRON ACTIV POWER MODULE
- Patent pend. Current drive technology
- symmetrical, single-ended circuit without any negative feedback
- direct control of the membrane acceleration

G3-500 BASS AMPLIFIER
- 500 Watt power output
- processor controlled active filters
- new G3 user interface for programming

HIGH END E-FUSE ELECTRONICS

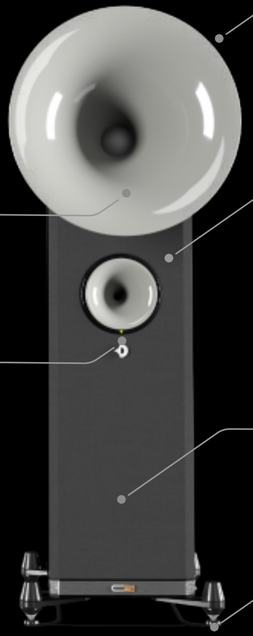


COPLANAR DRIVER ALIGNMENT

PIANO HIGH GLOSS FINISH

NEW COLORS
- High Gloss finish
- High Gloss Metallic finish
- Super Matte finish

ON/OFF SWITCH & LED

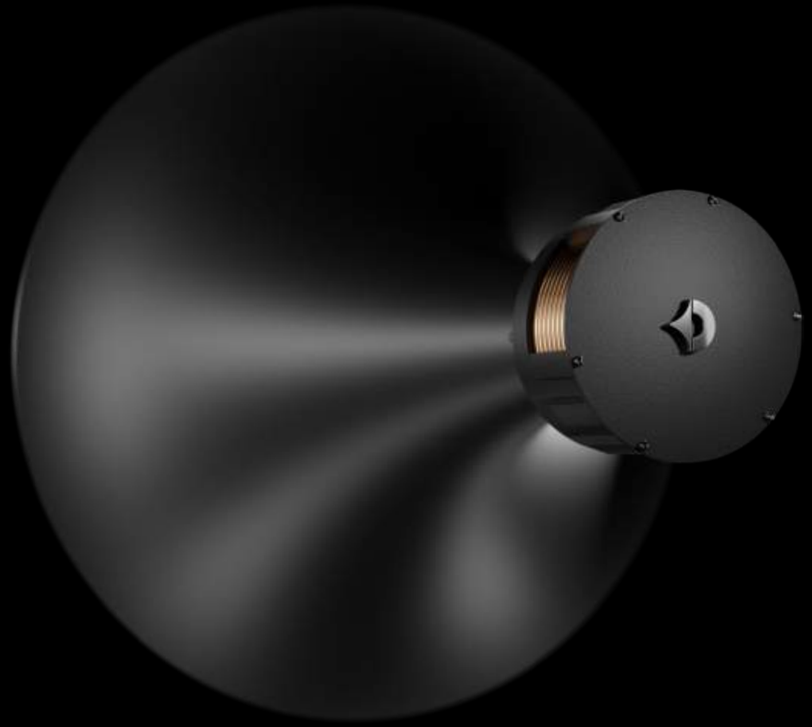


XM1 MIDRANGE UNIT
- new improved XM1 Evolution driver
- 107dB efficiency with 18 Ohm Omega technology
- 500mm spherical midrange horn

XT2 SUPER TWEETER UNIT
- new 160mm tweeter horn with 145mm length
- new improved XT2 Evolution driver
- annular diaphragm with duplex suspension
- extended frequency range up to 22,000 Hz

XB10 BASS DRIVER
- new 10 inch XB10 driver with 152mm voice coil
- 1.15 Tesla flux density on 480mm voice coil length
- Membrane composite of long-fiber paper and carbon fiber

SPIKE ASSEMBLY
- variable angle adjustment of the spike booms in 7.5 degree steps
- Aluminum die casting vibration damper element
- Precision spike made of CNC milled solid material



Spherical horns.

LOUDSPEAKER ROYALTY – PERFECTED BY AVANTGARDE.

More than 30-years ago, we transformed a fundamental natural principle into a unique product portfolio, using precise mathematical algorithms. Superior horn technology using the most precisely calculated spherical wave horns ever made. With the G3 Series, the basic physical laws of sound conversion have become indivisible from the process of design. Form follows function. Natural efficiency generates engineering and artistic elegance.

SETTING LIMITS TO OVERCOME LIMITATIONS.
Instead of uncontrolled radiation in all directions, our spherical horns emit sound waves with perfectly controlled directivity. This acts to both concentrate the sound – improving perceived efficiency, presence and energy – and reduce unwanted sidewall reflections that muddle and distort the music.

LESS LOSS, MORE MUSIC.
A trumpet mounted on the front of the speaker is the most effective way to amplify sound and increase the efficiency of the system. The moving parts of the loudspeaker – voice coil and diaphragm – can be made much more compact. Smaller moving parts mean less weight and greater mechanical control.

This reduced size and weight of the moving parts results in a significant reduction in moment of inertia, increasing the sensitivity and responsiveness of the system. The diaphragm in a horn loudspeaker not only accelerates much faster, but also comes to rest more quickly, if and when the audio signal demands it.

The reduction in diaphragm area also increases the mechanical stability of the assembly. The improved mechanical behavior of the diaphragm combined with its smaller excursion significantly reduces distortion.

‘SURGICAL’–QUALITY HORNS.
The driver is one half of the equation. The spherical horn trumpet is the other. Its surface must be almost surgically smooth, its profile calculated with micro–millimetric accuracy, so that the sound waves do not ripple or refract within the horn, causing reflections and thus interference and distortion.

Avantgarde’s spherical horns are not just incredibly complex in design and development, their manufacturing requires incredible accuracy and consistency, involving massive steel tooling and the sort of clean surfaces normally only found in operating theatres.

SQUARING THE CIRCLE.
Did you ever see a trumpet with a square mouth? To take full advantage of the natural laws that govern horn performance, the horn itself must be circular.

The sound waves thus propagate linearly from the circular diaphragm of the driver over the course of the horn and on into the room, completely free of diffraction or interference.

SCIENTIFICALLY PROVEN.
We have subjected our horn speakers to the most exacting, independent scientific testing. The results from the university laboratory tests even impressed the researchers!

- 8 x greater dynamic range
- 90% less distortion
- 10 x more resolution

What do those results mean in musical terms? This range from the softest sound to the loudest is 8 x greater with an Avantgarde speaker.

At the same time, due to the much lower distortion and higher resolution, our horn systems are able to clearly and accurately reproduce musical sounds and textures, the tiny details that bring recordings to life, that are finer by a factor of ten than with conventional loudspeakers in a box design.

Drivers.

