▶ *SymNet* | Network Audio Solutions

Full Line Product Catalog

The world class solution for delivering and processing sound in virtually any commercial application including convention centers, airports, nightclubs, shopping malls, corporate boardrooms, classrooms, and worship environments... just to name a few!

Advanced Digital Signal Processing is at the core of SymNet. Our solutions simplify system design, deliver superb fidelity, and add value for designers, integrators and end users. Only from the engineers at Symetrix.

Only SymNet.

Contents

Overview

SymNet Audio Matrix is a scalable DSP platform configured by SymNet Designer software and made by Symetrix. Installed in Convention Centers, Sports Arenas, Houses of Worship and many other venues throughout the world, consultants, integrators and end-users rely on the robust stability of the SymNet platform.

SymNet is an open architecture system. This means DSP modules (EQ, compression, etc.) are placed into the design and connected using standard drag n' drop methods. Various SymNet hardware can be chained together to provide a custom audio solution for the client. SymNet's main advantage can be summed up in one word "Options"; options for DSP processing, options for audio routing and options for control.

DSP Processing

SymNet developed at break neck speed to incorporate user input and fine tune the system architecture. There have been over 10 software releases since the product was released over 5 years ago. It is now an advanced DSP platform. SymNet includes more than 350 DSP processing modules. In addition to all the standard processes you would expect to find (such as EQ, compression, etc.) there are advanced DSP modules not offered by competitors. One for instance is the BGM Combiner for room combine scenarios. This module works together with the wall panels located in the rooms so the panels are linked when zones are combined. These combiners also work with SymNet's Automixing solution that has been widely received in the market. Another development is free floating **Echo Cancelling** DSP modules that can be placed anywhere in a SymNet design. The module is not directly attached to hardware inputs and is available on any SymNet hardware with DSP. In addition to this, SymNet has a full logic library for addressing the challenges that are not necessarily audio based. These are just a few examples of the DSP process that help you provide your client with an elegant audio and control system.

Routing

SymNet offers two routing options to move audio between units. One is SymLink; a proprietary high speed audio bus that connects SymNet hardware. The other is CobraNet which has become an industry standard for routing audio over Ethernet. Both have their advantages.

The SymLink advantage is speed. Audio travels between units directly connected with CAT5 cable at a speed of 0.08 milliseconds per unit. Sixty-four channels of audio and control route in a circle around the connected hardware. Another advantage is simplicity. Ethernet based audio transport systems

require additional networking gear and expertise whereas SymLink does not require this. The system is ready to go the moment it is connected.

Primarily, most audio routing for larger DSP systems is for I/O. To keep cost down, integrators stack up input and output hardware and then route audio into (or out of) a unit that has DSP. Since SymLink handles this, it doesn't eat up Ethernet network bandwidth. Instead, only the audio that needs to be sent over long distances is sent over the network. We have found SymNet can facilitate higher I/O counts than systems using only Ethernet-based routing solutions and requires less external networking hardware.

The CobraNet advantage is distance. CobraNet can send audio over Ethernet using standard network hardware. Media converters allow the signals to be sent over fiber optic to achieve incredible distances between units. Another advantage is that CobraNet is an industry standard that many manufacturers support. Equipment between these manufacturers can be connected together and share audio. SymNet has been on the leading edge of CobraNet developments since it was introduced into the market.

Control

Routing and processing audio is only part of the equation. How the system is controlled in real-time is a very important aspect of an installed audio system. To the end user, that wall panel or that computer screen is the audio system. This is why Symetrix offers a full line of wall panels called Adaptive Remote Controls or ARCs that control virtually any function inside a SymNet system. These panels are typically used for source selection, zone volume and preset switching. However, these are not like other wall panel solutions. These panels are scalable and can be chained together and fully configured to meet even the most esoteric switching and control needs.

In addition, SymNet allows integrators to design custom control screens that can be password protected and used by technicians or end users. And finally, SymNet integrates with external control systems such as those manufactured by AMX, Crestron or others with advanced integration features like unsolicited response.

