PRELIMINARY PRODUCT INFORMATION

Technical Specifications MX8000

MX8000 Close Coupled Network Processor

CLOSER COUPLING OF ACTIVE ELECTRONICS

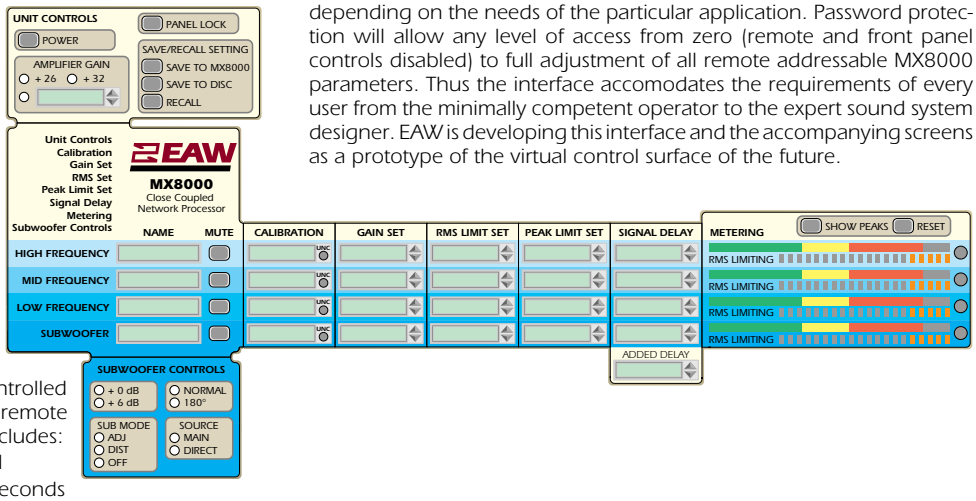
The concept of Close Coupling™ developed by EAW Executive Vice President, Engineering Kenton G. Forsythe is unique. EAW engineers integrate active signal processing into the total loudspeaker system – which may often include internal passive electrical networks and even acoustical filters that operate simultaneously with the external processor – in order to optimize the system's acoustic transfer function. EAW processors do not rely on dynamic effects to disguise limitations in the electromechanical and acoustical aspects of the system. Therefore they do not change the loudspeaker's tonal balance or power response at high output levels.

The MX8000 maintains this approach, which has been proven on concert tours and installations worldwide. It includes all the functions of previous MX Series CCEP™ units, and adds new dimensions of signal processing power and a new, more powerful interface that gives the system designer and operator more information, control and flexibility. EAW engineers will be able to acheive even better acoustic performance by integrating these new capabilities into existing EAW loudspeaker systems as well as new systems under development.

HYBRID ANALOG/DIGITAL TECHNOLOGY

Live sound reinforcement demands the highest available dyanmic range and signal-to-noise performance. In order to achieve the highest possible dynamic range, the MX8000 design team has opted to implement most signal processing functions in the analog domain. The MX8000's analog functions include:

- A four-way crossover using asymmetrical fourth-order filters
- RMS limiting on each frequency band to protect drivers against thermal failure
- Peak limiting on each band to prevent amplifier clipping
- Six bands of parametric equalization provide for flexible system optimization
- Subwoofer cone excursion limiting
- Phase compensation for coherent acoustic summing at crossover points
- Subwoofer OFF (three-way), ADJacent (true four-way) and DIStant (three-way plus subwoofer) modes.



Digital technology has been used wherever it would not compromise the audio signal path. Thus all of the above functions are controlled digitally via the front panel or the two types of remote control interface. In addition, the MX8000 includes:

- Digital delay lines on each frequency band
- Minimum delay resolution of 5.208 microseconds allows drivers or adjacent loudspeaker systems to be time aligned within fractions of an inch
- Maximum delay time of 341 milliseconds per band allows control of arrival times over a wide range.
- Provide coherent signal arrival time from multiple speaker systems.

TWO REMOTE CONTROL OPTIONS

The MX8000 extends the emerging audio control network to the loudspeaker system. Close Coupled signal processing functions as well as output gain and other setup parameters can be controlled via the front and rear panels, or remotely from any personal computer. The first remote control option is an RS232 serial port. The second is a proprietary implementation of the MediaLink network interface. The remote control is the only user access to the digital delay settings, the individual band gain settings and the limiter settings. This system allows a systems engineer centralized control of multiple loudspeaker arrays.

A UNIQUELY POWERFUL MEDIALINK INTERFACE

Previous MediaLink implementations have used Lone Wolf Corporation's MediaLink chip for all communications and control functions. In the MX8000, the same standard MediaLink chip handles network communications and housekeeping chores, while a second internal microprocessor translates the network messages into control vectors for the MX8000's parameter settings. The internal microprocessor also relays system and operating status messages to the network chip. This gives the MX8000 much greater flexibility as well as signficantly enhanced data throughput capacity.

AN ADVANCED GRAPHIC USER INTERFACE

The prerelease version of the MX8000's graphic user interface is shown below. The control surface can be collapsed or expanded by the user depending on the needs of the particular application. Password protection will allow any level of access from zero (remote and front panel controls disabled) to full adjustment of all remote addressable MX8000 parameters. Thus the interface accomodates the requirements of every user from the minimally competent operator to the expert sound system designer. EAW is developing this interface and the accompanying screens as a prototype of the virtual control surface of the future.