A PERFECT HORN NEEDS A PERFECT DRIVER.

Behind every beautiful horn there should be a beautiful driver. At Avantgarde, every drive unit is developed specifically and alongside its corresponding horn element. Since spherical wave horns place special technological demands on the driver and, at the same time magnify inaccuracies by a factor of ten – just like an acoustic magnifying glass – we have to take extreme care in our driver development. It has taken more than five years of refining, experimenting, improving, measuring and listening to create the new Evolution driver series. Horn and driver have been perfectly matched and merge to form a single, coherent unit of outstanding quality and performance.

THE IDEAL FREQUENCY RESPONSE FOR THE PERFECT SOUND.
A horn amplifies more efficiently the lower the frequency. For a perfectly balanced sound, our drivers must thus reproduce higher tones at a correspondingly louder level. That's why conventional drivers simply won't work in a horn speaker, meaning that not only do we design every driver ourselves, each Evolution^{AA} Series driver is painstakingly designed for and matched to Limitless a single, specific purpose.

LIMITLESS POWER.
The column of air in the horn imposes a greater resistance and is more closely coupled to the movement of the driver than in speakers without a horn. To overcome this initial mechanical impedance, our drivers have to be equipped with much more powerful magnet assemblies and motors.

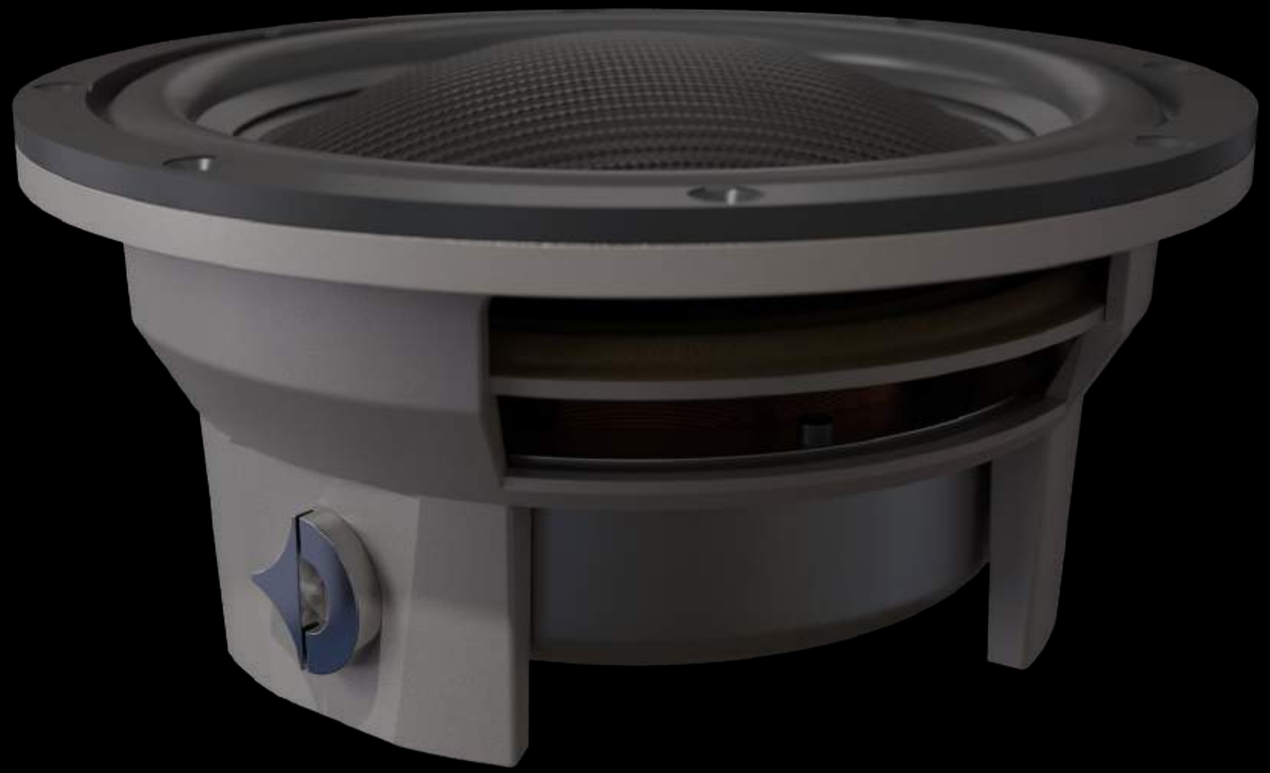
Compare our Evolution^{AA} horn drivers to conventional drive units of similar size and you'll discover that they generate vastly greater power. To achieve this we must use the most sophisticated design, technology and construction, combined with superior, cost–no–object magnetic materials: U-Yokes made of 0.05% low carbon steel, Y40 classified ferrites and exotic rare earths like Cobalt and Alnico.

PRECISION IS THE PRODUCT OF ATTENTION TO DETAIL.
Because horns amplify sound with such extraordinary efficiency, any distortion or non–linearities in the driver are also amplified accordingly. For this reason, our Evolution^{AA} Series drivers have to meet performance, consistency and quality control standards that are ten times higher than conventional design and manufacturing processes.

OUR HITEC DIAPHRAGMS. – STABLE, LIKE A ROCK IN THE SURF.
Spare a thought for the diaphragms in our drivers. Positioned between the air mass in the horn and the power of the magnetic motor, they exist in a world where an apparently immovable object is constantly assaulted by an irresistible force.

Helped by their smaller dimensions, our diaphragm and suspension systems are also specially designed to resist torsional forces, while our triple layer material sandwiches a stiff, Kevlar core between two anti-resonant coatings. The result is an incredibly stiff component which still exhibits the best self–damping in its class.

Continued on next page



Drivers.

A PERFECT HORN NEEDS A PERFECT DRIVER.

SPHERICAL DOME MEMBRANE.
The spherical–dome geometry used for the diaphragms in our Evolution drivers is precisely matched to the corresponding trumpet element to ensure a phase–coherent sound pressure curve within the horn. The perfect radiation of the sound waves is crucial for the final performance.

AIRGATE TECHNOLOGY.
By precisely controlling the chamber that couples the driver diaphragm to the horn mouth we can filter high–frequency distortions, reducing them by a factor of four, a natural phenomenon that sees distortion literally vanish into thin air.

MORE RESISTANCE FOR MORE CONTROL.
Our Omega voice–coil technology used in the G3 Series Evolution[AA] drivers, gives them extremely high electrical impedance, making them very easy to drive. That effortless drive characteristic allows amplifiers to perform at their best and speaker cables to sound better than ever. The speaker has more authority, less distortion and more control, for a more precise response.