Overall, SymNet systems are flexible and stable. The systems perform reliably for years once they are installed and adjusted. The audio quality has been revered by many system professionals and used in high-end recording studios and home theaters. SymNet allows you to create a customized, elegant and low maintenance system for your client. It is the future of audio and control processing at your fingertips.

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6408 216th St. SW | Mountlake Terrace, WA 98043 | USA | Tel: +1 (425) 778.7728 | Fax +1 (425) 778.7727 | Web: www.SymNetAudio.com

▶ SymNet Designer Software

SymNet Designer Software is a CAD style drag-and-drop Windows application used to configure all SymNet hardware including ARC (Adaptive Remote Control) wall panels. The software supports an open architecture so the entire audio signal path is defined by the system designer. DSP modules such as compressors and equalizers are placed into a design and easily connected with SymNet's elegant wiring method. SymNet Site files are created on a PC and then loaded into SymNet hardware. The Site file is stored onboard the SymNet hardware so it can be retrieved and edited at a later time.

DSP Modules are at the core of a DSP system. SymNet has more than 350 modules including Mixers, Matrixes, Equalizers and filters, Compressors/Limiters, Automatic Gain Control, Sound Pressure Level computers, AutoMixers, Room Combiners, Feedback Fighters, Control Logic, and more. Modules like the BGM Combiners specifically address difficult integration issues. In addition to internal signal routing, the BGM combiners link wall panels in room combine scenarios so that panels track together when zones are combined. This is a first for a DSP-based room combine solution. Other modules like the AutoMixers and the Feedback Fighters have met with great success and are used everyday in SymNet systems.
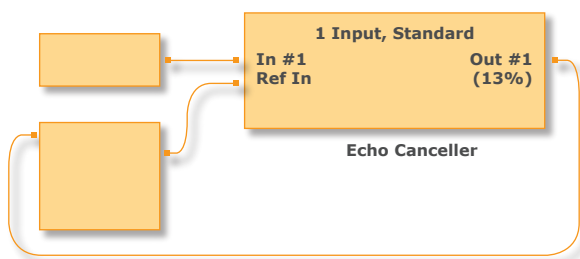
Control Screens are simple user interfaces for the technicians and the end-user that run on a connected PC. These screens are assembled by the system designer from DSP parameters in a SymNet design. Password protection allows different users separate interfaces for controlling the system while preventing access to the underlying design.
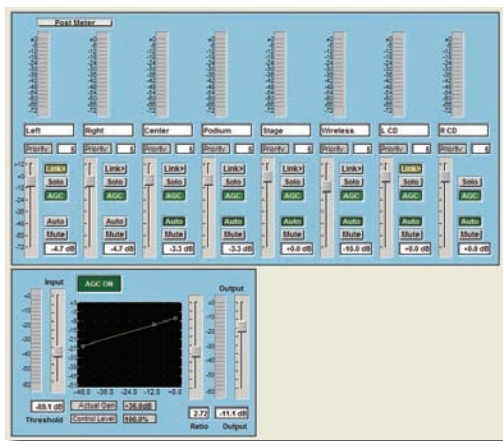
Presets are snapshots of module settings. Presets are built by storing either entire module settings, or specific parameter values into any of the 1000 preset locations. Presets can be triggered from SymNet Designer software, ARC wall panels or third party external control systems.

Super-modules are blocks of DSP programming. These blocks can be moved between SymNet designs via an import/export function. SymNet Designer includes a variety of pre-built Super-modules. These pre-built modules cut design time and help to quickly evaluate DSP usage for a given design. Super-modules can be password protected to prevent access to their internal DSP components. Each Super-module can support a dedicated control screen so selected parameters can be adjusted in real-time.

External Control of SymNet is straightforward and extremely flexible. Symetrix offers a full line of ARC wall panels that are fully configurable to control any function available in the software. Analog control inputs allow connection of potentiometers and contact closures, used to control parameters and/or trigger presets in the system. External equipment can be switched from SymNet hardware via contact closures and relays.

