PROCESSORS

MC-12

Digital Controller

- Twelve channels, twelve configurable inputs, and three zones
- Automatic speaker distance and output level calibration (with optional microphone kit)
- 5.1-channel analog audio input
- Analog bypass for stereo and 5.1-channel analog audio inputs
- Two 24-bit/192kHz digital-to-analog converters (DACs) for each main audio output
- Balanced main and second zone audio outputs (balanced version only)
- S/PDIF coaxial, S/PDIF optical and AES/EBU digital audio inputs
- S/PDIF coaxial and S/PDIF optical digital audio outputs
- Automatic switching between analog and digital audio inputs
- Two broadcast-quality video switchers
- Four component video inputs with full high-definition television compatibility
- RCA and professional-grade BNC component video inputs/outputs
- Eight S-video and five composite video inputs
- LOGIC 7 decoding
- Lexicon LIVE
- Dolby Digital Surround EX and Dolby Pro Logic IIx decoding
- DTS 96/24®, DTS Neo:6®, and DTS-ES® (matrix and discrete) decoding
- THX Ultra2® and THX Surround EX® decoding
- Three trigger outputs, rear panel IR input, and RS-232 control
- Four microphone inputs
- Optional rack mount kit

The MC-12 is the culmination of years of product design, effortlessly combining performance, flexibility, and elegance. Sophisticated and powerful, it is supremely equipped to control the most intricate home theater. Three zones, twelve configurable inputs, onboard processing, twelve output channels, and a wide array of expansion capabilities enable the MC-12 to easily meet the demands of the discerning audio/video enthusiast.

With myriad features available in the MC-12, the simple and intuitive user interface provides ultimate adjustability without being confusing. Access to the listening modes, input and output settings, speaker distances and levels is never more than a few button pushes away.

The MC-12's three zones are independent, allowing for seamless control of multi-room systems. Because each zone is capable of routing a different input source, it is possible to watch a DVD in the home theater while listening to a CD in the kitchen and recording a program from a satellite receiver to a DVD-R. The record zone can also be used to provide audio to a third room.

A glance at the MC-12's rear panel will show the tremendous array of inputs and outputs. Analog audio is available on stereo connectors and a 5.1-channel connector, ideal for DVD-A or SACD sources such as the RT-20 Disc Player. High resolution 24-bit/96kHz analog-to-digital converters can be used to bring these sources into the digital domain for processing or, for audio purists, a true analog bypass option is available which keeps the signal in the analog domain from input to output.

Digital audio input is available on one AES/EBU, six S/PDIF coaxial, and six S/PDIF optical connectors. These signals are processed at their native sampling rates through a two stage phase lock loop, achieving remarkably low intrinsic jitter and high jitter rejection. Lexicon's proprietary auto azimuth processing corrects timing and level imbalances in stereo signals, resulting in exceptional channel separation in matrix-encoded sources.

The MC-12 has twelve channels of audio output, including stereo subwoofers, an LFE, and two auxiliary outputs. The MC-12 Balanced adds XLR connectors for all Main Zone and Zone 2 audio outputs - useful for installations where long cable runs are required or where there is a high risk of RF interference. Each of the outputs uses two 24-bit/192kHz DACs operating in dual-mono mode. This design extends the signal-to-noise ratio and dynamic range, resulting in superior sound quality. High precision crossovers and tone controls are digital to avoid the signal distortion their analog counterparts often introduce. In addition, digitally controlled analog output levels can be adjusted in 0.5dB increments.

For maximum flexibility, each of the main audio outputs has independent crossover, speaker distance, and output level control. The crossovers are available in 10Hz increments from 30 to 120Hz. If the THX speaker setup is selected, a THX 80Hz crossover setting is automatically applied to all main audio outputs. The MC-12 also provides access to advanced speaker array processing and, if a THX Ultra2-certified subwoofer is present, boundary gain compensation controls.

Automatic calibration of speaker distances and output levels is available using the rear panel microphone inputs and an optional Lexicon Microphone Kit.

