



# M2

MASTER  
REFERENCE  
MONITOR



# Innovation Through Meticulous Attention to Detail

The core philosophy behind JBL's long history of audio innovation is based on meticulous attention to every detail of system design. If the wire needed for a new voice coil isn't available, JBL develops it. If a tool or technology doesn't exist, JBL invents it. This uncompromising commitment to the goal drives the development of every new product and technology that bears the JBL logo. In recent years, audio engineers have developed new work methods and have migrated to new work environments. Responding to the call for greater accuracy and dynamic range in this new breed of music and post production work spaces, JBL engineers developed the new M2 Master Reference Monitor. Breaking free of the conventional, the M2 incorporates numerous patented innovations to deliver unprecedented performance and a truly remarkable listening experience. Conceived and purpose built for modern recording and post production, the M2 was created so you can exercise your own meticulous attention to detail.

## The Demand for Next Generation Studio Monitors

Today's sophisticated music production is carried out in a broad range of spaces. Until now, the availability of a big, impressive, yet highly accurate monitoring experience, has been limited to purpose-built control rooms. Lacking the space, infrastructure and resources to effectively integrate large systems into their production environments, professional project studios are forced to rely on the use of near-field monitors.

As small and medium sized rooms play an increasingly significant role in cinema and broadcast content creation, high dynamic range and accuracy are required from a speaker system with a modest foot print. While JBL Screen Array® speakers are the standard on cinema mix stages, they are too large for use in smaller rooms, but near-field studio monitors don't provide the required acoustic output or dynamic range for re-mix of dramatic content.

Bringing a fresh perspective to the realities of this new production environment, JBL developed new technology to take monitoring to the next level.

## The Solution: The **M2** Master Reference Monitor

Addressing the growing need for high dynamic range and reference-monitor accuracy in a broad range of studios, JBL has developed the M2 Master Reference Monitor: a free-standing, 2-way system that can be placed in any environment to provide an exceptionally accurate monitoring experience. Leveraging a new generation of JBL high-output, ultra-low distortion transducers, the M2 provides in-room frequency response of 20 Hz to 40 kHz, and an extraordinary 123 dB maximum SPL to meet the demanding music, cinema and broadcast production requirements for impactful dynamic range.

In a compact form-factor, the M2 integrates three key components that work in harmony to deliver unparalleled performance. At the heart of the system, JBL's patented D2 high frequency and 2216Nd low frequency transducers are the engines that make this possible. Using a revolutionary design, the D2 produces smooth, extended high frequency response with ultra-low distortion whether listening at very high or subtle levels. Using patented technology, the remarkable 2216Nd woofer offers deep bass extension and very low power compression, even at its full-rated output. In spite of the M2's minimal footprint, its exceptional low frequency response eliminates the need for a subwoofer.



The unique Image Control waveguide completes the acoustic design. A marvel of engineering in its own right, this new JBL waveguide was designed specifically for the M2. Allowing an acoustically seamless transition between the woofer and high frequency driver, it produces exceptional imaging and delivers rich detail to a broad area of the room.

These unique components make possible a two-way design with an unprecedented level of performance, utilizing a single seamless cross-over point that reduces system complexity and allows a compact form-factor for flexibility of placement in the room.

Crown® Power Amplifiers with internal floating-point DSP are used to bi-amplify and tune each speaker, optimizing the M2's performance in any room.

The M2 brings a world-class, big monitoring experience with a new level of accuracy to a broad range of production spaces. For rooms wishing to step up, the M2 is a game changer.



Compared with traditional high frequency components, the annular design of the D2 diaphragms dramatically reduce distortion resulting in audibly superior fidelity.

