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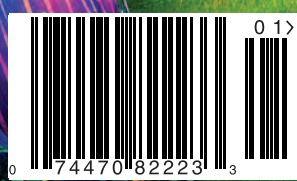


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M&K Sound X12 Dual-Driver Subwoofer

**THX[®] Ultra2-Certified, Push-Pull
Sealed Subwoofer**

Gary Reber

Background

This is our fifteenth M&K Sound subwoofer review. The previous reviews all appeared in *Widescreen Review's The Essential Subwoofer Buyer's Guide*, published as a Special Edition in 2000/01, with all the subwoofers designed by company co-founder Ken Kreisel and his team.

I have fond memories dating back to the late 1970s when I became friends with Jonas Miller and Ken Kreisel. At the time, the two ran M&K Sound as part of the Miller & Kreisel Sound Corporation of Wilshire Boulevard, Beverly Hills, California. Ken Kreisel had teamed up with Jonas Miller, who had opened up the world's first high-end audio salon, which became a favorite destination of mine. They sold Quad electrostatics and Magneplanar, which became one of my most treasured audiophile loudspeaker

brands that I have owned over the years. At that time Miller and Kreisel's client list included some of the most prominent artists in the record and film industry. And in 1973 M&K virtually invented the satellite/subwoofer configuration that has since been a dominant product category in the loudspeaker market and which has become so common with the proliferation of multichannel sound systems. Among the company's initial clients were Walter Becker of the jazz/rock band Steely Dan, who appreciated Kreisel's subwoofer's ability to accurately reproduce the low-frequency response of audio recordings. To say that this company has a lot of experience making powered subwoofers would be a big understatement.

Ken Kreisel, who at the time was also a brilliant recording engineer, and I also together shared a love for recording "live" one-take performances of jazz artists. In 1976 M&K Sound launched M&K RealTime Records, releasing digital recordings made Direct-To-Disc. Kreisel's Real Time Records was the FIRST label to release Compact Discs in the United States. At the time, Kreisel had developed the Bottom End monitor loudspeaker system, which was refined for use by Lucasfilm and Skywalker Sound in the epic *Star Wars Prequel* series. M&K Sound also launched the first "satellite-subwoofer" combination called "The David and Goliath."

During the late 1970s and 1980s I was producing and recording for my production company Dig•It Recordings and Reber Productions, among other non-related ventures. I produced and recorded the "Dig•It Recordings Concert Jazz Series," which Sony Electronics licensed as "The Sony CD Sampler, Volume One: Jazz," that came with the Sony 701ES, the second Sony CD machine, circa 1983. This was a very early and now rare not-for-retail-sale demonstration CD.

All the recordings I produced and recorded under Dig•It Recordings and Reber Productions were "live" multi-track and two-track sessions using professional digital audio equipment and new techniques regarding digital mixing, and design and utilization of microphones. Dig•It Recordings and Reber Productions specialized in jazz video and digital audio Compact Disc programming.

One of the sessions I remember vividly was the recording of the Shelly Manne trio in 1981. Shelly, the drummer extraordinaire, was one of the most influential musicians in the jazz community. The recording released on CD, to this day sounds incredible and captures the highly skilled and smooth technique Shelly was renowned for. Shelly used the drums not just as a sounding board but as an instrument that blends with the other melodic sounds of the group. Shelly has been heard on records of every conceivable type of musical context, ranging from combos and the Stan Kenton Orchestra (which I also recorded among others), to the first albums of Ornette Coleman, and the recordings of Oliver Nelson and Henry Mancini.

On this occasion, I recorded Shelly's trio on Sony professional PCM-1610 digital audio equipment at Hop Singh's in Marina Del Rey, California using the latest M&K Sound satellite/subwoofer system to monitor the "live" recording. I used the system to monitor other recordings as well.

I have always appreciated the natural deep bass response achieved with M&K Sound subwoofers. Down through the decades, M&K Sound has offered incremental improvements in bass performance. Now with the introduction of the X Series, the bass innovators set a new performance mark developed from everything that M&K Sound has learned about deep-bass reproduction in the past 40 years.

X Series Dual-Driver, Push-Pull Powered Subwoofers

The new X Series consists of the dual-driver X8 (2 x 8-inch), X10 (2 x 10-inch), and X12 (2 x 12-inch). The subject of this review is the X12, a stunning performer with its natural reproduction of music and sound effects.