SINGLEFRAME.
The new G3 Series SingleFrame drivers employ robust, cast baskets that also enclose the motor elements, creating a totally stable mechanical foundation for the moving components of the Evolution[AA] drivers.

LINEAR FORCE SUSPENSION.
Conventional drivers are designed for multiple applications in a wide range of different designs. Normally, the stiffness of such a driver's suspension increases as it approaches the limits of its travel. In an Avantgarde system, because we can precisely define the operating range and physical characteristics of each and every driver, we can also develop special suspension elements with linear stiffness throughout their travel, avoiding compression and limited dynamic response.

INPHASE RESPONSE.
In redesigning the Evolution[AA] drivers, we have succeeded in significantly improving the phase response of the drivers over their respective frequency ranges. With phase–coherent output, all frequencies are emitted at the same time, avoiding frequency related steps or jumps in volume and preserving the spatial relationships within the recording.

Aligning the drivers.

ENGINEERING A CO–PLANAR DRIVER ARRAY.

In the G3 Series, all drivers occupy precisely the same plane. This means that their acoustic centers are perfectly aligned, creating an identical distance from each sound source to the listener. The signals from the each source (tweeter, midrange and woofer) arrive at exactly the right time and with the proper musical relationship.

XT2 – the new tweeter.

THE FASTEST EVER UNO TWEETER

Although the sensitivity of human hearing decreases above 5,000 Hertz, musical overtones and harmonics are crucial to individual instrumental timbre. Accurately reproduced upper registers are vital to identifying specific voices or instruments, to creating an airy, open sound-stage and to precisely locating individual sounds in space.

The UNO SD uses the all–new XT2 tweeter. A radical change from our previous designs, every aspect of driver and horn has been revised. We have developed a completely new horn profile with a far longer throat, along with a totally new driver to match it, producing fantastic measurements and unbelievably superior performance.

145MM 'LONGTHROW' HORN.
Improving high–frequency performance meant redesigning the horn and driver from scratch. The result is a completely new tweeter horn. At 160mm in diameter, it is 30mm wider than the old Uno horn. At the same time, we have increased the length from 65mm to 145mm. As a result, we have a lower cut-off frequency with significantly increased acoustic power. This makes it possible to drive the horn with a much smaller diaphragm.

ANNULAR DIAPHRAGM & DUPLEX SUSPENSION.
In contrast to the dome shape of the XD tweeter, the new Evolution^{AA} XT2 tweeter uses a completely new geometry. Its annular diaphragm, with duplex guides on the inner and outer rims, is lighter and at the same time mechanically more stable, ideally suited to withstand the higher back pressure of the new 160mm horn.

RECORD DISTORTION LEVELS.
With the new Evolution^{AA} XT2 high-frequency driver, THD values are 6dB lower than with the XD tweeter, 50dB lower than the actual music signal. Distortion values have been reduced from 1% to 0.85% compared to its predecessor.

HIGHER EFFICIENCY. PURE SOUND.
With the new tweeter horn, we've managed to squeeze even more sound pressure out of a smaller and lighter diaphragm. In the lower frequency range we achieve a record-breaking 115dB with a clean upward sloping frequency response. This enables us to use a higher frequency for the high pass filter to improve power handling and headroom of the Evolution^{AA} XT2 compared to the previous model.

PERFECT TIMING AND NO PHASE SHIFTS.
The new Evolution^{AA} XT2 high-frequency driver achieves reference values when it comes to the measurements of temporal offset across the frequency range. With a linear phase progression of less than 50 degrees (4,000 – 20,000 Hz), this exceptional driver is in a league of its own, capable of reproducing even the highest frequencies without timing errors.

22,000 VIBRATIONS PER SECOND.
The Evolution^{AA} XT2 tweeter's lighter, annular diaphragm can vibrate much faster than the previous model. The frequency range covers up to 22.000 Hz, ensuring greater clarity, focus and harmonic resolution, a fuller and more natural sound.

XM1 – the midrange unit.

AVANTGARDE MIDRANGE PERFORMANCE.

When people talk about high–end sound, they talk a lot about treble and even more about bass. But nobody talks about the upper bass (or fundamental range) and midrange. Yet 290 – 4.000 Hz is not just the area where our ear is most sensitive, it's the range in which you find both the human voice and most instruments. More than 80% of our auditory perception (and musical appreciation) happens in this area.

Therefore, for us – no matter how high the treble or how low the bass – it is the quality of the low–midrange that really defines the quality of any high–end audio system. That midrange carries the essence, the very "soul" of the music.

It is very difficult to realize a lightning–fast reproduction in this range with horns, which is why this is where the high-end wheat is separated from the audio chaff. Here the sound transforms from good to "out–of–this–world". Get this range right and the sound is transformed, perceived as warmer and fuller. At the same time, the dynamics of the bass harmonics give the music an undreamt–of energy, precision, presence and penetration from low frequencies right up through the upper–midrange.

500–280–75. DREAMY VITAL STATISTICS!
The spherical wave horn of the XM1 midrange unit has a diameter of 500mm, a length of 280mm and a horn neck opening of 75mm. That's not just pretty big, but also pretty unique and, let's face it – just downright pretty. And because it is so big, it will easily cover the frequency range from 290 Hz up to 4.000 Hz at a mind blowing sensitivity of 107dB.

AN EXTRAORDINARY ENGINE.
To achieve low–frequency performance levels that push the limits of what's technically possible, you need one thing above all: power. That's why we've equipped the new Evolution^{AA} XM1 midrange horn driver with the best rare–earth magnets available. For an even stronger magnetic field, we've also added InnerCore magnets to the space inside the voice coil former. Pure power for pure, explosive sounds.

LEAVE NO STONE UNTURNED – REGARDLESS OF COST.
In designing the Evolution^{AA} XM1 midrange horn driver, we've used every technique and every material available to us: TripleLayerCompound^{AA} diaphragm, AirGate^{AA} filter, SphericDome^{AA} architecture etc. etc. Superior technologies based on over 30–years of experience, combined with a manufacturing precision that is second to none.

Our Evolution^{AA} XM1 midrange unit – extending the unmistakable, phenomenal sound that has made Avantgarde systems so famous. The midrange unit projects musical energy, generating 107dB sound pressure levels from just one, tiny watt. There is no competition.

The XM1 simply delivers an outstanding midrange – bar none.

Filter.

THE PERFECT CROSSOVER.

The purpose of a crossover in any multi–way loudspeaker is to prevent the same frequencies being produced by different drivers simultaneously. If that happens, the tones can overlap, resonate or cancel each other out. This interference must be avoided at all costs for credible, high-quality musical reproduction – reproduced music that sounds like life. If the horns are the soul of our speakers, the crossover is the beating heart.