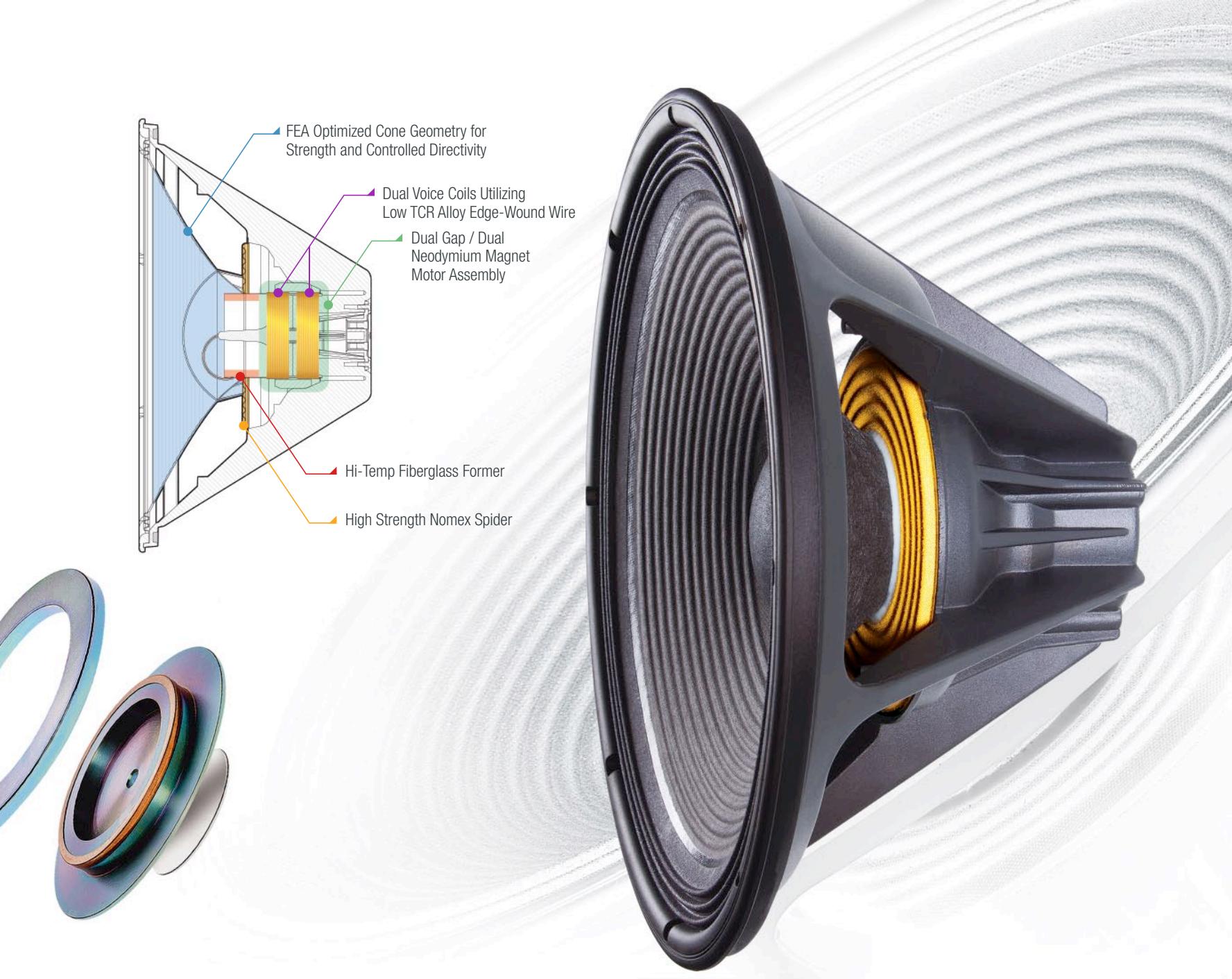
## D2 Dual Diaphragm, Dual Voice-Coil Compression Driver