The X12 is taller than a lot of subwoofers previously reviewed. The substantially constructed and internally braced sealed cabinet sports a silky-smooth black finish and a black grille for an attractive appearance. A back panel provides controls and connectors, which include a continuously variable phase switch marked 0 to 180 degrees; left and right RCA and XLR inputs; left and right RCA and XLR pass through outputs; a three-position switch for fixed low pass at 80 Hz, variable low pass 30 Hz to 125 Hz, and no low pass or THX® mode; a switch selectable to THX Bass EQ or Anechoic MK EQ; and a Bass level control that can be switched to THX fixed or variable from "Min" to +5 dB. There is also an Auto On position on the On/Off switch,




SPECIFICATIONS

Features – MK Sound X12 Subwoofer
Drivers: 2 12-inch woofers in push-pull configuration
20 Hz-capable
Input Options: Single-ended RCA/XLR line level
Output Options: Single-ended RCA/XLR with provision for pass through output
Fixed 80 Hz Low Pass/Variable Low Pass/No Low Pass THX Mode
THX Bass EQ/Anechoic MK EQ
Bass Level Reference Control (dB): THX Fixed or Variable
Variable Phase: (0 to 180 degrees)

Specifications
Frequency Response: 20 Hz to 200 Hz +/- 3 dB
Amplifier Power: Class D 400 watts (4 Ohm) / 700 watts peak
Power Consumption: 500 watts maximum / standby 0.5 watts
Dimensions (HxWxD): 26 x 17.3 x 18.1 (inches)
Weight: 79.3 pounds
Warranty: 5 years loudspeaker, 2 years electronics
Price: \$3,200
Manufactured In: Denmark

Manufactured By:
M&K Sound
2680 Solrod Strand
Denmark
Phone: 310 623 7244
Web site: www.mksoundsystem.com



which detects an active signal and automatically turns the subwoofer power on. When switched to Auto On, the subwoofer is in Standby until it receives an audio signal. The subwoofer also employs an auto-detecting universal power supply to handle input voltage from 100 to 230 VAC 50/60 Hz.

The X12 is fitted with line-level input RCA and XLR connectors. Both allow the subwoofer to be connected directly to corresponding preamp-level outputs on components such as surround sound receivers and processors that have preamplifier outputs, which are typically labeled Sub, Sub Out, SW, or LFE.

The X12 was operated in the No Low Pass mode, allowing the Classé SSP-880 Controller to provide the necessary high-pass and low-pass filtering. If your receiver or processor does not have an internal crossover for bass management, use the variable Low-Pass Filter control to match the X12 to your main loudspeakers. This control sets the upper roll-off point of the subwoofer and allows you to integrate your main loudspeakers with the X12. The variable low-pass control is a means of fine-tuning the transition of sound between your main loudspeakers and the X12 providing a roll-off of 24 dB up to 125 Hz.

The built-in fixed 80 Hz filter is especially designed to be used with M&K Sound professional satellite loudspeakers. As our reference loudspeakers are Magnepan 20.7s, 3.7s, 1.7s, CCR, and MMCs, this filter was not engaged.

The EQ position was set to THX Bass EQ, which provides low-frequency response down to 20 Hz at -6 dB (free field) in accordance with THX specifications. The optional Anechoic MK EQ position adjusts the low-frequency response at 20 Hz to -12 dB (free field). According to M&K Sound, this position should be used for small rooms and music reproduction.

When the X12 is connected to a THX-certified surround receiver or processor, M&K Sound recommends that the Bass Level Reference be set to the THX Fixed position, as the built-in bass management level adjustment in THX-certified surround receivers or processors will automatically supply the X12 with input gain to match the overall system volume.

During the review, the Bass Level Reference Variable control was set using a RadioShack analog Sound Level Meter set to "C" weighting and "Slow" response. The level was set at 75 dB, as are the Magnepans.



The 12-inch dual drivers are mounted in a push-pull configuration, with one cone conventionally facing out into the room and the other cone inverted and facing toward the interior of the enclosure from the bottom panel with the rear of the cone, magnet, and frame facing the outside. They are wired electrically out of phase so that their pressure radiation into the room is in phase, with one cone moving toward the magnet structure and the other moving away from the magnet structure at any given time. Therefore, regardless of position, each cone is always in the exact opposite position from the other in its travel, relative to its own magnet.

