



HARMAN Luxury Update – June 2022

Getting Active with Active Loudspeaker Technology

By Dave Tovissi, Vice President and General Manager



At HARMAN Luxury Audio, innovation and technology are at the core of everything we do. For over 75 years we have employed the best methodology and tools in the industry. We develop everything from the ground up. This not only ensures success in the marketplace, but it also guarantees that our efforts exceed the expectations of music enthusiasts across the globe. By staying true to this mission, our team has produced a prolific list of audio achievements, groundbreaking technologies, revolutionary advances in the art and science of audio. We are recognized as leaders in the industry and have the patents and the awards to back up that claim.

POPULAR
SCIENCE 50 YEARS

Best powered speakers overall: JBL 4305P



times as much. Along with the enthusiasm came some relevant questions from the attendees.

Earlier this year we introduced our first active studio monitor to great acclaim. The JBL 4305P active studio monitors are the perfect solution for music lovers who seek a simpler way to listen to their favorite artists and content creators who want the convenience and connectivity built into a nearfield monitor. Last month we had the opportunity to finally demo the JBL 4305P to the public and to the industry press at High-End Munich and the feedback was amazing. Some of the attendees shared that the 4305P was the most impressive product they experienced at the show — which was quite an achievement, because the venue featured competitive products that were priced ten

What are the benefits of active loudspeakers over passive loudspeakers?

Luckily, I sat down with An Nguyen, the distinguished engineer who designed the JBL 4305P, before I headed to Munich, so I was prepared to answer why active loudspeaker designs can outperform similar designed passive speakers. An replied to my question with... "In the case of passive loudspeaker designs, the engineer does not know exactly the type or the power of amplifier that will be used together with the loudspeaker, nor does he/she know the max output that the loudspeaker is expected to play. Therefore, the engineer must over-design the system to manage most of mechanical (dynamic) and thermal stress (power handling). That approach becomes inefficient and costly. But for active loudspeaker designs, we are the manufacturer of all parts that make up the product, so we know every single component in the system. Everything from the amplifier to the cabinet, the drivers and even the speaker cable has been chosen carefully by us to match perfectly, often adding up to more than the sum of their parts. This makes the system design more efficient and improves the acoustic performance of the product."

In the case of the 4305P, An had total control of the design parameters of the amplifier and transducers. For example, due to the difference in efficiency of the 2409H-2 compression driver vs. the 5.25" woofer in the 4305P, he was able to size the amplifier power accordingly based on max output of the system (125W = woofer & 25W = Tweeter instead of 125W for each transducer). Since it is a closed system design in an active loudspeaker, An worked with our electrical engineer Armando Martinez to specify and design amplifiers that have better impedance matching to the transducers for better power transferring, lower distortion, and to maximize the SPL output and dynamics. An and Armando were able to use digital signal processing (DSP) to further enhance the acoustic performance. Active crossover filters were used to implement the anechoic EQ to improve frequency response.

Of course, consumers may not need to know all the technical differences, but they should know that active speaker systems occupy less space in their home than conventional passive loudspeakers and the electronics components. Active speakers are much easier to set up and start using. One simply connects the active loudspeakers to power and pairs the product by using Bluetooth. Once they are paired, consumers can connect them to their home Wi-Fi network by using Google Home or Apple Airplay. Lastly, one does not have to worry about someone else turning up the volume too loud and blowing the drivers. That's because our engineers have added limiters to protect the transducers from over excursions and thermal stress.

Why did HARMAN Luxury Audio wait until now to release its first active loudspeaker?

Purposeful invention is not rushed and does not happen by accident. It requires leadership, persistence and an unfaltering commitment to delivering on our ultimate design goal: create the best components for the best, most accurate sound. Advances in faster internet (5G) for better hi-res music streaming, more efficient and higher quality amplifier designs, cost efficient DSP chip sets, more reliable and higher data transfer rates for Bluetooth and Wi-Fi, makes it the right time to launch a loudspeaker such as the 4305P to meet the needs of music lovers. One other thing that makes active speakers more relevant now than ever before is the lower costs of high-resolution music services like Qobuz and Tidal.

As is the case with any innovative and different product, these loudspeakers need to be turned on and played for the consumer. We would love to hear from you on the reactions that you are receiving from your customers and if you have any creative ways that you have set the 4305Ps up and demoed them in

your showroom. We strongly recommend that you demo these loudspeakers using the playlist that An created on Qobuz. Those tracks were used to voice the drivers.

Speaking of Qobuz, did you all happen to check out An Nguyen's and Jim Garrett's interview with David Solomon, the Vice President of Qobuz? The three of them had fun talking about the product and the many use cases for them. See the video here: <https://www.youtube.com/watch?v=-M-IH7HT7u8&t=7s>

With an award-winning active loudspeaker platform developed and refined by our engineers, you can expect more active products coming to the market from HARMAN Luxury Audio in the coming months. Until then, enjoy the JBL 4305P!

What's New

Dirac Live: A New Auto Target Curve

By Jordan Matthiass
Technical Marketing Manager
Dirac

James Todd
Global Product Line Manager
HARMAN Luxury Audio Group

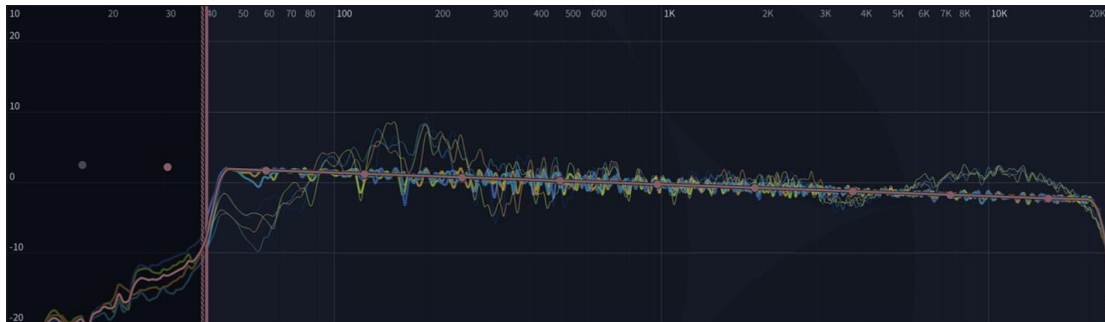


From Many of you will already be aware of Dirac Live and the benefits it adds to select ARCAM, JBL and JBL Synthesis units, as well as the end-user benefits it delivers to customers in the form of superior, optimized sound from a powerful yet easy-to-use tool.