The Ultimate High Frequency Driver for Critical Reference Monitoring

Extended HF Reproduction Smooth Response High Power Handling

Measurably Lower Distortion Reduced Power Compression Increased Dynamic Headroom

Exceptional system performance requires extraordinary components. To achieve their groundbreaking objectives, the M2 design engineers capitalized on new, patented JBL technology in the D2 Dual Driver, a revolutionary device developed by JBL to deliver dramatically superior high frequency response. The D2 dual driver design allows the M2 to meet seemingly opposing objectives: extended high frequency, very low distortion and very high output. Central to this innovative solution are two key developments. First: the use of an annular diaphragm, not subject to the break up modes of a conventional dome diaphragm. Second: the merging of two drivers into a single, compact transducer with a single acoustical output. Instead of the large and heavy metal dome diaphragm of a conventional compression driver, the D2430K uses two annular low-mass polymer diaphragms offering the same radiating area as a conventional 3-inch dome. Two separate 3-inch voice coils driven by their own magnet structures share the burden of heat transfer, resulting in a dramatic increase of output and power handling. The result is a high frequency transducer that produces smoother, extended high frequency response to 40 kHz and significantly lower levels of nonlinear distortion. Well-validated by objective measurements, the D2430K's superior sound quality has also been verified through exhaustive subjective listening by leading industry experts.