It's a challenge on which many loudspeaker designs come to grief, a challenge our designers have taken seriously indeed, developing components and entire, unique technologies to deal with this critical issue.

SPHERICLOWCUT TECHNOLOGY.
Each of our spherical horns can only reproduce low tones down to a certain, clearly defined frequency. If the wavelength of the notes becomes larger than the dimensions of the horn, those notes cannot properly propagate and are automatically filtered. Through careful calculation and without any additional componentry, Avantgarde horn drivers use SphericLowCut^{AA} technology to achieve perfect, perfectly natural low–frequency roll-off, the most efficient possible filter, based entirely on physical laws and devoid of any artificial artefacts.

AIRGATE TECHNOLOGY.
With AirGate^{AA} used for the midrange we have developed an innovative passive technology that filters high frequencies without placing a single component in the signal path. Unique, innovative and without the typical, negative side effects.

NATURECAP.
Despite the AirGate^{AA} and SphericLowCut^{AA} technologies, there are still situations in which additional electronic filters are indispensable, often outside the driver's pass-band: for example, to protect tweeters from low–frequency impulses or to prevent thermal overload of the driver.

For these applications we have developed the NatureCap^{AA}. An extremely elaborate capacitor, hand-built in Germany, instead of wafer–thin coated plastic foils, the electrodes of the NatureCap^{AA} are made of solid, roled aluminium. We use a cellulose fibre compound impregnated with biological oils as the dielectric. It is an extremely complex and expensive process, but due to the much higher weight of the solid aluminium and the damping properties of the oils, it is also much less susceptible to high–frequency vibrations.

The newly developed NatureCaps^{AA} are approx. 25 times larger and considerably heavier than the capacitors from the XA Series. Just achieving stable attachment to the circuit board requires specially manufactured brackets. It might be difficult to build and difficult to employ, but the NatureCap^{AA} sounds simply wonderful.

POLARISATIONPLUS CIRCUIT.
To prevent the dielectric field of our NaturalCAP^{AA} from oscillating with the changing polarity of the musical signal, we fix the magnetic alignment of each capacitor with a small DC circuit. This patented PolarisationPlus^{AA} circuitry renders the polarity absolutely stable, enabling cleaner processing of incremental signal changes.

XB10 – Voice Coil 153mm.

RADICAL BASS – RADICAL DRIVER.

We have developed a completely new 10 inch driver for the UNO SD.

Compared to the driver in the previous version of the UNO, we have increased the voice coil from 100mm to 153mm. This gigantic 6–inch diameter motor structure achieves astonishing levels for force factor and power handling, while at the same time significantly reducing thermal compression.

The magnetic structure is built around two high–grade magnets that have to be created in Europe's largest 200,000 volt facility. The resulting 1.15 Tesla magnetic flux density acts on a voice coil that is 480mm long – more than 50% longer than the previous model.

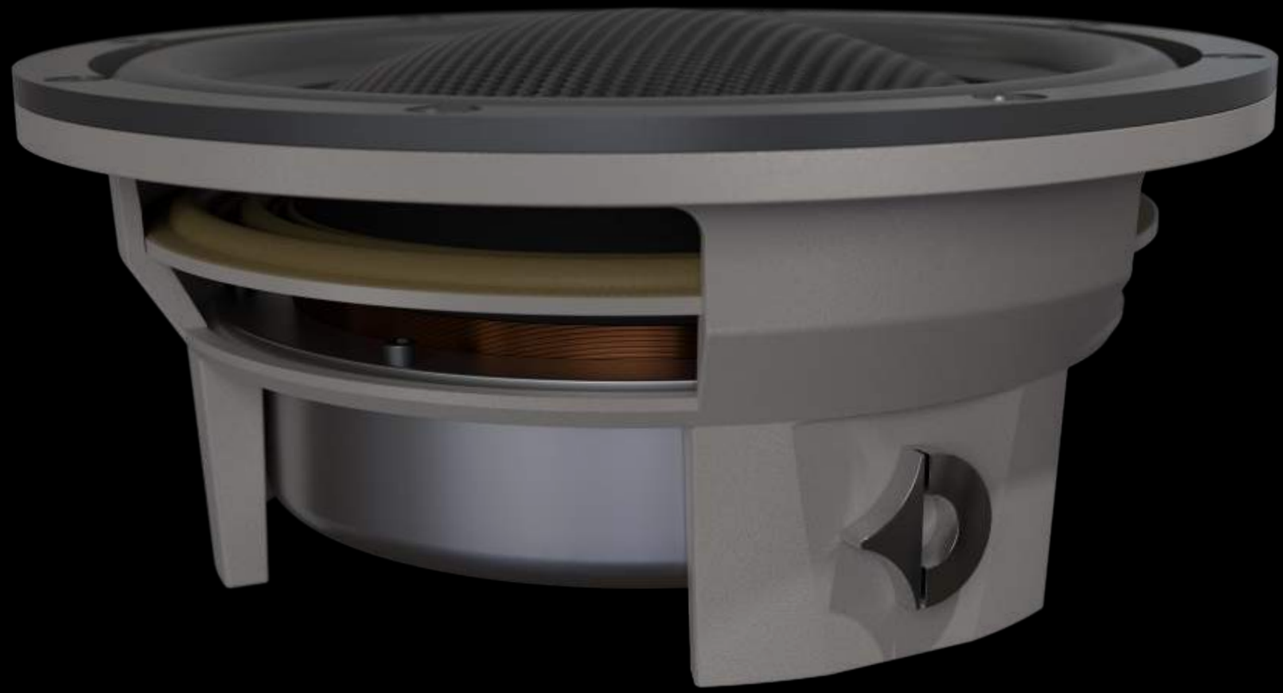
We use low–carbon steel for pole plates that were specially developed for the XB10. To ensure high linearity even at maximum excursion, the suspension spider has a patented dynamic profile with progressive behavior of its surround.

The surround itself is made of low–loss NBR (acrylonitrile butadiene rubber) to achieve a fast and clean transient response.

The diaphragm comprises a composite of long–fibre paper and carbon fibre – extremely stable and torsionally stiff for a precise piston movement.

The XB10's new SingleFrame chassis has robust die–cast aluminium outriggers that also enclose the magnet, to ensure the total mechanical stability of the motor structure's moving parts.

The XB10 is the absolute reference in terms of 10 inch bass driver technology and performance. It underlines the unique, uncompromising nature of the UNO SD. It underpins their unique, uncom-promising musical performance too!



Bass amplifier.