For those of you less familiar, Dirac Live is a convenient tool for measuring the response of a sound system in a room, and then improving its sound through patented digital signal processing. The impact of the room is then reduced so that the system can be enjoyed with superior clarity and bass. Dirac Live will improve the perceived sound stage and imaging as well as calibrate multiple speakers so that they work together in the room rather than adversely impacting one another.

You can supply the best loudspeakers in the world, but the sound they create will always be imperfect when installed. Every room has its own sound, with individual bass modes that shape how low frequencies sound. Sometimes the bass ends up boomy and dominating, other times it is weak and lacking energy. The impulse response (the ability to start and stop a sound quickly) of the speakers in the room is rarely accurate and affects the overall precision of the system, meaning that in an uncorrected system, certain small details in the sound simply cannot be heard. This further affects the perception of imaging.

There are many features of Dirac Live that help deliver superior sound. In this article, our focus is Dirac Live's newest feature, one that applies to all Dirac Live projects: The Auto Target Curve (<https://www.dirac.com/dirac-lives-new-auto-target-curve-even-better-sound-effortlessly/>).



Dirac Live's classic target curve — with a flat, simplistic tilt.

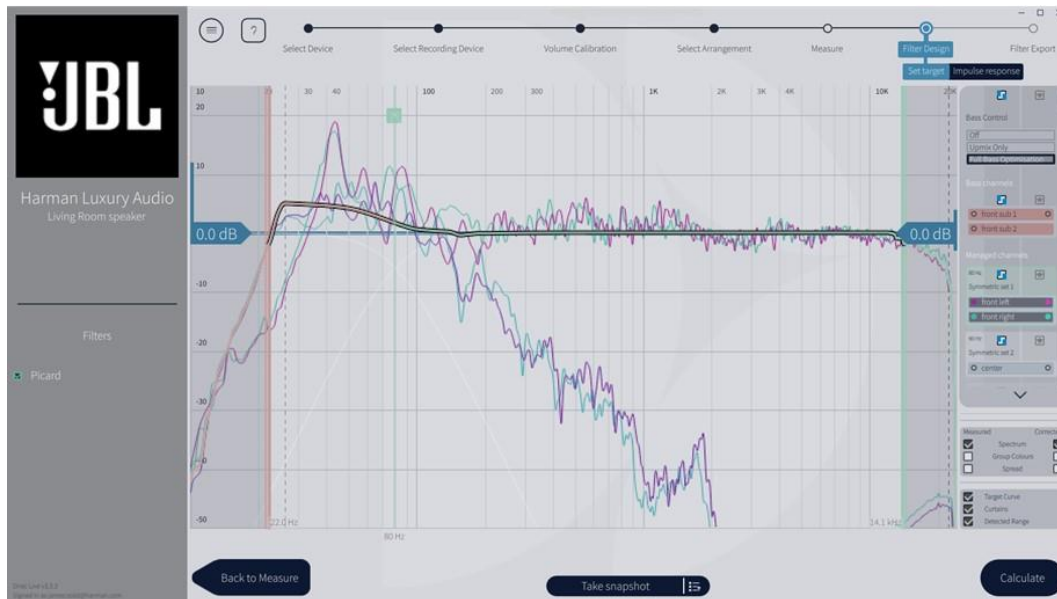


The new auto target curve — with a lifelike response tuned to your speakers' individual character.

The new Auto Target Curve more faithfully reflects the inherent character of the measured system, minus the adverse effects of the room. With the Auto Target Curve, a system can be quickly optimized without the user needing to make a single adjustment. Adjusting individual frequencies is not a necessity for getting better sound.

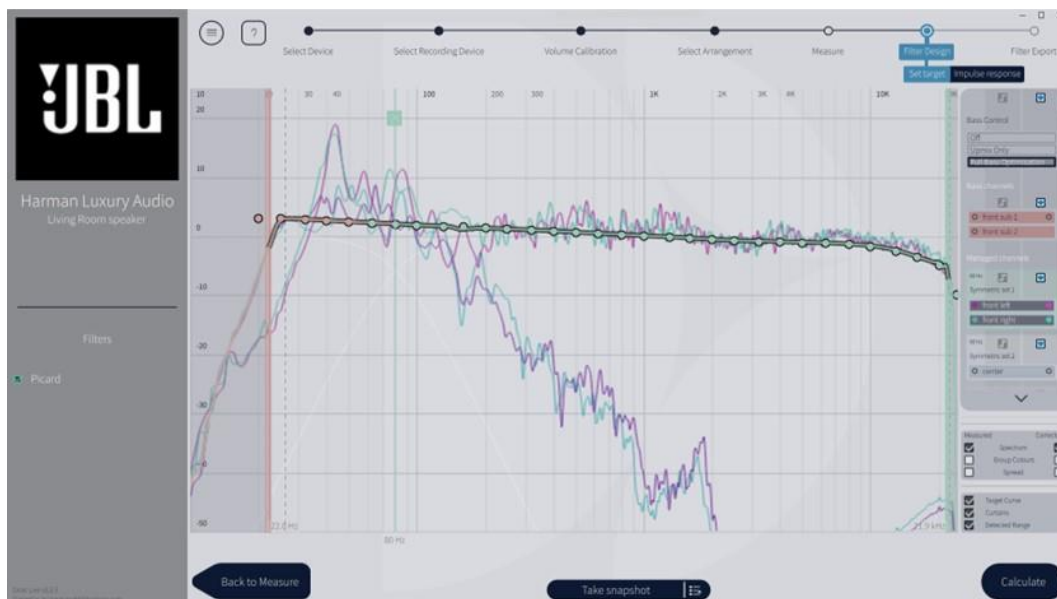
Crucially, Dirac Live's Auto Target Curve also delivers adjusted bass levels and tonality. Boomy, exaggerated bass, often the result of room gain, will still be removed, but the Auto Target Curve restores power across the low-frequency spectrum for a smoother, tighter bass response. Put simply, the new target curve system removes bass where there's too much and adds bass where there's too little to arrive at the best possible performance, tuned for the room.