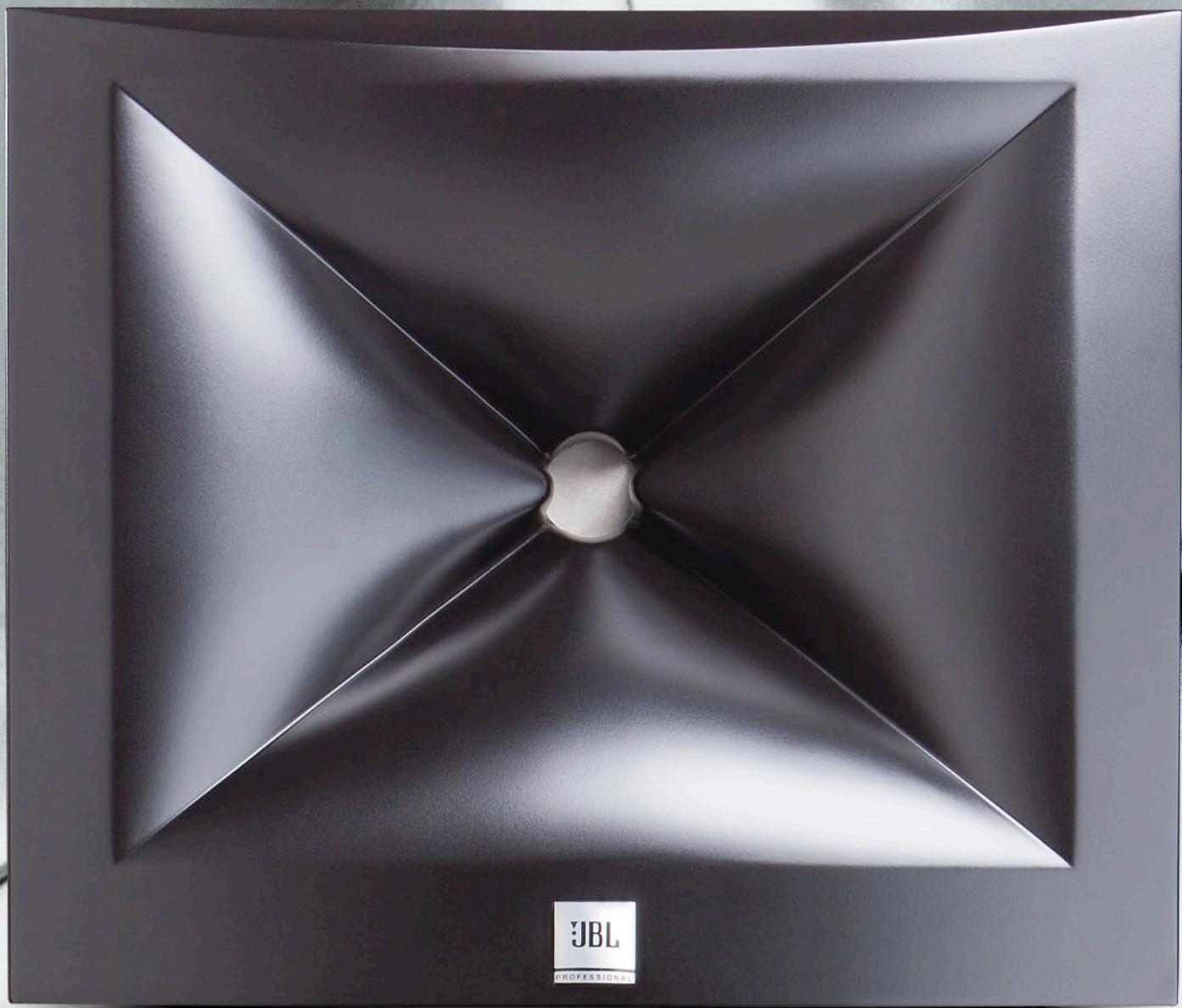


## 2216Nd

### Differential Drive® Woofer

Exceptional Low Frequency Extension   High Output  
 Very Low Power Compression   Very Low Distortion

Achieving extended, rich low frequency performance within the M2 system design parameters required additional JBL engineering innovations, and the 2216Nd in the M2 is no “off-the-shelf” woofer. It employs no less than five patented technologies to allow bass extension to the limits of the audible range, and high output, free of power compression that is detrimental to a system’s low frequency performance. Echoing the “dual driver” design of the D2, the 2216Nd utilizes dual neodymium magnets and two voice coils. To ensure the ultimate performance, even the use of special wire in the 2216 voice coils is a JBL patented application. Featuring a low thermal coefficient of resistance wire, this new JBL voice coil design allows the woofer parameters to remain more stable at high output levels. The result is lower power compression, which allows lower distortion at high system output. In addition, the 2216Nd’s cone, compliance and spider are engineered to allow greater excursion at the woofer’s lowest frequencies. In the M2 system, the 2216Nd produces impressive low frequency output down to 20 Hz.



## Image Control Waveguide

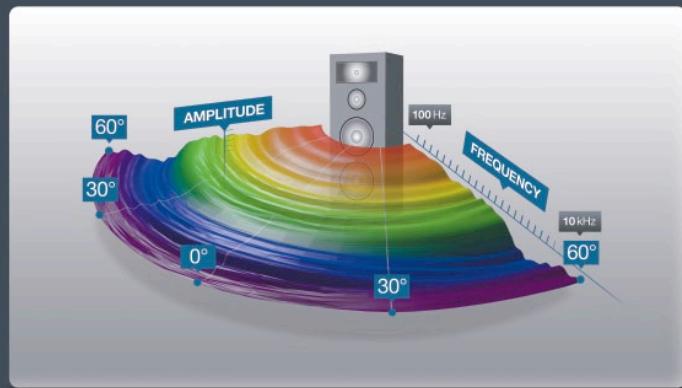
Impressive Imaging and Sound Stage   Exceptional High Frequency Detail  
Uniform Directivity for Smooth In-Room Response   Patent Pending Design

To support an imperceptible transition between the two drivers, and deliver exceptional imaging, JBL engineers pioneered a new patent-pending waveguide design that enables neutral frequency response, not just on-axis, but off-axis in the vertical and horizontal planes, all the way down to the M2's 800 Hz crossover point.

The unique geometry of this waveguide allows the M2 to deliver remarkable high frequency detail, imaging, and natural balance at nearly any listening position in a broad range of acoustic environments. Since design of this complexity and level of detail is an iterative process, JBL performs Finite Element Analysis, creating virtual simulations of off-axis response, pattern control, and the blend of the high frequency driver and woofer. Because "close" is not good enough, JBL uses in-house rapid prototyping equipment to produce and evaluate physical samples until the design is perfected.

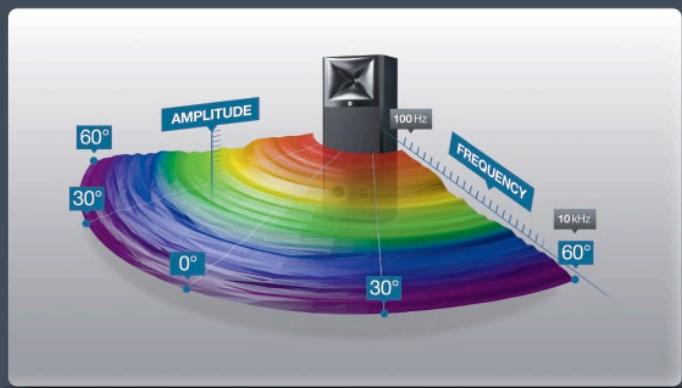
## Spectral Polar Response

Directivity anomalies, and resulting poor off-axis response can destroy accuracy and neutrality at the listening position and cannot be fixed using room EQ. The measurements below illustrate the M2's superior directivity.