POWER TO ROCK & ROLL.

The active subwoofer of the UNO SD is driven by the G3–500 power module. This integrated amplifier consists of a 500 watt amplifier, providing for ample headroom even in complex EQ settings.

A 12–volt switching voltage input allows the subwoofer to be powered on remotely.

Direct connection to integrated amps, power amplifiers or receivers is done via speaker-level input terminals. Line level inputs via XLR terminals are available alternatively. The signal take–off is not only at high impedance, but is also balanced and transformer coupled. This floats the circuit ground, avoiding hum loops and easing connection to balanced and bridged amplifier designs.

The entire electronic unit is protected by a State–of–the–Art E–Fuse circuit. This is not only much faster and thus safer than conventional fuses, but also superior in terms of sound.

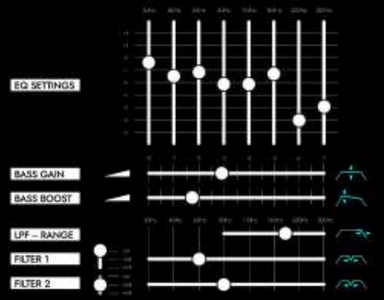
Digitale crossover.

EVERYTHING UNDER CONTROL.

The bass power amplifier is equipped with an advanced digital sound processor.

With a precision and bit accuracy that cannot be achieved with analog technology, the digital crossover eliminates all passive filter elements in the signal path.

The subwoofer volume is adjusted via two buttons on the DSP display.



Numerous additional settings (e.g. high and low pass filters, equalizers, etc.) can be programmed with the Avantgarde Control software. For this purpose, the DSP has 2 x LAN sockets, which allow daisy-chaining and thus programming of several subwoofers simultaneously. A USB connection is optionally available.

The user interface has been completely revised and now allows a very simple intuitive use by the customer. Thus, all parameters can be easily adjusted to the room acoustics or listening habits.

The BASS-BOOST fader can be used to boost the low frequency response below 45 Hz and thus adjust the bass response from "linear" to "fat".

For individual frequency adjustments, the DSP has an 8–band equalizer. Each of the 8 x bands can be boosted or cut by up to 4 dB. This way the bass response can be adjusted to specific sounds (linear, techno, disco, pop, etc.) or some broad-band room resonances can be reduced.

The LPF–RANGE slider adjusts the upper crossover frequency of the subwoofer and thus the "tonal balance" of the system.

With higher frequency the subwoofer partly overlaps with the frequency response of the midrange horn. This makes the sound character of voices / instruments "warmer" and "fuller".

When the crossover frequency is set to a lower frequency, the subwoofer and midrange frequency response have a small gap. The tonal balance of the system shifts towards a more "dynamic & punchy" sound.

FILTER 1 & 2 are narrow band "notch" filters with a level cut of –3dB or –6dB. These filters can be used to eliminate/reduce unwanted narrowband resonant frequencies of the room.

Innovation, that revolutionize the sound.
The amplifier, that is not an amplifier.

iTRON

OHM'S LAW

$$I = U/R$$

Current Voltage Resistance

iTRON.

CURRENT DRIVE – DELIVERING PERFECT CONTROL.

iTRON^{AA} is a revolutionary electronic circuit from Avantgarde that, for the first time ever, allows perfect control of the driver's diaphragm, achieving an incredibly detailed, pristine and crystal-clear sound. The difference to conventional amplifiers is so great that we call it our game-changer technology.

iTRON^{AA} is based on the current convertor circuit principle. Our patented development is based on the concept of an ideal voltage-current converter being the perfect driver for a dynamic loudspeaker. Innovative, stringent and, above all, electro-physically correct. iTRON^{AA} is not an amplifier, but "the most sophisticated driver engine in the world". In order to better understand this logic, we would like to take you on a short excursion into the basics of electro-physics.

HOW A LOUDSPEAKER WORKS.
A loudspeaker converts electrical energy into acoustic signals (sound). The functional principle is based on current flowing through a coil suspended in a magnetic field. It is important to understand that the acceleration of the diaphragm is caused by the magnitude of the current flow – and not by the magnitude of the electrical voltage.

HOW AMPLIFIERS WORK.
Paradoxically, however, practically all commercially available audio amplifiers work on the principle of voltage amplification. This means that an amplified voltage, which varies with and tracks the music signal, is fed to the loudspeakers. Strictly speaking, the voice coil is supplied with the wrong signal – a current flow is needed to generate sound, not a voltage. The fact that this sub-optimal system nevertheless works is due to the electro-physical relationships between voltage, current and resistance.

OHM'S LAW.
Ohm's law states: the strength of the electric current flowing through an object is proportional to the electric voltage at constant resistance. This means that if the voltage increases at a loudspeaker voice coil with constant impedance (e.g. 8 Ohms), the current flow increases proportionally and the diaphragm is accelerated in a linear fashion, tracking the input signal.

Conversely, Ohm's law also states: for the same voltage, the current flow depends on the resistance. The greater the resistance, the smaller the current flow and vice versa. The diagram below with the water containers illustrates these relationships.

In the case of a real–world loudspeaker, with constantly changing impedance, this means that the diaphragm's acceleration is no longer linear compared to the input signal, introducing significant distortion.

It is therefore crucial to understand the actual impedance characteristics of any loudspeaker.

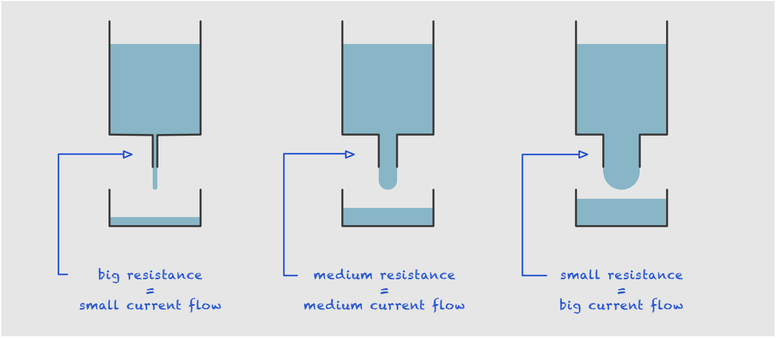


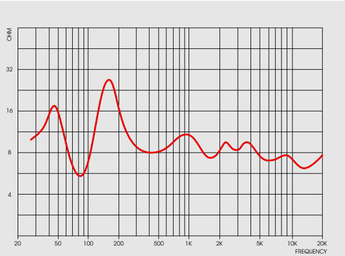
Fig. 3 Water tank with identical water level or pressure (= voltage).

Loudspeaker impedance.