MC-12
Digital Controller

The accurate adjustment of these settings ensures that signal arrival times and levels are optimal relative to the listening position.

A comprehensive bass management system helps protect the subwoofers and other loudspeakers from overloading, even with Dolby Digital and DTS sources that produce low-frequency signal peaks at much higher levels than stereo sources. Sophisticated routing automatically directs low-frequency signals to the loudspeakers most capable of reproducing them, while adjustable bass peak limiters restrict the amplitude level of low-frequency signals sent to the subwoofers and redirected to other loudspeakers.

Complementing its extraordinary audio performance, the MC-12 includes two broadcast-quality video switchers. An ultra-wide bandwidth component video switcher accepts analog component video signals, including high-definition television signals, while a separate composite and S-video switcher accepts high-quality NTSC, PAL, and SECAM video signals. The MC-12 has five composite video inputs, eight S-video inputs, and four component video inputs.

Enhanced versions of Lexicon's popular Nightclub, Concert Hall, Church, Cathedral, and Panorama listening modes are available, along with an impressive collection of advanced decoders, including Dolby Digital Surround EX®, Dolby Pro Logic IIx®, DTS 96/24, DTS Neo:6, DTS-ES (discrete and matrix), THX Ultra2, THX Surround EX, and the latest version of Lexicon's own critically acclaimed LOGIC 7. Unlike other decoders, LOGIC 7 is compatible with all input sources and requires no special encoding for playback. Applied to music recordings, it increases the sense of spaciousness in the listening area without altering the front soundstage, resulting in a more realistic recreation of the original recording. Applied to film soundtracks, LOGIC 7 expands stereo sources to 7.1 channels for a performance that rivals that of discrete multi-channel sources. LOGIC 7 also derives two additional channels from 5.1-channel sources to create a more enveloping listening experience. See page 14 for more information on LOGIC 7.

Most impressive about the MC-12 is its enormous array of custom processing. Four 32-bit floating-point digital signal processing (DSP) engines provide

vast resources to power such proprietary features as LOGIC 7, Lexicon LIVE (page 8), Auto Azimuth, five-speaker enhancement, bass enhancement, and dialog enhancement. Lexicon's bass management system, digital crossovers and tone controls are also powered by these DSP engines. This processing is performed at sample rates up to 96kHz, with 24-bit resolution to retain top performance from all input sources. A fifth DSP engine is dedicated to decoding Dolby Digital and DTS sources.

Inside and out, the MC-12 is designed to accommodate possible hardware and software advancements with internal expansion slots, a removable rear panel access plate, and additional RS-232 connector. One RS-232 connector performs flash-memory software upgrades as well as configuration downloads. A configuration tool available at www.lexicon.com can be used to send current MC-12 settings to a compatible personal computer, creating an archive of settings that can later be sent back to the MC-12 for instant reconfiguration.

The MC-12 is a paragon of home theater processing. Immense power, leading-edge technological sophistication, and extensive expansion capabilities make it an indispensable addition to any high-quality home theater.

LOGIC 7

LOGIC 7 is a proprietary Lexicon algorithm that is capable of extracting seven channels of output from stereo, 5.1, or 6.1 channel input sources. First introduced in 1990, LOGIC 7 has undergone constant refinement through multiple revisions, resulting in an algorithm that is widely regarded to be the best stereo to multi-channel decoder available.

Presentation of 2-channel sources approaches the performance of discrete multi-channel formats. Surround effects, dialogue, music, and ambience are steered intelligently between all speakers. Even better, LOGIC 7 requires no special encoding to work its magic.

LOGIC 7 transforms the listening area, or "sweet spot", into a larger, more comfortable space. A larger sweet spot means that you can enjoy movies and music with others and all have a good listening experience.

LOGIC 7 also increases the sense of envelopment, making the movie watching or music listening experience much more engaging and exciting. Instead of feeling like you are in your living room, you feel like you are transported to the space depicted in the recording.