### Conventional Music Production Speaker

The coverage of this speaker is erratic and not uniform at all frequencies. As a component of sound that reaches the mix position, the off-axis response negatively impacts the speaker's accuracy.

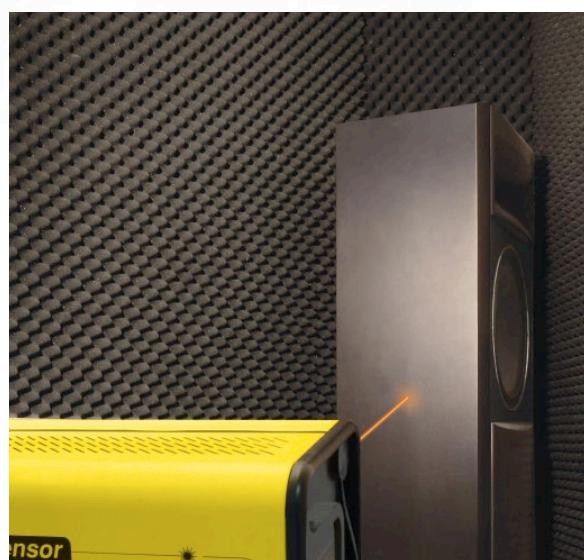


### JBL M2

The M2's response is exceptionally smooth and consistent across a wide listening window, providing neutral response, and natural balance, not just at the mix position, but virtually anywhere in the room.

## LSR Linear Spatial Reference Design

With an awareness that today's audio production is carried out in a wide range of acoustic environments, JBL engineers employ a set of measurements to predict how a loudspeaker will behave in actual room environments. While other manufacturers use a single on-axis frequency response measurement taken at one point in space, LSR Design Protocol requires 72 measurements that encompass all power radiated into the listening room, in every direction. This data reflects 1,296 times the information of a single on-axis response curve. The entire sound field heard by the listener is correlated and studied to optimize the speaker's response at the listening position. LSR Design Protocol exposes resonance, directivity anomalies and the cause of off-axis coloration. This allows intelligent system design that ensures a wide, accurate sweet-spot, and neutral timbre in a broad range of listening environments. The M2 is the ultimate expression of the LSR Design Protocol.



A laser interferometer can detect the source of resonance in a prototype enclosure

## M2 Enclosure

Small Footprint

Extended Bass Performance

Patented Low Frequency Port Design

Extended low frequency performance and high SPL can be the formula for unwanted resonance. The M2 enclosure is constructed of rigid 1" MDF and with the aid of JBL's interferometer, extensively braced for rock-solid stability at the system's full rated power. The enclosure incorporates a JBL patented Slipstream port design with internal flares that ensure low frequency efficiency while eliminating noise caused by port turbulence. Architecturally elegant, the M2 enclosure occupies a relatively small footprint, and can be transported to various working environments,



## System Integration



### Crown® i-Tech 5000HD

HARMAN Crown i-Tech power amplifiers complete the M2 system, providing greater than a kilowatt of clean power to the 2216Nd woofer, and more than enough power for the D2 driver. Working in concert with the M2's revolutionary Image Control waveguide, BSS® OMNIDRIVE HD™ digital signal processing in the Crown i-Tech allows the implementation of an ideal crossover, while providing the option for storage of EQ presets.