SymNet uses a straightforward protocol to easily integrate with external control solutions from Crestron, AMX and others. **Unsolicited Response** automatically sends updated values to external control systems when parameters are changed in SymNet. This simplifies control system programming by eliminating the need for constant polling.

Control Modules are logic based processing modules. These modules can be assembled in various combinations to elegantly overcome unique performance challenges often encountered in system design. Commonly used control modules are Logic gates (And, OR, XOR), and Flip Flop modules for switching. SymNet also includes an RS-232 string output module for control of external devices such as video projectors and switchers. These examples are the tip of the iceberg; SymNet's control module library is extensive and widely used in SymNet designs.

**Event Scheduler** allows time-based triggering of presets or external switching connections like Relays and Open Collector outputs. Events can be scheduled on daily, weekly, or monthly basis, or custom calendars can be created to trigger events on unique timelines.

SymNet Designer Software Installations can be downloaded for free at www.SymNetAudio.com.

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► SymNet Designer Software

Symnet Designer DSP and Control Modules

Module Classes	Module Variations
Mixers and Matrixes	Mono/Mono, Mono/Stereo, Stereo/Stereo, LCR, Matrix (Mono and Stereo), Gain, Inverter, VCA, Summer
Automixers	Gain-sharing, Gating
Combiners	Standard, Automix, BGM, BGM Automix
Conferencing	Echo Canceller, Echo Reducer, Dialer
Filters and EQs	Crossover, Parametric, Graphic, British, Highpass, Lowpass, Bandpass, Allpass, Shelf, CD Horn, Small Speaker, Feedback Fighter
Loudspeaker Management	Smaart-Compatible, Standard
Dynamics	Compressor/Limiter, Split Compressor/Limiter, Limiter, AGC, Expander/Gate, Ducker, Continuous SPL Computer, Gap-sensing SPL Computer
Delays	Up to 2 seconds per module, mono and stereo.
Routers	Input Selector, Output Selector, Distributor, Priority Selector, Switch
Signal Generators	Pink Noise, White Noise, Sine Wave, Sawtooth Wave, Square Wave, Triangle Wave
Meters and Analyzers	Bar Graph, Gauge, Oscilloscope
Control Modules	Latched Button, Momentary Button, Radio Button, Fader, RS-232/485 Input, Inverter, Threshold Detector, Range Detector, Scaler, Taper Converters, Ramp Processor, Comparator, Input Logic, Delay Logic, Counter, Flip-flop, Binary Decoder, Binary Encoder, Multiplexers, Meters, Preset Trigger, Audio Level Detector, Audio Peak Detector, Relay Output, O/C Output, RS-232/485 Output, RS-232 String Output