All of these enhancements are provided without harming the original mix– the sound stage and stereo image are meticulously preserved. LOGIC 7's stereo image preservation is unparalleled by any other decoder of its kind.

In addition to being present in all Lexicon processors, LOGIC 7 can be found in automobiles such as BMW®, Mercedes®, Rolls Royce®, and Land Rover®. Cars have become the latest surround sound listening environment. They present unique challenges to creating an enjoyable experience for each listening position – challenges that have been successfully met by the LOGIC 7 algorithm.

LOGIC 7 excels at steering sounds to precisely the correct position in the listening room by analyzing stereo source material for phase and amplitude clues to determine where sound should be placed. It is important that the algorithm detects and steers the sound very quickly, so that the listener is not aware of the process. If steering is sluggish, the listener will hear artifacts and be distracted. LOGIC 7's steering capabilities approach the performance of discrete multi-channel source material.

LOGIC 7 also uses frequency contouring to provide a seamless transition between the fronts and surrounds. When surrounds are reproducing background material or ambience, a low-pass filter is applied so they do not distract from the primary sounds (such as dialog). When the surrounds are reproducing steered material (such as a sound effect), the filter is removed.

Frequency contouring is an important factor contributing to LOGIC 7's superior performance.

The ability to unobtrusively reproduce secondary surround information, then flawlessly steer full range sound effects around the room, creates a sense of realism without distraction from the most important aspect of the film soundtrack: dialog.

There are other stereo-to-multi-channel formats now available in the market. LOGIC 7 out-performs them by providing:

Better front stereo image preservation
More accurate steering
More natural sounding surrounds (not "phasey")

In addition to transforming stereo audio sources to multi-channel, LOGIC 7 expands 5.1 sources to 7.1 channels. Discrete multi-channel sources are steered intelligently through seven channels instead of five, providing an increased sense of envelopment and involvement.

Steering in the front channels is very similar to that found in LOGIC 7 for 2-channel sources, giving the user the flexibility to affect the balance between the center channel and the front left and right channels in a multi-channel source. This is performed in such a way that the appropriate level balance of the center channel is maintained.

The center channel is in many ways the most important speaker in a multi-channel system. However it is still underutilized in many recordings. The most common examples of this are multi-channel music recordings that place little or no vocal content in the center channel. Instead, the vocals are mixed into the front left and right channels. For a listener sitting directly between the front left and right speakers, this does not present a problem. The front left and right speakers create a phantom center image and the vocals appear to come from the center of the front soundstage. However, for any listener that is off-axis, recordings like this present a major problem. The vocals appear to come from the speaker that the listener is closest to. LOGIC 7 provides a means of redirecting the vocals to the center channel, thus maintaining the front soundstage for all listeners no matter where they are located in the room.

With multi-channel sources, LOGIC 7 extracts two additional surround channels, which increases the perceived depth of the listening area, as well as providing smoother steering of sound effects between the fronts and surrounds. The Side and Rear channels are independent of each other (contain different audio material). Adjustable parameters shift the sound field forward or backward and control high-frequency attenuation for surround channels, giving the user unprecedented control over the listening experience.

LOGIC 7 technology offers a universal multi-channel sound solution. It plays normal stereo recordings in full and satisfying surround with a wide sound stage and increased envelopment, also offering enhanced playback of all encoded surround formats.

Based on years of psychoacoustic research, LOGIC 7 strikes a delicate balance between channel separation and surround envelopment. For music, film, and broadcast sources, LOGIC 7 distinguishes between primary and background signals and processes them appropriately. Prominent sounds like a singer's voice or an airplane's roar are reproduced with stunning clarity. The signal is sent to the appropriate speaker with high channel separation, while secondary sounds like the ambient noise of a concert hall or the great outdoors are reproduced with amazing spaciousness. With LOGIC 7, the listener experiences an unmatched sense of involvement.