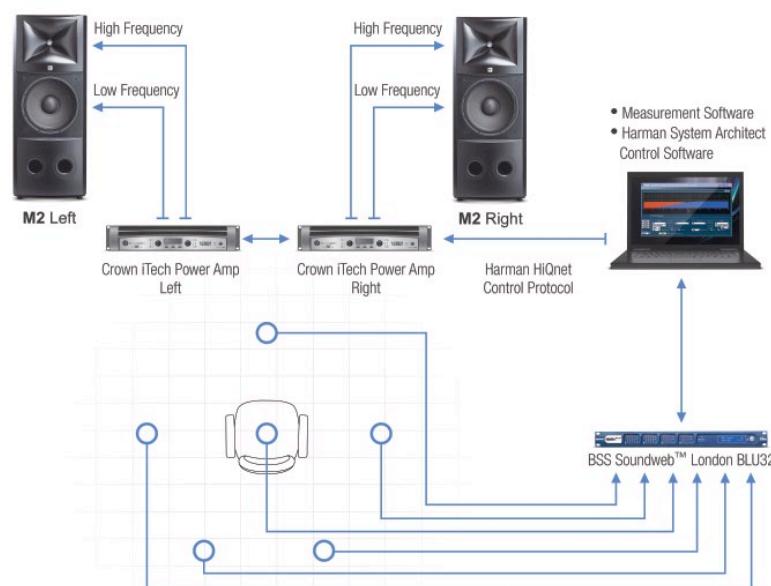


### BSS Soundweb™ London Processing

For large system configurations, BSS Soundweb London signal processors provide centralized processing of multiple M2 systems and are controlled using supplied London Architect software. When digital inputs and outputs are needed, the Soundweb London BLU-800 model can be outfitted with digital I/O cards and synchronized to external word clock sources. The use of BSS Soundweb processors, in combination with Crown Macro-Tech® power amps, provide a powerful, flexible, and cost effective system.

## Tuning and Room Integration

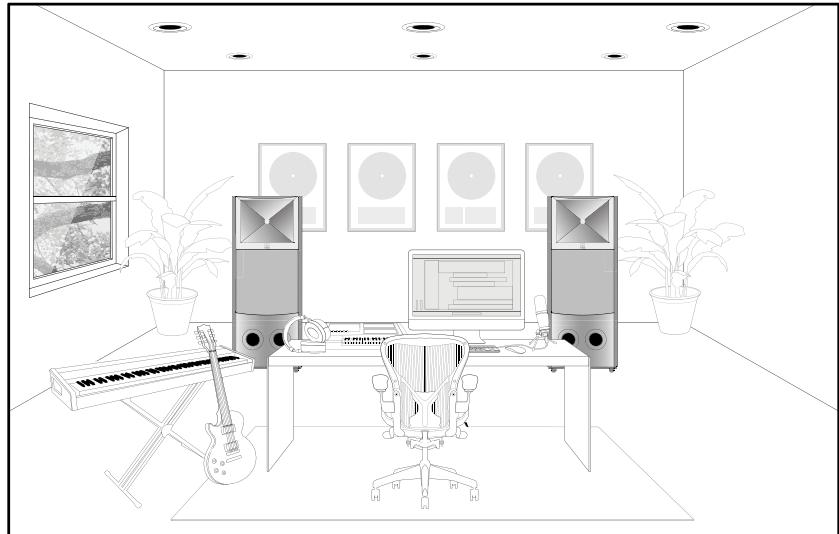
Room acoustics can play a big part in what you hear at the mix position, particularly in the room-dependent low frequency bands, where resonance caused by room modes can give a false impression of bass in the mix. While offering exceptional accuracy "out of the box," the power of the M2 is fully realized with its intelligent in-room tuning and integration capabilities, ensuring optimum performance in your listening environment. Room optimization is achieved through the use of floating-point digital signal processing integrated into Crown iTech HD power amplifiers and BSS Soundweb London processors. HARMAN System Architect™ Software is included to provide external control of system EQ and tuning capabilities. Used in conjunction with external measurement hardware and software, the complete M2 tuning and room integration system addresses non-linearity in the room. This ensures a high degree of accuracy whether the monitors are freestanding, soffit-mounted, or placed adjacent to a wall.