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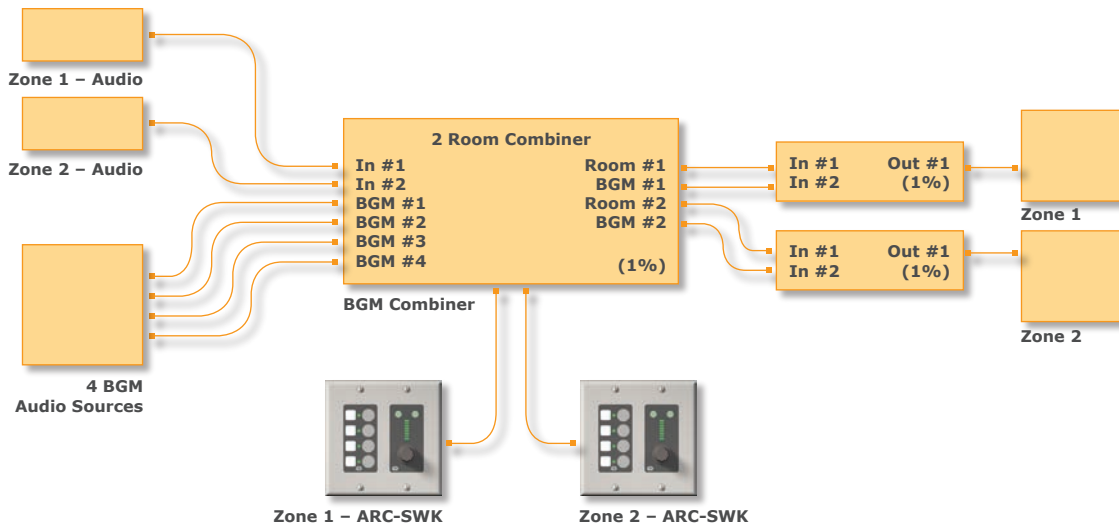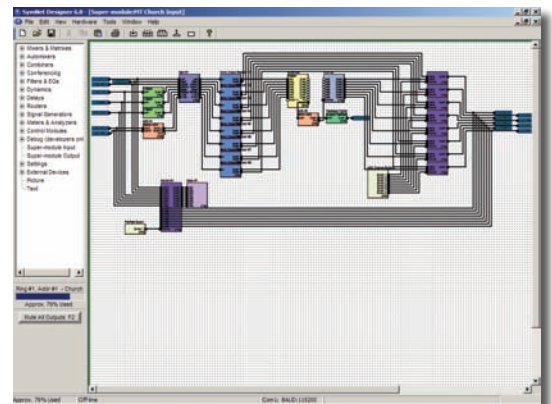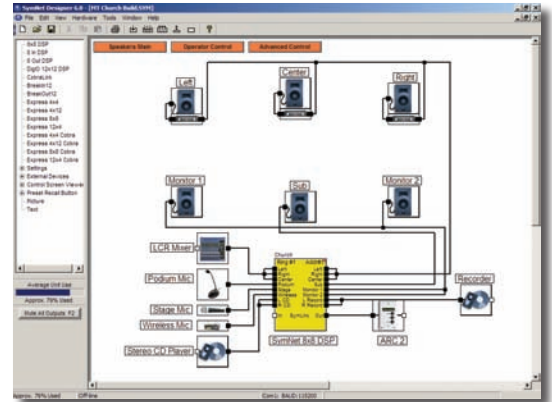
▶ SymNet Hardware

SymNet is a modular system utilizing a variety of hardware I/O configurations, offering many options to the system designer. The hardware falls into two groups: **SymLink** and **Express**. This grouping of devices allows the system designer to tailor both features and price points to the client's needs.

All **SymLink** hardware models include the SymLink bus, a proprietary interconnect which supports up to 64 low latency channels of audio and control, freely circulating between a maximum of 16 SymLink devices. These devices are connected to each other in a ring topology using shielded CAT5 cable. In order to support the high speed, low latency bus, SymLink cables are restricted to 10 meters between devices. In practice, the SymLink components are generally located in the same rack. _Models: 8x8 DSP, DigIO 12x12 DSP, BreakIn12, BreakOut12, CobraLink._

Also included in the SymLink group, used for routing audio over longer distances, CobraLink hardware is used to break out of a SymLink Ring and convert the audio format to CobraNet, Cirrus Logic's multichannel, bi-directional industry standard protocol for networked audio. This hardware allows interconnection of multiple SymLink rings, and provides direct Ethernet access for control of the hardware from a facility's LAN, if so desired.

SymNet **Express** hardware is targeted for applications where a single, stand-alone unit is sufficient for all the audio processing required between the microphones and the power amplifiers.

These applications typically include houses of worship, school auditoriums, media rooms, and others where flexible signal processing is required, yet budget limitations must be observed. All Express models are addressable over Ethernet and can be placed on a facility's LAN.