TECHNOLOGY

Lexicon LIVE™

Lexicon LIVE is a unique system that can transform any listening room into an exceptional and pleasurable acoustic space. It uses a combination of microphones and digital signal processing to enhance the room's acoustics and create the illusion of a much larger space. A room utilizing Lexicon LIVE can rise to any occasion. Choose from one of three customizable presets to create a pleasing environment in which to practice or perform with a musical instrument or create an ambiance to liven up a party.

The change in frequency content that takes place as a sound travels from the speaker that produces it to the microphone (or ear) that receives it is called the room transfer function. The transfer function in any room is uneven - there are peaks and dips in the frequency content. It is the peaks that cause feedback when an enhancement system is used, often making it difficult to raise the volume to the optimum level.

The first step in creating a stable sound reinforcement system is to even out these peaks. Lexicon LIVE solves this problem in several ways. An automatic calibration evens out the power response across all frequencies being produced by the speakers. This calibration takes approximately one minute and must be performed after all other frequency-related parameters have been set (speaker crossovers, bass and treble settings, loudness control settings) to provide accurate results. Then time-varying reverberators, which are able to both broaden and reduce the level of the resonant peaks, are inserted into the signal path. The final step is a proprietary method used to help lower the risk of feedback and reduce overall system noise.

The reverberation provided by Lexicon LIVE is based on years of psychoacoustic research. Lexicon is renowned for developing the world's premier reverb algorithms found in the majority of top music and cinema recordings. The proper timing and level of early and late reflections is central to this algorithm design. Research has shown that early reflections should arrive at the listener between 15 and 50 milliseconds (ms) after the end of the direct sound and they should be relatively low in level. Reflections that arrive too late or too loudly will sound like echoes and will reduce clarity. The late reflections, or reverberant tail, should have substantial energy starting after 150 ms in order to provide an adequate sense of envelopment. When these conditions have been met the result is an increased sense of spaciousness that does not obscure the intelligibility of the source.

Three presets have been provided as a starting point for the Lexicon LIVE experience. Each of these presets is fully customizable and can be adjusted to create acoustic spaces that range from small rooms to cavernous structures. The ability to modify both the room size and the reverberation time provides enormous control over the type of space being created. A pre-delay setting can be changed to give the impression of being different distances from the reflecting surfaces (the walls). Separate parameters for reverberation and early reflection levels allow for precise control over the apparent distance from the sound source.

The Lexicon LIVE system requires the MC-12 Version 5 software and a Lexicon Microphone Kit (with two permanently installed microphones) to operate. Note that Lexicon LIVE is active only for sounds originating from within the listening room itself - sounds that are picked up by the microphones. Lexicon LIVE cannot be applied to a recorded source such as a CD or a DVD.

Lexicon LIVE frees your listening space of acoustic confinement. Simple to install and set up, it adds immediate excitement to a previously ordinary home theater. Use Lexicon LIVE to transport yourself to a gothic cathedral, a concert hall, a sports arena… the possibilities are endless.

Lexicon EQ

With the MC-12 EQ upgrade, Lexicon has raised the bar for room equalization, providing a solution that demonstrably improves the listening experience. It is easy to set up and requires only a small amount of user interaction to achieve superior results. Lexicon EQ uses advanced room analysis techniques and is completely integrated with existing processing. No additional analog or digital conversion is required. The upgrade doubles the amount of processing available to the MC-12, and provides up to seven filters per channel for as many as ten output channels. Four microphones, designed to meet Lexicon's stringent requirements for room analysis, enable optimization for the entire listening area.

Equalization is necessary because the listening space is the victim of room modes - resonances that occur when sound waves reinforce each other as they reflect back and forth between the hard boundaries of the room. Room modes can cause certain bass frequencies to sound too loud and others too soft.