We're confident that you will appreciate the adaptive nature of the automatically generated target curves, but Dirac have also made it easier than ever to adjust curves whenever you want. The current target curve design, composed of many individual points of adjustment, can be intimidating. That's why Dirac have also implemented a simplified custom filter design process, so that users simply drag a sound region up or down to increase or decrease its volume.



The new auto target curve — with simple broadband bass and treble region adjustment.

Simply pump up the bass or turn down the treble to your liking. For those of you accustomed to fine tuning a system with Dirac Live, the classic target curve designer will remain available, and this will continue to allow the application of the HARMAN Target Curve for all systems that use JBL, JBL Synthesis and Revel loudspeakers, to optimize those speakers with the same target for which they were designed.



The Harman target curve — complete with control points for fine adjustment.

The best part? The Auto Target Curve is available NOW. You can download the latest version at <https://www.dirac.com/live/downloads>

What's New

Global Trade Shows Continue to Show Strong Engagement

In last month's newsletter we asked the question "How Important Are Trade Shows to Your Business?" We also highlighted a couple of examples of successful and well-attended shows that took place in April and May with the Munich High End Show and Axpona in the U.S. The trend continues this month with overviews of two more shows in India and Japan presented by HARMAN's Puneet Jankar and Kaz Tsuchiya.

What Hi-Fi Show: May 26–28 in Mumbai, India

By Puneet Jankar
National Sales Manager
HARMAN Luxury Audio India



HARMAN Luxury Audio India team participated in the most anticipated What Hi-Fi Expo 2022 from 26-28th May with a commanding presence on the show floor. Over the years, the What Hi-Fi show has grown into the largest hi-fi show in India and is a key venue for manufacturers to showcase their newest products to a large audiophile audience. As a three-day event, the first and second day were exclusively dedicated for our business partners and systems integrators, where the focus was to create awareness across all Luxury Audio brands.



Our location for this year's Expo was on the 8th Floor & 12th floor at the Iconic St. Regis, Mumbai. At the heart of the Expo was our JBL HDI range, which won the hearts of every audio enthusiast present at the Expo. The large space gave us plenty of room to display a large selection of products from our JBL Stage, ARCAM and Revel brands. Attendees entering our space were greeted with a display of a wide assortment of JBL Stage loudspeakers including the Stage A170, A100P, A125C & A120P. The idea here was to showcase to our customers that a Luxury Audio setup accompanied by a good sound doesn't necessarily have to be expensive. Along with the current Stage line-up we also introduced the Stage 280W and 260C, which will shortly be launched in India.

The showstopper setup from JBL HDI series included HDI3800, HDI3600, HDI4500C, HDI1200P and HDI1600 powered by JBL Synthesis SDA4600 and SDP55. This setup truly delivered a "WOW!" experience to all visitors at the Expo. We also showcased the in-wall SCL2 & SCL3 and Conceal C83 alongside the HDI series to project the versatility of our loudspeaker range.



Towards the right-end of the HARMAN range were our most popular Revel speakers. The setup here included Revel F35, C25, M16, S16 WH, B1/230, B28W, C263, C283, W253L and W283. This setup targeted the prime system integrators from across the country. The wide application of Revel speakers impressed the architects and designers and stirred business discussion with our partners.

OTOTEN 2022: June 11 – 12 in Tokyo, Japan

By Kaz Tsuchiya
Senior Manager, Sales, Luxury Audio
HARMAN International Japan



HARMAN International Japan (HJ) participated in the OTOTEN 2022, which was organized by Japan Audio Society (JAS). Because of the pandemic, it has been three years since the last time this event was held. This year Ototen took place at maximum scale to celebrate the 70th anniversary of JAS. JAS requested HARMAN Japan to exhibit in the largest room available for the OTOTEN 2022 show in order to create the most excitement. We responded to the request and held the largest exhibition and demonstration in history, which included celebrating the 50th anniversary of Mark Levinson.

There were a wide variety of Mark Levinson products that were exhibited and demonstrated including the No5909. In addition, there was a full range of ARCAM products, and all JBL Studio Monitor series and L Classic series including JBL4305P, L75ms. We even unveiled the JBL 4312G Ghost Edition.

All the sound demonstrations were exhibited by utilizing TIDAL streaming and Roon as the media controller. Vinyl was played additionally in JBL Hi-End corner. Over 3,500 visitors joined OTOTEN 2022 and an estimated 1,500 visitors came to the HARMAN Japan booth.

G409 is the biggest room in Tokyo International Forum. The room was divided into three areas: JBL corner, High-End corner, ARCAM and Mark Levinson corner (shown below)





Meet the Team

Name: **Dave Wright**

Position/Job Title: **Senior Global Product Line Mgr.**

With HARMAN Since 2021 (this time)



With Meet The HARMAN Luxury Team, our goal is for you to get to know us better. In each edition we feature a different member of the team, and this month it's Dave Wright, Senior Global Product Line Manager.

How would you describe what you do in your current role?

I, like most Product Managers, identify the needs of the customer and align those with the business objectives of the company. This ensures that customers will be happy and the company will make money.

What did you study in school? Did you always imagine yourself doing something like what you're doing now, or did the fates just take you in that direction?

This may sound weird, but nothing. When I graduated from high school I was undecided on a direction, so I never dreamed I would be able to create great sounding audio products that make people happy.

How did your career path lead you to HARMAN?