# System Configurations

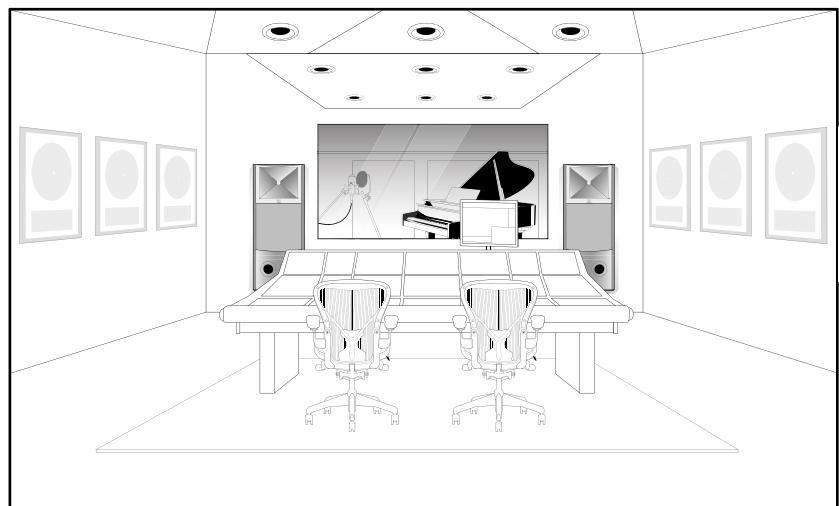
## Professional Project Studios

With a compact form factor, flexible placement options, tune-ability, and its integrated system approach, the M2 system eliminates the impediments that have prevented personal-use studios from having the dynamic range and accuracy of a large format monitor system. For the first time, the M2 system enables project studio owners to make the leap from small near-field monitors to a "big", world-class monitoring experience.



## Music Recording Control Rooms

Solid MDF enclosures, front porting and outboard electronics make the M2 soffit mount ready. Eliminating the requirement for outboard equalization, the Crown powered M2 system includes all the EQ needed for detailed room-tuning, and offers the ability to store multiple EQ curves to meet the needs of the application or client preference.



## Post Production Control Rooms

While the M2 provides exceptional dynamic range and the resolution needed for demanding remix applications, its compact foot-print allows placement behind the screen in smaller rooms. Used as screen channels, the M2 integrates perfectly into a system with JBL cinema surrounds, subwoofers and overhead surround speakers specified in burgeoning theatrical release formats. Select models in the BSS Soundweb London processor line can be fitted with digital inputs and externally synchronized to house word-clock for an all-digital signal path. Centralized management of EQ presets allow storage and easy recall of curves such as the X-Curve for specialized applications.



# Revolutionary Steps Require Unique Tools

Taking reference monitoring to the next level requires cutting edge science, highly advanced measurement tools and an extraordinary commitment to innovation and excellence. The development of the M2 is a product of that commitment and JBL's on-campus resources were fully engaged.

## Anechoic Chambers

Throughout development, JBL's anechoic chambers were used to verify system performance and tuning. Photographed in one of several anechoic chambers at JBL, a final prototype of the M2 undergoes 360 degree measurements used to predict in-room response.



JBL Professional Anechoic Chamber (above), & Facilities (below), Northridge, California USA



## Power Test Chamber

Like all JBL Professional products, the M2 design was subjected to the extreme JBL Power Test regimen in which a speaker is required to operate at full rated output for 100 hours continuously, without failure. This strenuous test ensures the speaker will provide years of reliable performance in the demanding professional production environment.

## Speaker Shuffler

Because the room can play a big part in what you hear, JBL's unique speaker shuffler allows critical evaluation and benchmarking of a speaker design. The shuffler swaps pairs of speakers in the space of 3 seconds, placing each pair in exactly the same position in the room, ensuring the most accurate comparative listening evaluation possible.