Lexicon EQ improves the sound over a wide listening area, not just one seat. The system utilizes four microphones, allowing detection of room modes that would be missed by systems that employ only a single microphone. Using four microphones also provides improved accuracy and a larger listening area, since the measurements from each microphone can be correlated. Careful engineering has created a room equalization procedure that is easy to use. The process is simple: place the microphones at ear height on the seat(s) used for listening, and select the automatic test from the MC-12 Speaker Settings menu. The MC-12 automatically analyzes the room, identifies problem room modes, and calculates the proper correction. The MC-12 EQ upgrade requires an enormous amount of processing power so that detailed correction can be applied to all channels: up to seven filters for each of the seven main channel outputs and three subwoofer outputs. The additional DSP provided in the upgrade ensures that the best results can be obtained for all of the speakers in the system.
Lexicon's approach to solving the problems of room equalization delivers better results than traditional methods, which simply attempt to flatten the frequency response of the listening room. These traditional methods have several limitations, the most significant of which is that it is very difficult to improve more than one listening position. When improvements are made for one seat, others can be made much worse.

It is more important to make sure that resonant frequencies do not have abnormally long decay times than it is to have a flat frequency response. Lexicon's EQ algorithm measures the decay times of the room resonance modes and prioritizes those with long decay times as being the most important to correct - an approach which has far more impact on the audio experience than merely flattening the frequency response. Another benefit of using this method is that the long decay times occur throughout the room; correcting them for one listening position also fixes them for others. Addressing the decay time, especially of low frequencies, results in flatter frequency response and a more uniform experience from seat to seat.

One of the primary goals in the development of the Lexicon EQ user interface was ease of use. The need was for a powerful tool that was quick and self-contained. With Lexicon EQ, the only special equipment required is an MC-12 and a Lexicon Microphone Kit. Once the EQ setup has been run, the user is given the choice of four settings: Low, Medium, High, or Maximum, allowing the adjustment of EQ being applied. EQ can also be turned on and off to quickly A/B the improvement. Each of the EQ settings can be selected with discrete IR codes from the MC-12 remote control for quick comparisons.

Lexicon has a tradition of providing remarkably innovative, powerful, and practical upgrades to our products. Lexicon EQ builds on this tradition, offering MC-12 owners a completely automatic digital room equalization package that is based on the latest research in acoustics.

SPECIFICATIONS

MC-12 *Specifications*

Audio Inputs and Outputs

Analog Audio Inputs	Eight stereo pairs (RCA) *or* five stereo pairs and one 5.1-channel analog input
Digital Audio Inputs	Six S/PDIF coaxial (RCA), six S/PDIF optical (five TosLink, and one optical mini jack), one AES/EBU (XLR); coaxial and optical inputs conform to IEC-958, S/PDIF standards
Sample Rates:	44.1, 48, 88.2, 96kHz
Accepts:	16-24 bits PCM audio, Dolby Digital, DTS and DTS-ES discrete data formats
Main Audio Outputs	Twelve unbalanced (RCA) and twelve balanced (XLR, MC-12 Balanced only) connectors for Front L/R, Center, LFE, Subwoofer L/R, Side L/R, Rear L/R, Auxiliary L/R
Zone 2 Audio Outputs	Two stereo pairs (RCA, one fixed and one variable output level); two balanced (XLR) for L/R variable output (MC-12 Balanced only)
Record Audio Outputs	Two stereo pairs (RCA, one fixed and one variable output level); one coaxial (RCA) S/PDIF and one optical (TosLink) S/PDIF output (in parallel)

Performance (Main Zone)

Analog-to-Digital Conversion	24-bit, 96kHz, dual-bit △∑ architecture
Digital-to-Analog Conversion	24-bit, 44.1 to 192kHz, multi-bit △∑ architecture, operating in dual-mono mode
Frequency Response	10Hz to 20kHz, +0.1dB/-0.25dB, -0.75dB at 40 kHz, reference 1kHz
THD + Noise	Below 0.008% at 1kHz, maximum output level
Dynamic Range	108dB minimum, 111dB typical, 22kHz bandwidth
Signal-to-Noise Ratio	108dB minimum, 111dB typical, 22kHz bandwidth
Input Sensitivity	200mVrms (2Vrms for maximum output level) at 0dB input gain
Input Impedance	100kΩ in parallel with 150pF
Output Level	150mVrms typical, 6Vrms maximum (RCA outputs); 300mVrms typ, 12Vrms maximum (XLR outputs, MC-12 Balanced only). Maximum value with full-scale input signal and volume at +12dB
Output Impedance	100Ω in parallel with 150pF (RCA outputs); 50Ω in parallel with 150pF (XLR outputs, MC-12 Balanced only)