My career actually started with HARMAN back in 1988. I worked for HARMAN Consumer Group as a consumer product quality manager for 10 years and then I moved to Madrigal Audio Labs, which was the home of Mark Levinson and Revel back in the day. Having spent 15 years in the industry under various roles, my career continued with such companies as Monster Cable, Good Guys, Tweeter, Russound and Savant. For a 10-year period I became a technical writer focusing on the AV industry and even had my own company for a spell. Flash forward to 2021 and I received a call from David Tovissi, whom I knew from Monster Cable and Tweeter, asking me if I was available, as they were looking for a Product Manager. I jumped at the chance to come back to the company where I started and loved to work at for the first 15 years of my career.

What is the most important thing you have learned over your career?

I have learned that companies are all about the people and how those people work and treat others. My life on the outside as it were did not always go as planned, and in those situations the people were not always the best. Since being back at HARMAN I have met some very nice, highly intelligent people - most of whom are members of the Luxury Audio team. The GPLMs go to lunch together every day and others on the team sometimes join us. We are a team at work and on the outside as well, as we all get along amazingly.

Any other advice you would offer people just starting out in this industry?

Ask questions, pay attention to those with experience, and learn the philosophy that makes things work. People may have a degree, but that is just a start as it provides the basics. There is so much to learn about our industry and the only way is to learn from the veterans who have been in the trenches for decades.

What are you most proud of in your life?

Being able to have a 30+ year career and not just a job without the benefit of a degree. Don't get me wrong, degrees are important, but having been able to grow by the on-the-job experience and having people acknowledge me for me and not for a piece of paper is pretty awesome sometimes. And I have to say that I owe that to those who were at HARMAN back in the day. People like John Eargle, who always answered my questions and treated me with respect.

When did you first realize you had a passion for music or audio?

When I was entering junior high school. Sure I had interest before, but the passion did not reveal itself until I joined the jazz band in school playing the trumpet. That is where the passion started to grow. That passion increased after I started working for HARMAN in 1988 and was around the great people who worked here and had access to high-end audio products.

What current technology impresses you the most?

I don't know really. There are some technologies that are impressive, but I kind of see them all equally.

What's your favorite music genre?

Rock is the best way to describe it as it actually covers multiple sub-genres like Classic Rock, Jazz, R&B, Dance and even Hip-Hop. My musical tastes are varied and I can't think of a time where I have played only one genre for an extended period of time.

The desert island question, of course. If you were marooned for eternity and could listen to only three albums, what would they be?

There are so many that I can listen to for days, but if I only get three they would be:

- Miles Davis, *Kind of Blue* – One of the first albums I ever purchased when I was just a kid.
- Heart, *Bebe Le Strange* – The album that got me into Heart and the one that I feel represents the band best.
- Creedence Clearwater Revival, *Willie and the Poor Boys* – Another album that introduced me to the band and contains songs that define the band.

You have the floor. In closing, tell us anything else you want us to know about yourself.

Aside for my love of music and audio, I also have a deep passion for everything automobile.

Most weekends I can be found watching an F1, GT Car, or WEC race, or out and about cruising down some twisty road. While I love all cars, I am a huge Volkswagen nut, from air-cooled Type 1s to the current cars, I go nuts for anything they produce, and that includes the sub-brands like Porsche, as well.

Dealer Profile: Upscale Audio

La Verne, California

Founder: **Kevin Deal**

Opened: **1994**

HARMAN Brands Supported:

ARCAM, JBL Synthesis, Mark Levinson and Revel

The HARMAN Luxury Audio Group is proud to have some of the best high-end consumer electronics partners across the globe. Each month, we have the pleasure of learning a little bit more about one of our dealers or distributors. This time we spoke with the folks at Upscale Audio in La Verne, California.

How long have you been in business?

Upscale Audio was founded in 1994 in Upland, California.



How many locations do you have?

In 2015, plans were started for our newest location in La Verne, California. It was completed and relocation was in 2016. Two years later, Upscale needed to grow again and took over an

even larger building across the street expanding to 26,000 sq. ft. of warehouse space, with four demo rooms, a dedicated full-service department and turntable setup lab, and video studio.

How did Upscale Audio get its start?

Kevin Deal had a vacuum tube epiphany in 1974, while in high school, and has been in the audio industry since 1978. In the early 90s Kevin saw an opportunity in vintage vacuum tubes and the huge demand for the old-time greats from brands like Telefunken, Mullard, etc. He began travelling the world looking for lost inventories, looking everywhere from Europe to Serbia to Myanmar. These rare tubes are the “attractant” that built a massive customer base for audio equipment. But more importantly, we believe in deep and meaningful relationships with our customers.

How many people are on the Upscale Audio team?

We currently have 38 people on the team, and a huge number of these are hi-fi and pro audio professionals and enthusiasts, not just in sales, but marketing, admin, warehouse and service.



Thoughts on the importance of training?

Ask our vendors. We demand it. To work at Upscale Audio, you need to be somewhat of a geek. You must have good technical knowledge. So we have training pretty much every week.



What do you like most about HARMAN Luxury Audio products and which lines do you feature?

ARCAM, JBL, Mark Levinson and Revel. We are always so impressed by the price-to-performance ratio of ARCAM. We've been JBL fans for decades, and love that they're so much fun. Mark Levinson offers incredibly high performance in such beautifully machined packages. Revel is a little under-appreciated, frankly, and more people need to hear just how amazing these speakers are.

How do you think the luxury audio industry is currently doing?

We are just exiting an unprecedented boom of free money due to the stock market and home prices exploding, low interest rates, PPP loans that are forgiven, and enhanced unemployment. And nowhere to spend it all due to COVID. We have real challenges ahead of us.

What is Upscale Audio's mission?

At Upscale, we treat customer systems like our own. We aim to deliver audio nirvana with every interaction, building up relationships, and asking a lot of questions and listening deeply to the answers, before we sell anything.

You have the floor. Anything else you want to share with us about Upscale Audio that you would like the world to know?

As it stands now, none of our salespeople are on commission, and there are many benefits. I learned many years ago that if you tell a customer "Don't waste your money on this — it's a bad idea" when it's the truth you create a deep level of trust. You won't get that when it means a salesperson doesn't close ... and get paid.