The push-pull design cancels the non-linearities caused by fore versus aft cone movement and reduces even-order harmonic distortion in real time, not after the fact, as is the case with most servo systems. Essentially, the two identical drivers become one, and their non-linear distortion products are eliminated. The design also effectively doubles the sound power per watt of amplifier power distributed to two drivers, for 6 dB of additional output.

A combination of discrete analog technology and switch mode amplification powers the X12. A Class D digital switching power amplifier delivers 400 watts continuous and 700 watts peak power. Amplifier output is equalized to produce flat response in the room down to 16 Hz to 18 Hz.

An effective proprietary compression circuit, the Headroom Maximizer™, analyzes the incoming signal to prevent any combination of frequency and amplitude that would clip the amplifier or cause the drivers to overextend their boundaries, to pass unaltered. The Headroom Maximizer is designed to prevent large driver excursions without clipping peak voltage values above a fixed level, and provide less invasive protection by controlling dynamic variations in program material. The Headroom Maximizer monitors peak voltage values in program material to detect dynamic changes that would require the amplifier to deliver full power, and unobtrusively adjusts the voltage from input section to output section appropriately, protecting the subwoofer without compromising dynamic integrity by keeping the driver excursion within linear control. As a result, the X12 cannot be overdriven to distress. After a certain point, it simply stops getting louder. The Headroom Maximizer eliminates servo control approaches that measure direct feedback from an accelerometer attached to the driver cone and electronically applies corrective measures thereafter.

The sealed enclosure is built from dense MDF panels up to 22 mm or about 1 inch thick. Extensive internal bracing also contributes to the rigidity of the enclosure. Inside, the sealed box is tightly packed with sound-absorbing material (which cannot be used with a vented loudspeaker).

Engineering Features

The X12, as with all M&K Sound products, features straight-forward, gimmick-free engineering—and a lot of it. There are two magnetically shielded, 12-inch coated, pulp cone drivers designed for very long linear excursion and high efficiency. Both drivers comprise the equivalent cone area of a single 18-inch driver, but in a small cabinet. They feature rigid aluminum cast baskets, undercut pole pieces, and aluminum AC shorting rings with asymmetrical voice coil mounting to linearize magnetic field forces and aluminum pole spacers above the pole piece, plus a dual-spider suspension system to prevent cone rocking on extreme excursions. The voice coil windings are long, to ensure full control of impulse excursion throughout the frequency response range. The non-inductive Titanium voice coil further provides thermal stability, and the 2-inch coil diameter assures extended power-handling capabilities. The solid-aluminum framework ensures that heat will be efficiently dissipated from the motor system for reduced power compression.

While previous generations of M&K Sound subwoofers used polymer-coated foam surrounds, the X-Series advantageously uses low-loss thermally stable SBR rubber surrounds. The surround is designed to provide optimum damping of pressure build-up inside the cabinet, to prevent collapse modes in the surround in the presence of large input voltage. A half-roll suspension is employed to deliver extended long-stroke cone motion, with no mechanical losses within each driver's linear excursion range.

Subwoofer Ratings

	■ ■ ■ ■ ■
Music Rating	■ ■ ■ ■ ■
Effect Rating	■ ■ ■ ■ ■
Impact	■ ■ ■ ■ ■
Tonal definition	■ ■ ■ ■ ■
Overhang	■ ■ ■ ■ ■
Rhythm and Pace	■ ■ ■ ■ ■
Midrange Coloration	■ ■ ■ ■ ■
Box Integrity	■ ■ ■ ■ ■
Distress	■ ■ ■ ■ ■
Subjective Deep Bass	■ ■ ■ ■ ■
105 dB @ 35 Hz?	Yes
25 Hz?	Yes

I have always preferred a correctly tuned, sealed enclosure design because it is the most precise and accurate subwoofer design if optimum impulse and transient response are to be achieved.

The critically damped system operates at a low 0.5 “Q” value to optimize transient performance and output down to frequencies below 20 Hz. The total Q of the system (0.7 Qtc) has a big effect on measured performance, and ultimately on what you hear. Qtc defines the shape of the response curve and the amount of damping to overshoot or ringing (oscillation after the signal stops) that the system will provide.

For those interested in an even more detailed explanation of the engineering that went into the development of the X Series, M&K Sound has published *The White Paper* online, available at <http://mkloudspeakers.com/pdf/XSeries-Whitepaper.pdf>.