However, Express hardware also includes the new 16x16 CobraNet chip from Cirrus Logic which allows for some expansion as well as connection to a larger SymNet SymLink system. Its rear panel connections support a split network for separate management of CobraNet audio and Ethernet control over a LAN. Express hardware is a cost-effective solution for bridging distant hardware units requiring no more than 16 channels of audio in either direction. Express hardware is also compatible with third party CobraNet-enabled amplification systems or powered speaker enclosures. _Models: Express 4x4 Cobra, Express 8x8 Cobra, Express 4x12 Cobra, Express 12x4 Cobra._

SymNet Audio Hardware Model Comparison

	8x8 DSP	BreakIn12	BreakOut12	CobraLink	DigIO 12x12 DSP
DSP processors	4x 66MHz	-	-	-	2x 66MHz
Analog audio inputs	8	12	-	-	-
Analog audio outputs	8	-	12	-	-
Digital audio ins	64	64	64	32 (CobraNet) 64 (SymLink)	12* (AES/TOSLINK) 64 (SymLink)
Digital audio outs	64	64	64	32 (CobraNet) 64 (SymLink)	12* (AES/TOSLINK) 64 (SymLink)
Max. Cobra channels	-	-	-	32 in / 32 out	-
Analog/binary control inputs	8	-	-	-	-
Hardware group	SymLink	SymLink	SymLink	SymLink / CobraNet	SymLink
Relay outputs	3	-	-	-	-
Binary outputs (O.C.)	6	-	-	-	-
RS-485	1	-	-	1	1
RS-232	2	1	1	2	1
Ethernet	-	-	-	yes	yes

* Direct connections to four channels - HomerLink BreakOut required for channels 5-12.
** SIMD - Single Instruction Multiple Data architecture achieves increased performance per MHz in many modules.

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▶ SymNet Hardware

*CobraNet
+
Ethernet*

SymLink

CobraLink

BreakIn 12

BreakOut 12

DigI/O 12x12 DSP

SymNet 8x8 DSP

Network Hardware
(Switch)
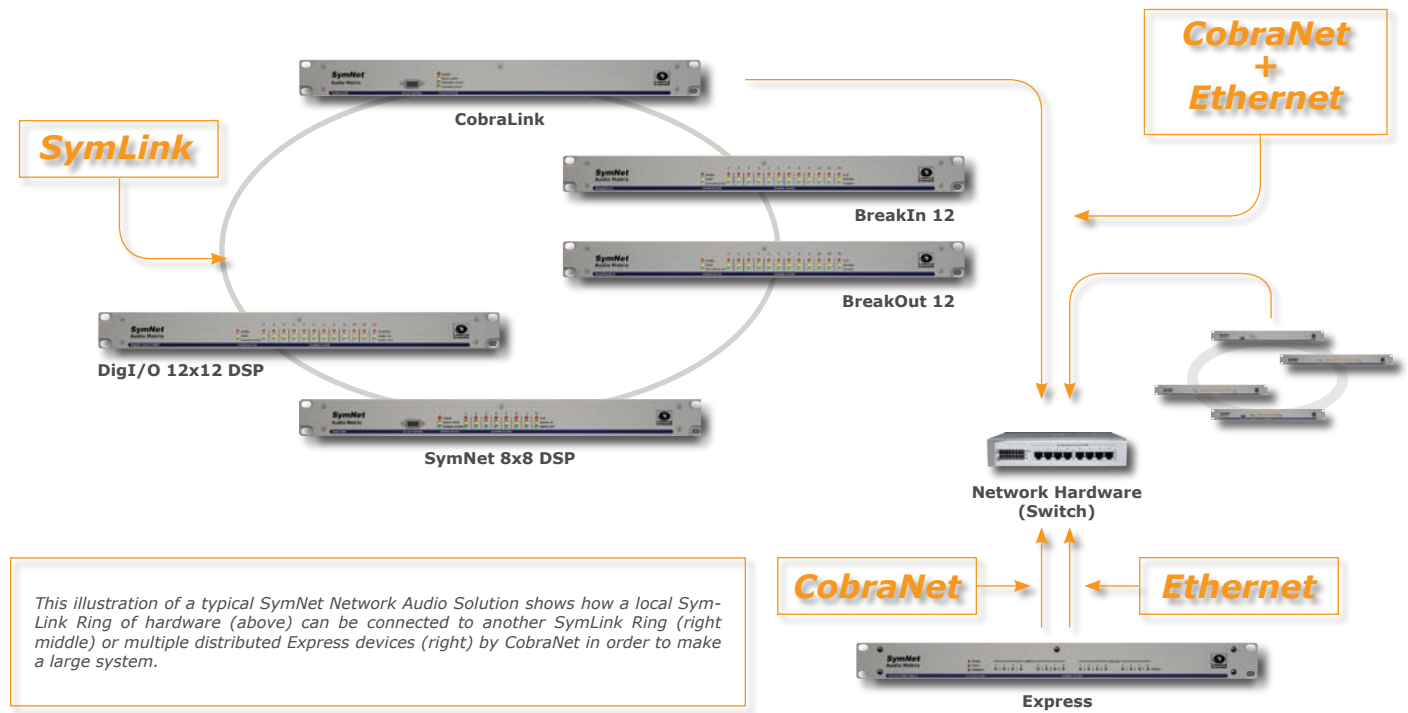
This illustration of a typical SymNet Network Audio Solution shows how a local Sym-Link Ring of hardware (above) can be connected to another SymLink Ring (right middle) or multiple distributed Express devices (right) by CobraNet in order to make a large system.