In addition, all salespeople are vested in customer happiness regardless of which person made the sale. The team spirit and affection for our customers *and for each other* at Upscale Audio is incredibly deep, and I'm very proud of that. Could I kick up sales a little by having them on commission? Maybe. But then it would not be Upscale Audio. There are some things you can't put a price tag on.

upscaleaudio.com

Tech Talk

Volume Control in Mark Levinson Products

By Dimitri Danyuk
Senior Principal Engineer
HARMAN Luxury Audio



Part 1

In its simplest form volume control is a variable resistor or potentiometer.

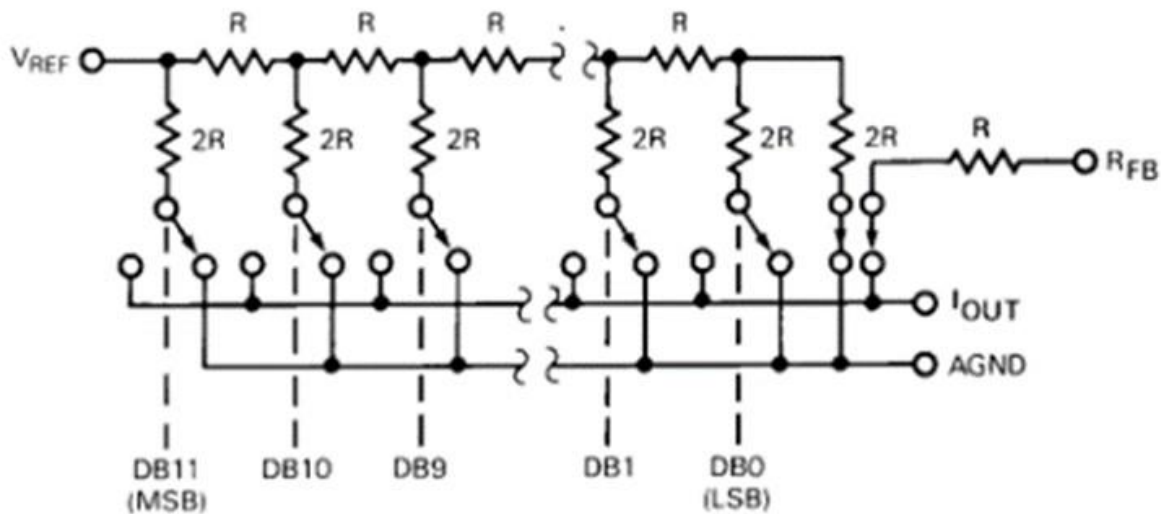
Potentiometer is a mechanical device that has a long strip of resistive material with a connection on each end of the strip and a third contact - wiper. A wiper can move up and down the length of the resistive strip. One side of the resistive strip is attached to the audio source, the other side is connected to ground and third contact – wiper becomes the output of the volume control.

The quality of potentiometer depends on the quality of the resistive element, the contacts, and the way it's implemented. Mark Levinson used the best available potentiometers for their products, e.g. Bourns 6657s with rotational [wiper] life of one million shaft revolutions or more.

It is not unusual to find the old Mark Levinson product with the mechanical volume control in the perfect working order. The last preamplifier with mechanical potentiometer as a volume control is N° 26.

Demand to control volume remotely was the main reason to implement electronic volume control.

Mark Levinson engineers chose multiplying DAC for controlling the volume. A multiplying DAC applies a digitally set attenuation to an audio signal, offering almost ideal building block for the volume control.



R-2R resistive ladder.

Multiplying DAC employs R-2R resistive ladder, shown in figure 2. The resistance ladder provides a digitally controlled output signal by means of electronic switches. Switching transient are minimized because the switches are switching between ground and virtual ground.

Integrated multiplying DAC has the ladder and switches fabricated on a die. On chip ladder resistors provide excellent tolerance and thermal tracking.

For the first time multiplying DAC was implemented in N° 28 (DAC8222 from ADI) with control provided by an optical encoder. When the optical encoder shaft is rotated, the encoder sends

pulses to a microprocessor, which converts the pulses into the control code for the multiplying DAC.

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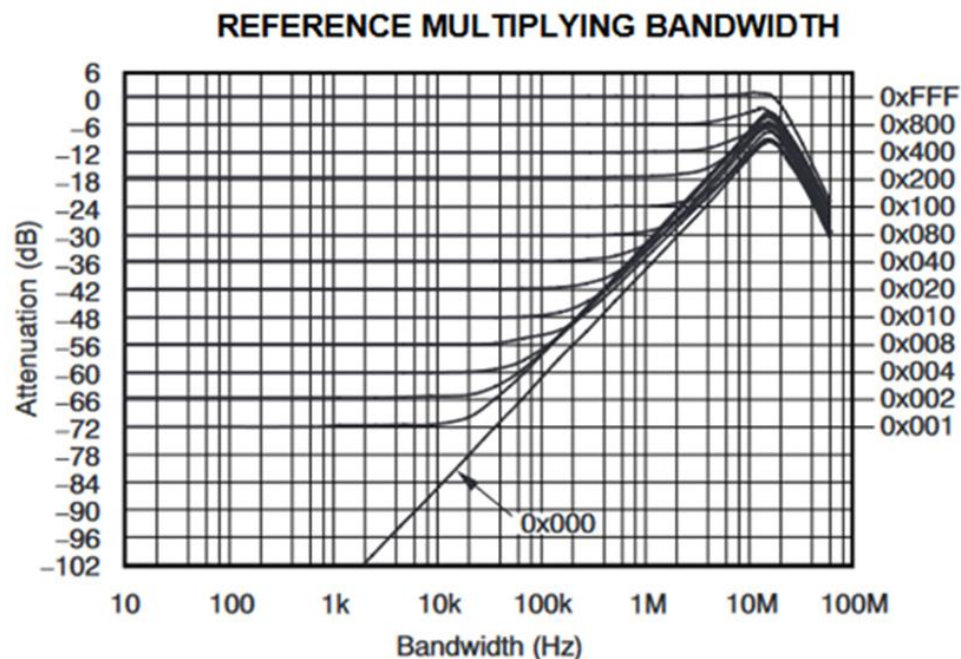
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There are two minor design challenges with integrated multiplying DAC as a volume control: resistance of the R-2R ladder and feedthrough error.