THE ORIGIN OF THE SINGLE BIGGEST ERROR IN AMPLIFIER DESIGN.

A dynamic loudspeaker is a complex electro-physical system whose resistance, i.e. impedance, is influenced by a multitude of factors. Difficult to control, these factors constantly change during operation.

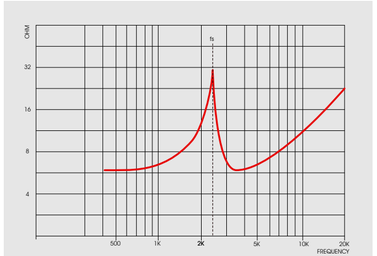
FREQUENCY–DEPENDENT IMPEDANCE CURVE.
The impedance curve of any drive unit varies but is highest in the range of its resonant frequency. A voltage amplifier reacts to this changing impedance, reproducing certain frequency ranges too loudly or too softly, distorting the music signal.



Impedance curve of a multi–way loudspeaker

INDUCTIVE REACTANCE OF THE VOICE COIL.
The inductive reactance of the voice coil causes increasing impedance at high frequencies. With a voltage amplifier, this causes a drop in level at higher frequencies, especially with tweeters.

POSITION–DEPENDENT INDUCTANCE.
The inductance of a voice coil depends on its distance from the pole core. When oscillating in and out, this distance changes and thus automatically changes the electrical inductance. Operated with a voltage amplifier, a driver thus produces



Impedance curve of a tweeter

continuous distortion that can be up to 20%, depending on the driver's stroke. Dynamic music impulses are thus distorted.

BACK EMF.
A voice coil with current flowing through it generates a negative voltage when it swings out, which is fed back into the loudspeaker cable. This so-called counter–electromotive force (back EMF) reduces the incoming voltage, voltage that is actually required for a voltage amplifier to track the music signal. Music impulses are reproduced too softly and dynamics are compressed.

THERMAL COMPRESSION.
During operation, a voice coil carrying current heats up, sometimes considerably. Heat increases its internal resistance and under full load the impedance of the driver can increase by up to 40%. Musical impulses are strongly compressed and there is a considerable reduction in dynamics.

THE INERTIA OF AN ACCELERATED MASS.
In physics, inertia is the tendency of moving bodies to remain in their state of motion. In relation to the loudspeaker, Newton's 1st law means that the accelerated diaphragm tries to maintain its direction of movement, independent of the music signal. The magnitude of this force, which directly counteracts the music signal, depends on the moving mass of the driver and the speed of the diaphragm's movement. In practice, this means that loudspeakers with a high moving mass cause considerable non–linearities at high volumes.

Fig. Resistor

Fig. Voice coil

The challenges facing current amplification.

OR, WHY CURRENT DRIVE IS NOT COMPATIBLE WITH EVERY LOUDSPEAKER.

As explained in detail, a loudspeaker is an extremely complex load and impossible to operate without distortion, at least with a voltage amplifier. Nevertheless, virtually all, audio amplifiers are based on this principle. Why voltage amplifiers? Why are there practically no current amplifiers on the market? The reasons lie in a basic incompatibility between current drive and conventional passive loudspeaker cabinets and in the enormous complexity of current amplifier technology.

CURRENT DRIVE RESTRICTIONS.
A current amplifier cannot control a drive unit in the range of its resonant frequency. This is the range at which any loudspeaker is loudest and at the same time has its impedance maximum. The iTRON^{AA} circuit would try to compensate for the peak and "pump" ever more energy into this range. The electronics would be overloaded and the loudspeaker would therefore inevitably boom at this frequency.

To further complicate matters, the principle of the current amplifier does not work with passive cross–overs. Instead of precisely controlling the current flow in the voice coil, parts of the current would flow unhindered through and flood the passive crossover.

So, current drive technology cannot be used in the drivers' resonant frequency range and cannot be used on a passive speaker.

Since practically all loudspeakers are based on these principles, only voltage amplifiers can be used in these applications.

THE AVANTGARDE WAY.
But we are so convinced of the clear superiority of our iTRON^{AA} current drive technology, that we developed a system topology just to exploit it. By moving to a fully active system, in which each individual drive unit has its own iTRON electronics, we can ensure that each driver is operated outside its resonant frequency range and that there are no passive crossover components in the signal path.

iTRON- the greatest technological challenge.

THE PUREST VOLTAGE–CURRENT CONVERTER EVER.

iTRON^{AA} is the greatest technological test we have ever faced. Theoretical knowledge is one thing, but its implementation is the real challenge. As with any fundamental innovation, it demanded extensive basic research.

We developed the most diverse circuit concepts and extensively tested them on the widest range of drivers, with technical measurement and comparative listening, the entire development programme taking over five years. The end result: a patented circuit that outclasses every voltage amplifier known to us and puts all previous current amplifier concepts in the shade.

Established current amplifier circuits work either as a voltage amplifier with a current feedback or as a current amplifier with feedback. In both variants, the negative feedback turned out to be too sluggish for the requirements of a high-end audio amplifier.

The iTRON^{AA} circuit, which we have submitted for a patent, is a symmetrical, single–ended circuit without any negative feedback. The output is a perfectly controlled current that exactly follows the voltage at the input. Strictly speaking, therefore, the iTRON^{AA} circuit is not really an amplifier at all, but a sophisticated voltage/current converter, an engine that directly controls movement of the driver diaphragm.

LABORATORY TESTS.
To demonstrate the dramatic advantages of the iTRON^{AA} circuit, we can simulate its behavior compared to a voltage amplifier using laboratory modeling techniques. The two graphs show a simulation of both concepts using a 2–way box loudspeaker. The curves for input voltage (blue), output voltage (green) and output current (red) are slightly shifted relative to each other for greater clarity.

With the voltage amplifier (Fig. 1), the input voltage is amplified perfectly to the output voltage. In this circuit, the current (red curve), which actually accelerates the diaphragm, builds up only slowly due to the inductance of the voice coil and runs sluggishly behind the input voltage. Pulses of musical energy are inevitably slowed down and reproduced with a time delay.
The simulation of the iTRON^{AA} current amplifier (Fig. 2) shows the completely different way in which this circuit functions: the output voltage (green curve) does not follow the input voltage, but peaks dramatically (approx. 20V) at the beginning of the input pulse. The current amplifier circuit thus generates a short max. voltage so that the inductance of the voice coil is overcome and the current starts to flow immediately. In this case, the output voltage peak runs ahead of the output current, but the output current is a time–correct, practically perfect 1:1 copy of the input voltage.