Setup

I evaluated the X12 using bass management in the crossover-bypass mode (using an 80-Hz crossover in our Classé controller tuned to the “small” designated surround Magnepan loudspeakers in our reference system). The X12 was connected to the Classé Audio SSP-880 Controller via a single-ended RCA connector from the subwoofer pre out to the input on the subwoofer, and used the bass-management capability of the pre/pro. Thus, the Classé was used to merge any .1 LFE with the bass from the other seven loudspeakers and manage the delay of all loudspeakers and the subwoofer through a distance/time delay function.

I positioned the subwoofer near my sweet spot listening position, not in a corner.

Not only are subwoofers capable of extending the low-frequency response of the system, importantly, they can lower distortion in the midrange, prevent amplifier clipping and potential loudspeaker damage, and make the whole system play louder, with greater dynamic range and less audible strain. All of this is accomplished by relieving your main amplifiers and loudspeakers of the demands of reproducing very low frequencies.

As noted in previous reviews, there are numerous good subwoofers available, and most will do a credible job of reproducing the sound of a bomb blowing up a car. The major difference between them will be how loud the bomb can be without sounding unduly distorted, and how deep and visceral the sound effect is.

In most music, the bass player plays a tune that harmonizes with the melody. The easier it is to follow that tune, the better the job that the subwoofer is doing. Bass and percussion set the rhythm and pace of music. The easier it is to tap your foot to the music and respond to the rhythm, the better the subwoofer.

Subwoofers reproduce frequencies with wavelengths that are long in relation to the dimensions of most living rooms or dedicated home theatre environments. Standing waves may boost or cancel various frequencies at the listening position due to the interaction with room boundaries. Moving a single subwoofer just a little bit in a room may drastically change what you hear at the listening position. Using two widely spaced subwoofers will alleviate most of these problems.

In reviewing M&K Sound’s X12, my evaluation, as with all subwoofers reviewed by me, is based on my subjective impressions under the conditions in our main reference room—a living room dedicated home theatre—which incidentally is very good for bass. As our

M&K SOUND'S THX ULTRA2 CERTIFIED X12 IS AMONG THE BEST SUBWOOFERS AVAILABLE.

While fine-tuning controls are provided on the X12, every room has its quirks, and there is no way to know the best combinations of settings for your room, with your particular receiver or processor, without measurements. The results you get after measurements will change how you perceive the performance of the X12, or any other subwoofer. Thus, adding one or two (or more) well-designed subwoofers to your system, and taking the time to make sure that they are properly integrated with the main loudspeakers and the room, can dramatically enhance your enjoyment of music and movies at home. Getting a seamless blend between the subwoofer(s) and the main loudspeakers can be a difficult and time-consuming task. A qualified custom installer can assure you of optimum response in your room based on measurements, listening, and trial-and-error testing. For a comprehensive technical treatise on subwoofer design, please refer to *Widescreen Review's* “The Essential Subwoofer Buyer’s Guide” published in 2000/01 or the article “Subwoofers: Presenting The Fundamentals” in Issue 172 (December 2012). These contain all that you need to know in order to make an informed choice when purchasing a subwoofer. You can also refer to them when installing the subwoofer(s) in your system.

Performance

Bass is the foundation of music reproduction, and nothing can pump up the excitement of movie watching more than adding some articulation and impact to the low-frequency sound effects.



library of Blu-ray Disc™ releases is extensive (see *Widescreen Review's* searchable Blu-ray Disc database for movies with bass below 25 Hz), as is our music on CD collection, I used a combination of content for the evaluation, including motion picture soundtracks, especially action, thriller, and science fiction movies with enormous bass impact and rhythmic music, including solo drum recordings. The main loudspeakers in the 7.1-channel system are all Magnepan, with the main stereo signal directed to 20.7s and the four surrounds comprised of two 3.7s and two 1.7s plus Magnepan's tri-center CCR/MMC 2s array for the center signal. A single X12 replaced the three Bag End INFRA D18E-1 subwoofers for this evaluation.

The single X12 performed well against the far-more-expensive Bag End array, except for the deepest and loudest reproduction of bass frequencies below 25 Hz for maximum slam and maximum output. Had I two X12s, I do not believe this would be a distinguishing factor in the evaluation of movie soundtracks with bass energy below 25 Hz. Music reproduction was absolutely exemplary!

When evaluating a subwoofer I consider the following subjective impressions: overall music reproduction, overall sound effects reproduction, impact, tonal definition, freedom from overhang, ability to follow the rhythm and pace of a musical selection, midrange coloration, box integrity (freedom from enclosure resonance), distress (can the subwoofer be easily overdriven?), deep bass response, and measured ability to play at 105 dB @ 35 Hz in the room-listening position, and measured ability to play 25 Hz without substantial reduction in SPL.