Resistance of the R-2R ladder integrated multiplying DAC is about 10k Ω . That resistance adds thermal noise that can reduce the dynamic range of the volume control.

Feedthrough error is caused by capacitive feedthrough from the audio input to the DAC output (shown below).



Feedthrough of the typical integrated multiplying DAC.

Mark Levinson engineers decided to use discrete components for R-2R ladder. The resistance of the ladder is ten times smaller than typical resistance in the integrated multiplying DACs. This allows to reduce the thermal noise of the ladder resistors and eliminate feedthrough at high frequencies.

The first discrete R-2R ladder was implemented in N° 32 reference preamplifier. Discrete R-2R ladder can be found in N° 52 reference preamplifier and in most recent products: N° 526 and N° 523 preamplifiers, N° 585 and 585.5 integrated amplifier.

In Part 2 we will discuss volume control implementation in the Mark Levinson 5000 series of products: N° 5206 preamplifier and N° 5805 integrated amplifier.

Part 2

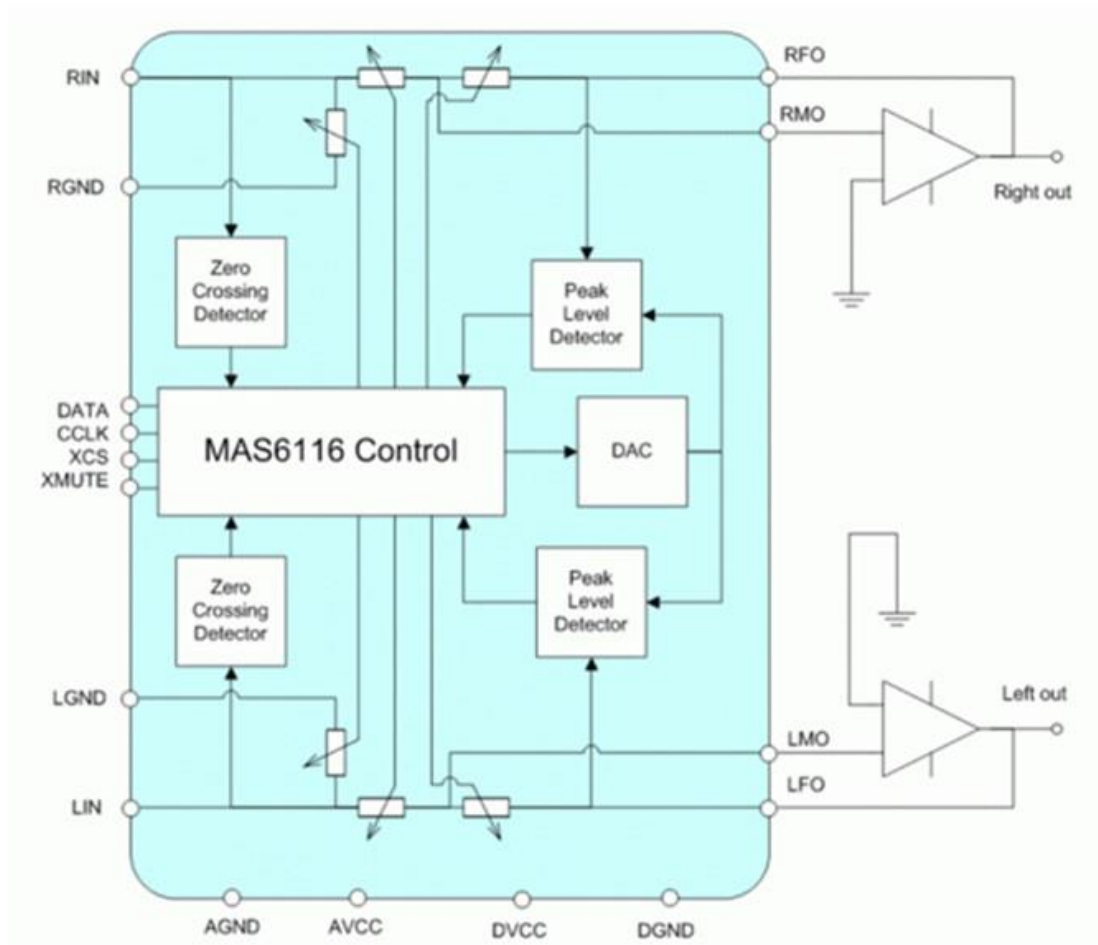
The N° 5206 preamplifier and N° 5805 integrated amplifier have two independent signal paths: analog and digital.

Analog signal path are fully discrete, direct-coupled, dual-monaural preamplifier circuitry, operating in pure Class A. Digital consist of a built-in 32-bit/384kHz DAC with 4x DSD capable, jitter-elimination circuitry, and a fully balanced, discrete current-to-voltage (I/V) dual-monaural converter. A unique single-gain stage mated to a digitally controlled resistor network for volume control is the important component of the analog signal path.

The heart of the volume control is MAS6116, manufactured by Micro Analog Systems Oy from Finland. MAS6116 is improved version of WM6116, manufactured by Wolfson Semiconductors. (Wolfson ADC/DAC business is now part of Cirrus Logic).

MAS6116 is based on R-2R ladder technology and has unique specifications:

- Gain range from -111.5dB to +15.5dB
- Gain step size 0.5dB
- THD 0.0002% in balanced mode
- SNR 124dB in balanced mode
- Crosstalk -110dB typical
- Input Signals up to +/-18V
- Zero Detection for Gain Changes
- Peak level detector



MAS6116 volume control block diagram.

To utilize the richest extent of features in MAS6116, fully custom differential (balanced input and balanced output) amplifier was designed.

That proprietary PurePath circuitry is a foundation of the Mark Levinson 5000 series reproduction capability.