SUMMARY.
In terms of both operational principle and measured performance, the iTRON^{AA} current drive circuit is superior to any voltage amplifier on a compatible loudspeaker. No other amplifier concept is able to drive and control the voice coil so perfectly: innovative, stringent and, above all, electro–physically correct.

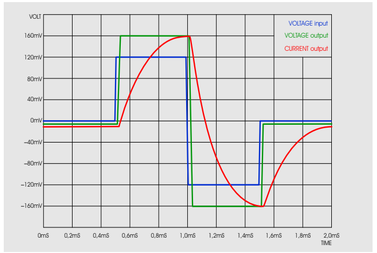


Fig. 1: Voltage amplifier simulation

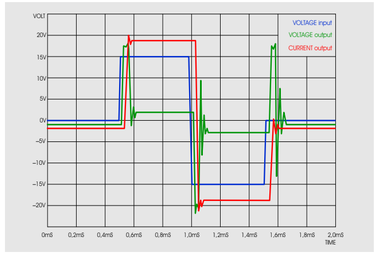


Fig.. 2: iTRON current amplifier simulation

The iTRON Modul.

THE BEST AUDIO CURRENT AMPLIFIER OF ALL TIME.

The iTRON[AA] circuit (patent pend.) combines the innovative direct voice coil drive technology of the current amplifier principle with a state–of–the–art circuit topology of uncompromising high–end technology.

The iTRON[AA] module of the UNO SD includes 2 x analog crossovers and 2 x completely autonomous current amplifier circuits.

The active crossovers limit the operating range of the amplifiers to the exact frequency range of the respective driver. This ensures that the current amplifier does not operate within the resonant frequency of the drivers. In the signal path of the circuit we use the superior sounding NatureCap[AA] components. Extremely intricately designed capacitors, handmade in Germany.

The iTRON[AA] circuitry is fully balanced. The circuits operate exactly differentially and any interference that may occur thus neutralizes each other.

The current amplifier is designed as a single-ended amplifier. With this circuit design, the operating current is always larger than the actual music signal and thus has by far the lowest distortion and the purest sound.

The limited slew rate of multiple amplifier stages results in a certain delay time between the input and output signal when using negative feedback. This adds up accumulatively over several amplifier elements and leads to audible sonic degradation. iTRON[AA] is consequently a pure zero-feedback circuit that operates without any negative feedback in the signal path.

The generously dimensioned power is provided by modern power supply technology of the latest generation. All electronics are protected by a state–of–the–art E–Fuse circuit. This is not only faster and thus safer than conventional fuses, but also much better in terms of sound quality.

The iTRON[AA] active module is connected via a balanced XLR input. For the balanced connection of additional subwoofers, an XLR daisy-chain output is available.

With the power mode switch 4 different power on/off modes can be selected. A 12V trigger input is available for automatic remote power on.

Via GAIN switches the input sensitivity can be adjusted. To avoid sound degrading potentiometers in the signal path, 3 x precision switches in an additive stepped arrangement are used for this purpose.

The volume of the 2 x UNO SD horns can be adjusted in adjusted in +/– 1.5dB steps. The settings can be made according to personal taste, to match the sonic "tonality" of the connected source devices or to slightly correct room acoustic influences.

The place where paradise caresses music.

HORN TECHNOLOGY AND CURRENT DRIVE – THE PERFECT PARTNERSHIP.

The speed and dynamics of our horns combined with the control and resolution of the iTRON^{AA} circuitry is an audiophile marriage made in heaven – a perfect combination – a seamless junction between the world of acoustics and the world of electronics. It is the place where paradise caresses music.

What does iTRON^{AA} sound like? Fantastic, phenomenal, audibly invisible, unforgettable, beyond our wildest dreams or simply super awesome? We are happy to leave the struggle for an adequate description to you: music – live music – means different things to different people. But we would like to point out a few attributes that distinguish the performance of our iTRON^{AA} current drive from that of the very best and most highly regarded voltage amplifiers.

SUBSTANTIALLY BETTER DYNAMICS.
iTRON^{AA} delivers much wider and more natural dynamics because the impedance fluctuations in the loudspeaker are effectively eliminated, the current output (and thus the acceleration of the diaphragm) perfectly tracking the input signal. The power in the musical performance is unleashed. Like live. Like an audio system on steroids.

ETHEREAL RESOLUTION AT LOW VOLUMES.
The iTRON^{AA} circuitry is able to compensate perfectly for inductance effects, especially at very low volumes and with the most delicate electrical signals. Even the quietest sounds have a presence and intimacy, delicate texture and attack, dimensionality, tonal shading and luminous harmonics. Even the quietest passages come to life...

UNRESTRAINED HIGH FREQUENCIES.
iTRON^{AA} has tremendous high–frequency resolution because it compensates perfectly for the increasing inductance in the tweeter. Combined with the extended frequency response of the new G3 super–tweeters, this means fabulously delicate reproduction right up to the highest frequencies, without the level drop otherwise inherent in other systems.

THE MOST PRECISE TIMING THERE IS.
With the iTRON^{AA} circuit, the output current does not lag behind the input signal as it does with a voltage amplifier. Leading edges start at precisely the right moment and rise to exactly the right level. The diaphragm starts to accelerate at the correct time and moves just the right distance. With iTRON^{AA} every detail, every facet of the sound happens in the moment – the right moment. Temporal accuracy to within one thousandth of a second – separate sounds (so, separate instruments) in perfect harmony.

EXTRAORDINARY DIMENSIONALITY.
iTRON^{AA} delivers outstanding impulse response from loudspeakers (see Fig. 2). Even the smallest time differences in music are reproduced with crystal clarity, recreating the three-dimensional space in which the recording was made, sitting you in the middle of the front row at the live event.

NO DISTORTION FOR EVEN PURER SOUND.
Let's cut to the chase: there's no amplifier that sounds anywhere near as natural as iTRON^{AA} The artificial artefacts that bedevil voltage amplification, overlaying, smearing and distorting the musical signal are entirely eliminated. This technology disappears. The sound detaches itself from the loudspeakers, simply existing in your space. The music has a natural clarity and purity – and because of that it has the power to touch our heart.

CONCLUSIONS.
As you can see, we are pretty excited. We see iTRON^{AA} as a technological step-change, a game-changer that establishes a completely new level of audio and musical performance. Sound that simply sounds like music. Its superiority to conventional technology is so marked that once experienced, you'd rather listen to iTRON^{AA} in mono than stereo with a voltage amplifier. Suddenly, eliminating losses in the amplifier/speaker chain means that even an MP3 music file can sound more impressive than the best high-res playback on a conventional system!

You probably think that we are exaggerating? Go to your dealer and find out for yourself. Listen to our iTRON current drive technology and compare it with the best voltage amplifiers in the market.