As a subwoofer needs to reproduce low-frequency special effects sounds, such energy is usually in the 35 Hz to 60 Hz region because that's where they have maximum impact. Most anything that occurs below 25 Hz is subharmonic or just noise. As a result, the best subwoofer performance should focus on the range where most signals actually occur.

The X12 is an impressive "Deep Bass" subwoofer that delivers effortless and tight bass response with deep, undistorted extension below 20 Hz with exceptional transient response, accuracy, and authority—qualities which enhance realism. Explosions in motion picture soundtracks were dynamic sounding and felt with the X12, without the objectionable boominess and rumble that other designs can convey. During low-bass acoustic and electric music reproduction, the sound was wonderfully clean and accurate and without overhang. The sound was authoritative, even in the mid-bass region and at low volumes. The output from the X12 was impossible to localize from my sweet spot listening position.

The X12 reproduced music with a sound that was warm, full, and very natural, while articulating the beat well. Percussion instruments conveyed realistic "snap" with no perceptible overhang. Electric bass, acoustic bass, and organ pedal were naturally re-created with excel-

lent tonal definition. The sound from the X12 was exceptionally tight and tuneful, with superb pitch definition and flawless rendering of the rhythm and pace of music. The ability to deliver bass detail and articulation, and punch and snap was excellent on music and percussion.

Motion picture soundtrack sound effects and atmospheric were presented with stunning impact and slam, rivaling the sound from our much larger and more expensive Bag End subwoofers. Music recordings, with both acoustic and electric bass, were well reproduced, with an excellent sense of rhythm and pace and articulated bass. Pitch definition was excellent as well, with no sense of heaviness or mid-bass emphasis.

There was virtually no midrange coloration due to the steep, graduated low-pass filter and the solid integrity of the enclosure.

The X12 subwoofer produced full-range bass down to and below 25 Hz. And while most people probably hear little or nothing at 25 Hz and lower, you sure can feel it. This is the realm of subharmonics, as there is little recorded information below 30 Hz. An essential part of the emotional impact and sheer excitement you feel in a home theatre comes from the deep, accurate, and powerful bass that only a great subwoofer can provide. Good subwoofer performance is essential for a great, convincingly visceral home theatre experience.

Speaking of recorded information below 30 Hz, other than subharmonics, there is little recorded information below 30 Hz anyway, except for the Octobass, whose low C vibrates at 16 cycles per second (the same as the low C of a 32-foot organ pipe). While quite a sound, it is a rare recording that will output 16 Hz. Still, subharmonics in the low-frequency signal present in motion picture soundtracks greatly enhance the emotional impact of the movie experience.

The X12 exhibited tight transient control, as well as effortless transparency and usable output well below the nominal cut-off frequency when integrated into the system. With proper setup the X12 can sound bigger, warmer, and more natural, not more bass heavy—making the home theatre experience sound better, not boomier.

To experience M&K Sound's X12 is to experience a subwoofer that can deliver amazingly loud, deep bass with good control. The X12's measured output was 112 db at 35 Hz, 110 dB at 25 Hz, 94 dB at 20 Hz, and 90 dB at 16 Hz. This is a subwoofer that really delivers the necessary sub-25 Hz low-frequency response that is characteristic of numerous motion picture soundtracks.

Preferably a system should have no fewer than two subwoofers operating in stereo, not from a mono subwoofer output. A 5.1/7.1-channel system needs at least three so that there is a dedicated subwoofer for the low-frequency effects (LFE) channel. I can just imagine the emotional impact of deep-bass reproduction using three X12 subwoofers!

Conclusion

Subjectively, the single X12 does exactly what it is supposed to do, and its performance is difficult to fault. The X12 is among the best subwoofers available. Its performance qualities are equally suited to both the reproduction of motion picture soundtracks and music recordings. At \$3,200, M&K Sound's THX Ultra2-certified X12 is not inexpensive, but its high performance more than justifies its cost. If you can afford two or three X12s, your needs for bass are sure to be satisfied, and one is all you need to start, even if your room is quite large. If the price is too dear, much of the same technology is available in lower-priced models in the X Series from M&K Sound. This company has had more experience building powered subwoofers than just about anybody, and they make a full range with models, including primary mains monitors, to match any budget. **WSR**

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