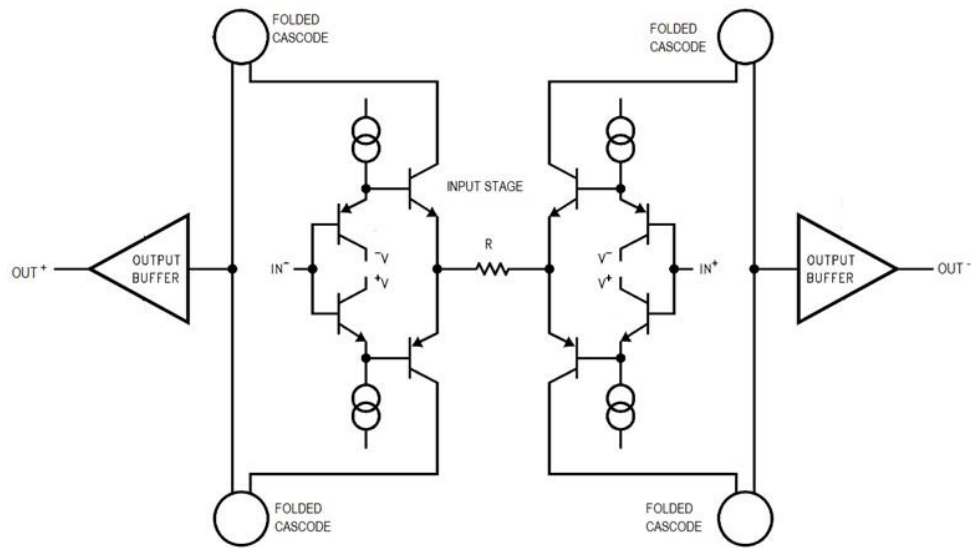
The block diagram of the amplifying block in analog signal path is shown in below.

Key points are:

- The class A input stage is fully symmetrical and converts input voltage into current.
- The output current of the input stage is converted in the voltage by the folded cascode stages.
- The triple output stage isolates the folded cascode output from the load to provide low output impedance.
- The output stage operates in class A and is powerful enough to drive dynamic headphones.

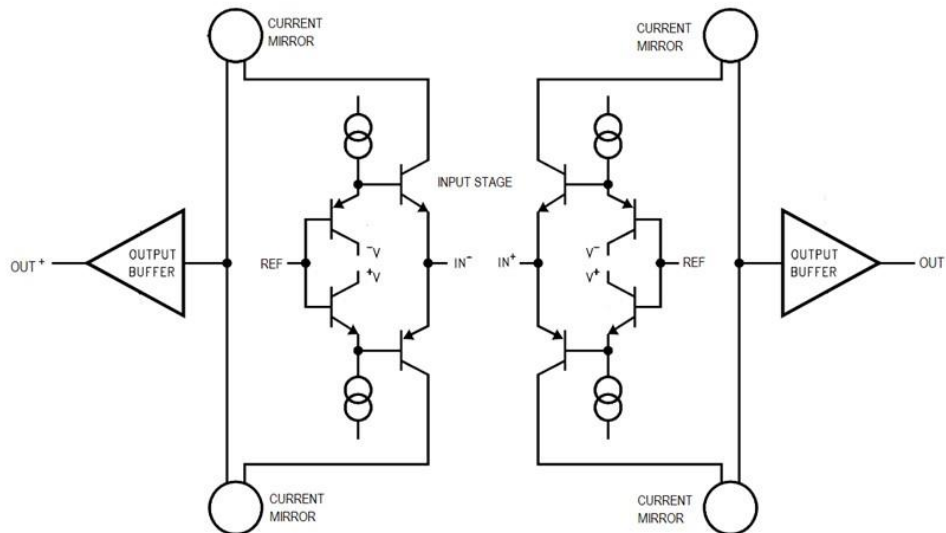
One aspect of the single gain stage is disclosed in US patent 10404222B2 (Bootstrapped application arrangement and application to the unity gain follower).

The details of the operation of the MAS6116 R-2R ladder volume control IC and the single gain stage fully differential amplifier can be found in US Patent 10720895B2 (Fully-differential programmable gain amplifier).



Block diagram of the single gain stage fully differential amplifier.

The volume control in digital signal path is implemented in the digital domain by performing mathematical operations on the digital data representing the audio signal. The volume control is internal to ESS Sabre Pro series 32-bit D/A converter and implemented just before the oversampling filter on the digital data. This allows to reduce the volume substantially without having the quantization errors. Performance-wise 32-bit digital volume control matches analog volume control.



Block diagram of the single gain stage fully differential current to voltage (I/V) converter.

The ESS Sabre Pro series 32-bit D/A converter operates in the current output mode. Current to voltage converter transforms DAC output current in the output voltage.

The block diagram of the fully balanced, discrete current-to-voltage dual-monaural I/V converter is shown in above.

The Class A input common base stage is fully symmetrical and passes the DAC output current to the output stage through the current mirrors. The triple output stage operates in Class A, provides low output impedance, and is capable of driving a dynamic headphone directly.

Mark Levinson engineers continue to pursue best in class practices, components, and patentable techniques in providing the purest results, including the volume control stage.