Our customers have always been the final judges, our most demanding audience. We have never awaited that judgment with greater confidence.

Modular technology for adaptability and longevity.

EVERYTHING IS POSSIBLE. EVERYTHING IS SIMPLE.
EVEN THE FUTURE IS ACCOMMODATED.

We have the right technology for every situation. The UNO SD offers the optimal solution for a wide variety of customer needs and is available in two versions:

- PASSIVE
  Requires a conventional, external amplifier

- FULLY ACTIVE with iTRON current drive
  Operation without external power amplification, directly from a pre–amplifier or DAC.

EASY TO REPLACE AND UPGRADE.
The electronics module supplied with the UNO SD is modular to provide maximum flexibility. Each model has an exchangeable technology module that is connected to the loudspeaker via a multi-pin power connector. Pull out the plug and replace the technology module with the new one. That's it!

This means that you can convert or upgrade one version into another at any time: a PASSIVE version into a VOLLAKTIV – or vice versa. This allows the loudspeakers to be easily and quickly upgraded or adapted according to the customer's wishes and needs:

PASSIVE for owners of a favourite conventional amplifier. VOLLAKTIV with the new iTRON technology for the best available sound and the uncompromising audio and musical perfectionist.

It makes the UNO SD versatile and accessible. It means that not only can the entry level for initial investment be lower, but the electronics modules can be kept constantly up to date, incorporating the latest technology or new digital standards, even after many years, extending working the life of your speakers, keeping it at the cutting edge of performance and protecting the value of your purchase.

Protecting your investment and for generations to come.

Individuality.

A WORLD OF ALMOST LIMITLESS POSSIBILITIES.

Each shade of our 12–color collection has been carefully selected. Our claim is that the shades of colors are both timelessly elegant and expressive. That they integrate harmoniously into your home and that they emphasize the beauty of the horns.

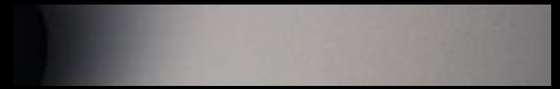
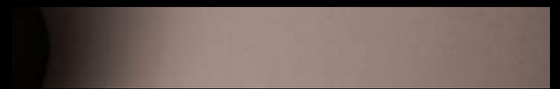
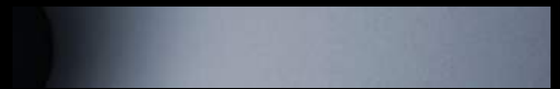
The inspiration for the selection of the colors is partly our origin – the Odenwald, with its natural, soft and earthy nuances. We are close to home and nature and we are down–to–earth.

At the same time, we are always creating new ideas, questioning the existing, striving for perfection – and are fascinated by astronomy. Therefore, we have also been inspired by the universe – with all its colorful beauty – which is ultimately the origin of us all.

Horn Colors.

	**NO. C1**	**Andromeda.** High Gloss Grey.	
	**NO. C2**	**Black Hole.** High Gloss Black.	
	**NO. C3**	**Genuine Red.** High Gloss Racing Red.	
	**NO. C4**	**Total Eclipse.** Metallic High Gloss Orange.	option
	**NO. C5**	**Red Giant.** Metallic High Gloss Dark Red.	option
	**NO. C6**	**White Dwarf.** Metallic Pearlescent White. (ex Akoya Pearl White)	option

Horn Colors.

	**NO. C7**	**My Milky Way.** Metallic High Gloss Silver.	option
	**NO. C8**	**Very Venus.** Metallic High Gloss Light Brown.	option
	**NO. C9**	**Galactic Glow.** Metallic High Gloss Blue.	option
	**NO. C10**	**Nocturne Grey.** Ultra Matte Light Grey.	option
	**NO. C11**	**Goose Bump.** Ultra Matte Light Brown.	option
	**NO. C12**	**Audiophiles Heaven.** Ultra Matte Blue.	option

Design elements.

	**HORN MOUNT RING – BLACK FINISH.** CNC precision mounting ring in black anodised finish tweeter horn	option
	**HORN MOUNT RING – COPPER FINISH.** CNC precision mounting ring in copper anodised finish for tweeter horn.	option

Specifications.

UNO SD

SYSTEM DATA		
Frequency range	Satellite	290 – 22.000 Hz
	Subwoofer	18 – 350 Hz
Power handling		50 Watt
Sensitivity (1watt/1m)		> 107 dB
Crossover frequencies		290/2.800 Hz
Nominal impedance		18 Ohm
Recommended amplifier power		> 10 Watt
Recommended room size		> 16 sqm
Coplanar driver alignment		yes
OmegaDrive[AA]		yes
AirGate[AA]		yes
NatureCap[AA] incl. PolarisationPlus[AA] circuitry		yes

HORN		
Horn type		spherical Horn
Horn aperture angle		180 degree
Horn diameter	midrange	500 mm
	tweeter	160 mm

HORN DRIVER		
Diameter	midrange	127 mm / 5 Zoll
	tweeter	25 mm / 1 Zoll

BASS DRIVER	
Driver size	250 mm / 10 Zoll
Number of drivers	1 x XB10
Voice coil diameter	153 mm
Flux density	1,15 Tesla / 480 mm
Pole plate	low carbon steel
Diaphragm material	Paper/carbon fibre compound

iTRON ELECTRONICS (option)	
iTRON voltage/current converter technology	patent pend.
Fully symmetrical circuit	yes
Single-ended circuit	yes
Zero feedback	yes
Without negative feedback	yes
Output power	2 x 100 Watt

BASS AMPLIFIER	
Output power (RMS)	1 x 500 Watt
Digital crossover	DSP
Equalizer	8 Band EQ
Digitale room tuning	yes
Inputs	1 x SPKR Input
	1 x XLR Line Input

MODULAR DESIGN	
High Performance Multi Contact Connector	yes
Passive version	yes
Fully active version with iTRON amplifier	yes

DIMENSION/WEIGHT		
Dimensions	Width	500 mm
	Depth	615 mm
	Height (+/– 10 mm)	1.355 mm
Weight		81,5 kg

Illustrations show pre-series models. Design and colour scheme of the final model may differ.
Subject to technical changes. Copyright by Avantgarde Acoustic™. Printed in Germany.

Avantgarde Acoustic GmbH
Nibelungenstrasse 349
D–64686 Lautertal
Germany

Tel: +49.6254.306 100
email: info@avantgarde-acoustic.de
www.avantgarde-acoustic.de

UNO SD brochure, Version 3.0, July 2023 – Copyright by Avantgarde Acoustic™. Printed in Germany.