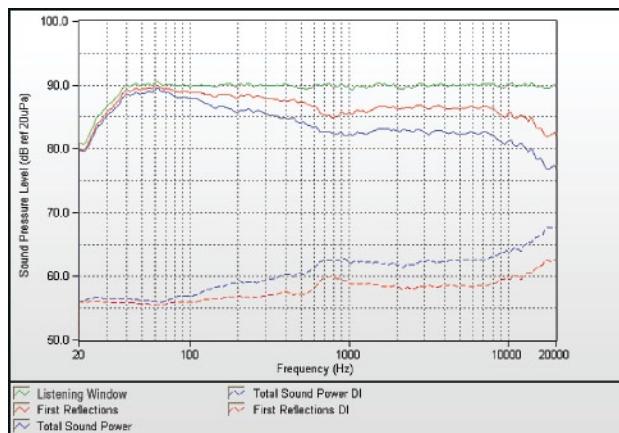
## Rapid Prototyping

JBL Professional's sophisticated Rapid Prototype Machines play a key role in the perfection of a system design. Rapid production of acoustically correct mechanical components allows JBL engineers to verify and perfect the design over multiple iterations. The result is not only a shorter design cycle, but better analysis and refinement of the final design, ensuring the final component meets design objectives.

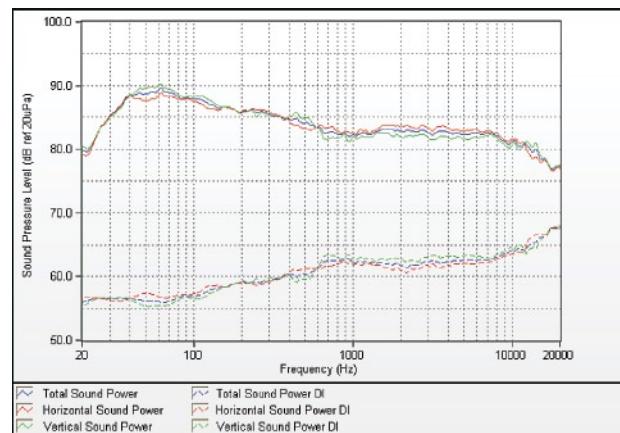
# Performance and Specifications

These detailed measurements of the M2 illustrate the system's exceptional performance.

## Frequency Response



## Directivity



## Harman Green Edge Environmental Responsibility

Harman GreenEdge systems combine environmentally-friendly design and dramatic energy savings without compromising the excellent performance for which Harman products are known.

- Improved Acoustic Efficiency and Heat Dissipation • Lower System Weight and Packaging
- Reduced Power Consumption and Amplifier Efficiency



SPECIFICATIONS		M2
		<b>System Format:</b> 2-Way Floor Standing or Soffit Mountable
		<b>High Frequency Model:</b> D2430K Dual Diaphragm Dual Voice Coil Compression Driver
		<b>Low Frequency Model:</b> 2216Nd 15 in (381 mm) Differential Drive® Woofer
		<b>Crossover Frequency:</b> 800 Hz
		<b>Frequency Range:</b> 20 Hz - 40 kHz
		<b>Image Control Wave Guide Dispersion:</b> 120°H x 100° V
		<b>Sensitivity 1W/1m SPL:</b> 92 dB
		<b>Continuous/Peak SPL@ 1m:</b> 117 dB /123 dB; 108 dB Peak SPL @ 8m
		<b>The System Requires:</b> One Crown® iTech 5000HD power amp for each speaker, or BSS® Soundweb London Processor with Crown Macro-Tech® MA-5000i
		<b>Recommended Amplifier Power:</b> 1,200 Watts into 8 ohms
		<b>Input Connectors:</b> Spring Terminals
		<b>Enclosure Construction:</b> 25 mm (1 in) MDF
		<b>Finish:</b> Satin Black Lacquer
		<b>Included:</b> Removable ABS Grille with Black UL Compliant Fabric
		<b>Dimensions (W x H x D):</b> 508 mm x 1256 mm x 355.6 mm (20 in x 49.5 in x 14 in) Including removable feet
		<b>Weight:</b> 58.5 kg (129 lb)

System tuning requires external measurement hardware and software, not supplied as part of an M2 system.

## JBL Pro Patents

The JBL technologies used in the M2 Master Reference Monitor are protected under one or more of the following patents:

D2430 Dual Diaphragm, Dual Voice Coil Compression Driver  
8280091

2216ND Differential Drive® Woofer  
5664023, 5748760, 6768804,  
6847726, 6774510

Image Control Waveguide  
Patent Pending

Bass Reflex Port  
7890312

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