Training Tips

JBL Stage Architectural Training

By Dave Wright
Senior Global Product Line Manager



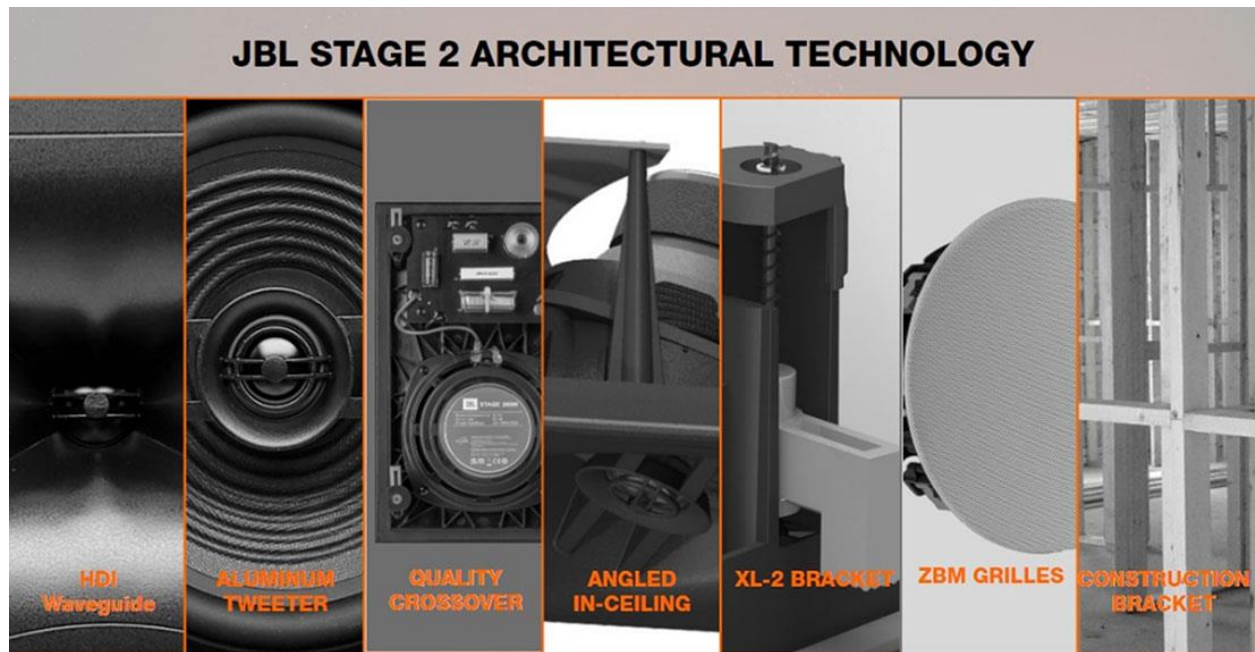
Releasing the last week of June 2022, a new training will be available for the Stage Architectural series. This training will cover the models available in the series and dive deep into the technologies that make Stage Architectural a low cost, high performing solution for architectural speakers. Look for it on the HARMAN University website.

The Stage Architectural Series was designed to deliver iconic JBL sound that blends into the environment so that the music stands out. All models are crafted to be visually discrete with zero-bezel grilles and easy installation, allowing these speakers to be heard and not seen. Elements including baffles with acoustic smoothing, acoustic lens tweeters, and our patented High-Definition Imaging (HDI™) waveguide which has been incorporated into the design to ensure that the sound is clear and accurate. Eight models are available in various configurations for In-Wall and In-Ceiling installation.

Technology Highlights

- High-Definition Imaging (HDI™) waveguide with optimized geometry for smooth dispersion and low distortion
- Aluminum Dome Tweeters with Acoustic Lens for smooth on and off axis frequency response
- Rigid Baffle design with acoustic smoothing for improved transducer integration
- XL-2 installation system compatible with up to 2" (50mm) thick wall/ceiling material
- Zero-bezel metal grille installs flush to wall or ceiling for clean, inconspicuous appearance

As always you may access all the training courses by clicking [here](#).
Once you sign in, if these courses are not populated on your home page, click “Go to Courses” to sign up. Stay tuned next month as more training becomes available.



Training Tips

Mark Levinson ML-50 50th Anniversary Limited Edition Amplifier



By Matta Dever
Senior Global Product Line Manager

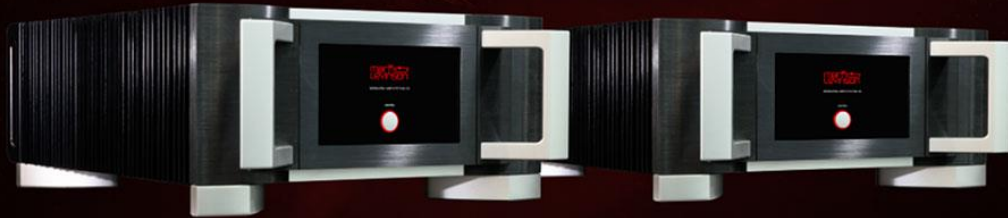
Mark Levinson ML-50, 50th Anniversary Limited-edition Monaural Amplifier Training Going Live This Month!

Since 1972, Mark Levinson has been dedicated to the uncompromising art of sound, with the guiding principle of musical purity above all else. The ML-50 is the ultimate expression of our brand essence and passion for great sound.

mark levinson

50th Anniversary

ML-50



The training will dive into the inspirations of the overall design, which echoes some of the most popular and important models of the Mark Levinson brand's storied history. You will get a look "under the hood" at the platform that the ML-50 is built upon that offers extremely clean, high power in both Class A and Class A/B delivery, improved symmetry in the Mark Levinson Pure Path signal design, and an improved temperature profile all wrapped in a work of art that showcases the internal components beautifully and elegantly.

For the ML-50 we've gone even further...

Improved Pure Path Design

- Increasing signal symmetry
- Reduces distortion
- Delivers superb transient response



Fully Balanced XLR, Quasi-Balanced RCA, and dual sets of Hurricane binding posts



50th Anniversary

The ML-50 is a fully discrete amplifier that will drive virtually any loudspeaker effortlessly for impeccable imaging, musicality and openness. Join us in learning and celebrating 50 years of the power, precision, and purity of Mark Levinson.

As always you may access all the training courses by clicking [here](#).

Once you sign in, if these courses are not populated on your home page, click “Go to Courses” to sign up. Stay tuned next month as more training becomes available.

From the Audio Files

ARCAM AVR5 AV Receiver Review



The ARCAM AVR5 gets an outstanding 5-star rating from *What Hi-Fi?* Here are a few quotes from this glowing review:

“There’s a transparency to the AVR5 that’s rare for a home cinema amp, bringing to life subtle sonic touches that lesser kit leaves unearthed. “

“There’s no shortage of AV products that claim to be equally adept at delivering music and movies, but with its rhythmic deftness, the AVR5 is a very entertaining musical performer.”

“ARCAM is so confident in the sound of the AVR5 that it has removed features that it feels don’t have mass appeal in order to bring a hi-fi sensibility to its most affordable home cinema amp.”

See the complete review [here](#).