Performance (Zone 2 and Record Zone)

Analog-to-Digital Conversion	24-bit, 44.1 to 96kHz, dual-bit △∑ architecture (Record Zone only)
Digital-to-Analog Conversion	24-bit, 44.1 to 192kHz, multi-bit △∑ architecture
Frequency Response	10Hz to 20kHz, +0.1dB/-0.25dB,-0.75dB at 40kHz, reference 1kHz
THD + Noise	Below 0.008% at 1kHz, maximum output level
Dynamic Range	105dB minimum, 108dB typical, 22kHz bandwidth
Signal-to-Noise Ratio	105dB minimum, 108dB typical, 22kHz bandwidth
Input Sensitivity	200mVrms (4Vrms for maximum output level)
Input Impedance	100kΩ in parallel with 150pF
Output Level	200mVrms typical, 4Vrms maximum (RCA outputs); 400mVrms typical, 8Vrms maximum (XLR outputs, Zone 2 only, MC-12 Balanced only); maximum value with full-scale input signal and volume at 0dB
Output Impedance	100Ω in parallel with 150pF (RCA outputs); 50Ω in parallel with 150pF (XLR outputs, Zone 2 only, MC-12 Balanced only)

Video Inputs and Outputs

Video Inputs	Five composite (RCA), eight S-video, and four component video (three RCA, one BNC)
Video Outputs	Four composite (RCA, two monitor and two record), four S-video (two monitor and two record), and one component (BNC)

Performance (Composite & S-video)

Compatibility	NTSC, PAL, and SECAM
Switching	Active
Output Level	1.0V peak-to-peak
Impedance	75Ω
Input Return Loss	>40dB
Differential Gain	<0.5%
Differential Phase	<0.5°
Bandwidth	>25MHz
K Factor	<0.3%
Gain	±0.15dB
Signal/Noise Ratio	>70dB
Frequency Response	10Hz to 10MHz + 0.1/-0.3dB

Performance (Component Video)

Compatibility	3-channel (Y, Pr, Pb), format-independent
Switching	Passive
Impedance	75Ω
Bandwidth	>300MHz
Insertion Loss	<3dB

Other

Microphone Inputs	Four 3.5mm miniature phone jacks
Input sensitivity:	10mVrms (400mV maximum input level)
Input Impedance:	20kΩ (accepts balanced or unbalanced input signals)
Trigger Outputs	One power on/off trigger, two programmable triggers; +12 VDC, 0.5 amps each; detachable screw terminals
RS-232 Serial Input/Output	Two 9-pin D-sub connectors for system control and software upgrades
Power Requirements	90-250 VAC, 50-60Hz, 90W (universal line input), detachable power cord

Dimensions

MC-12:	
Height (with feet)	5.65″ (144mm) (three rack units without feet)
Width	17.3″ (440mm)
Depth	14.85″ (377mm)
MC-12 Balanced:	
Height (with feet)	6.73″ (171mm) (~four rack units without feet)
Width	17.3″ (440mm)
Depth	14.85″ (377mm)

Weight	
MC-12:	36lbs (16.4kg)
MC-12 Balanced:	45lbs (20.5kg)
Rack Mounting	Optional brackets are available for installing either unit in a standard 19-inch equipment rack (three rack units required for MC-12, four rack units required for MC-12 Balanced).
Environment	
Operating Temp:	0° to 35°C (32° to 95°F)
Storage Temp:	-30° to 75°C (-22° to 167°F)
Relative Humidity:	95% maximum without condensation
Remote Control	Hand-held, backlit infrared remote control unit
Batteries:	Two AA

Specifications subject to change without notice.