EASTERN ACOUSTIC WORKS
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MX8000 PRELIMINARY PRODUCT INFORMATION

AUDIO PERFORMANCE

Dynamic Range	105 dB
THD+N (0 dBu 20 Hz -20 kHz)	0.03% (≤0.08%)

INPUT

Connectors	Female XLR (Locking)
Type	Electronically Balanced Differential
Differential	20 kΩ Input Impedance
Common-Mode	10 kΩ Input Impedance
Input Overload 20 Hz -20 kHz	21.8 dBu

OUTPUT

Connectors	Male XLR (Locking)
Type	Single-Ended
Impedance	10 Ω
Max Voltage	+21.2 dBu
Minimum Resistive Load	200 Ω
Maximum Capacitive Load	22 nF (Outputs are stable with any capacitive load.)
Offset Voltage	±1.5 mV (±10 mV limit)

Output Noise (20 Hz -20 kHz, R_s = 600 Ω, Amp Gain = 32 dB, All Bands Unity Gain)

SUB, LF	-97.5 dBu (<-96.5 dBu)
MF	-96.0 dBu (<-95.0 dBu)
HF	-90.0 dBu (<-89.0 dBu)

ELECTRICAL/ENVIRONMENTAL

Dimensions	19" W x 1.75" H x 12.2" D
Line Input Power	55 Watts
Line Voltage Requirements	
110 VAC Setting	90-135 VAC, 50-60 Hz
220 VAC Setting	195-270 VAC, 50-60 Hz
Line Input/ Fuse Holder	IEC 320 block with 5x20 mm Fuseholder, Line Voltage Selector and Line Cord Socket, UL/CSA/VDE
Operating Temperature	0 - 50° Celsius
Accessories Included	UL/CSA Line Cord Spare Line Fuse (in fuseholder)

DIGITAL CONTROL OPTIONS

Observe/Control	Signal Delay, Gain, Threshold Settings, Mute Status, Subwoofer Mode Status, Power Status
Observe Only	Level Metering, Calibration Status, Amp Gain Status, Limiter Status
Current Platforms	RS232, MediaLink

CROSSOVER FILTER TYPE

HF,MF High Pass	4th Order Linkwitz-Riley, Variable F_0
MF,LF, SUB Low Pass	4th Order Linkwitz-Riley, Variable F_0
LF Highpass Modes	
ADJacent	4th Order Linkwitz-Riley, Variable F_0
DISTant	2nd Order,Variable Q, Variable F_0
SUB OFF	2nd Order, Variable Q, Variable F_0

CROSSOVER CUTOFF FREQUENCIES

HF High Pass	800 Hz - 10 kHz
MF Low Pass	800 Hz - 10 kHz
MF High Pass	80 Hz - 1 kHz
LF Low Pass	80 Hz - 1 kHz
SUB Low Pass	50 Hz - 800 Hz
LF Highpass Modes	
ADJacent	50 Hz - 800 Hz
DISTant	12.5 Hz - 225 Hz
SUB OFF	12.5 Hz - 225 Hz

SYSTEM HIGHPASS AND LOWPASS

Subwoofer High Pass	
All Modes	2nd Order Butterworth, Variable F_0
Fixed LF High Pass	
All Modes	2nd Order Butterworth, -3 dB @ 25 Hz
Fixed System Low Pass	
#1	2nd Order Butterworth -3 dB @ 44 kHz
#2	5th Order Chebishev -3 dB @ 25 kHz

PASS BAND GAIN

HF/MF/LF/SUB	-9 dB to +19 dB

DELAY

Time Base	12.288 MHz ±10 ppm
Maximum Delay	341.3 ms
Minimum Delay	5.2 µs
Delay Resolution	5.2 µs, 0.054 in.
Freq. Response	20 Hz – 15 kHz ±0.25 dB 15 kHz – 20 kHz ±0.5 dB
THD+N @ Max Input Level	
20 Hz – 20 kHz	0.006% (<0.01%)
Delay Type	
Electrical	Digital, 1 input, 4 output
Mechanical	Plug-in Module

LIMITER FUNCTIONS

Limiter Type	
Short Term	Instantaneous Peak Limiter
Long Term	True RMS Above Threshold Infinite Compressor
Limiter Time Constant	
HF RMS	4 ms
MF RMS	13 ms
LF RMS	38 ms
SUB RMS	180 ms
HF/MF/LF/SUB Limiter Threshold	
PEAK Limiter	0.5 V_{PEAK} – 12.5 V_{PEAK}
RMS Limiter	0.1 V_{RMS} – 8.9 V_{RMS}

LF/SUB PROTECTION

Subwoofer Protection	
Circuit Type	2nd Order Variable Q Highpass Filter (Q changes with energy in SUB Pass Band)
LF Protection (SUB Off Mode Only)	
Circuit Type	2nd Order Variable Q Highpass Filter (Q changes with energy in LF Pass Band)

PHASE ADJUSTMENT

Network Type	1st Order Allpass
MF/HF Adjust	0°-180°
LF/MF Adjust	0°-180°
SW/LF Adjust	0°-180°

PARAMETRIC EQ

Available Bands	Band 1, Band 2, HF, MF, LF, SUB
Bandwidth	Up to Q = 5.0
Boost/Cut Range	±12 dB
EQ Out	Flat

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