CobraNet   *Ethernet*

Express

SymNet Audio Hardware Model Comparison... continued

	Express 12x4 Cobra	Express 8x8 Cobra	Express 4x12 Cobra	Express 4x4 Cobra
DSP processors	2x 100MHz SIMD**	2x 100MHz SIMD**	2x 100MHz SIMD**	2x 100MHz SIMD**
Analog audio inputs	12	8	4	4
Analog audio outputs	4	8	12	4
Digital audio ins	16	16	16	16
Digital audio outs	16	16	16	16
Max. Cobra channels	16 in / 16 out	16 in / 16 out	16 in / 16 out	16 in / 16 out
Analog/binary control inputs	2 pots or 4 switches	2 pots or 4 switches	2 pots or 4 switches	2 pots or 4 switches
Hardware group	CobraNet	CobraNet	CobraNet	CobraNet
Relay outputs	1	1	1	1
Binary outputs (o.c.)	2	2	2	2
RS-485	1	1	1	1
RS-232	1	1	1	1
Ethernet	yes	yes	yes	yes

* Direct connections to four channels - HomerLink BreakOut required for channels 5-12.
** SIMD - Single Instruction Multiple Data architecture achieves increased performance per MHz in many modules.

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Introduction

The SymNet 8x8 DSP is the original model in the SymLink series of network audio processors. It is the hardware platform used to execute system designs created in SymNet Designer software. Up to sixteen 8x8 DSPs, or other SymLink hardware models, can be networked together in a ring topology via the low latency, 64-channel SymLink Bus to provide high channel-count processing systems for use in convention centers, arenas, university and corporate campuses, large houses of worship, theaters, hotels, and casinos.

Powered by four Analog Devices SHARC processors, the 8x8 DSP delivers pristine audio through eight line/mic-selectable analog inputs (with independent 48 VDC phantom power per channel), eight line-level analog outputs. Coupled with a comprehensive external control connectivity scheme, this unit is a very powerful tool for the modern system designer or integrator. This is made evident by the number of audio professionals around the globe who bet their reputations on SymNet 8x8 DSP hardware every day.

The power and flexibility offered by the SymLink Bus cannot be overlooked. The sharing of digital audio and control at an average latency of 80 microseconds between hardware units opens vistas in applications and system capabilities not offered by other systems. 64 configurable bus channels of digital audio can be used and reused across multiple units in a ring to far exceed 64 channels of system I/O.

External control options are plentiful. The 8x8 DSP supports RS-232 control systems, the complete line of ARC wall panels, other RS-485 control devices, a full compliment of analog control inputs, and an assortment of binary outputs. The rear panel RS-232 port can issue text string commands to compatible third-party devices such as projectors, negating the need for additional external control hardware in some cases.

Specifications

General Specifications

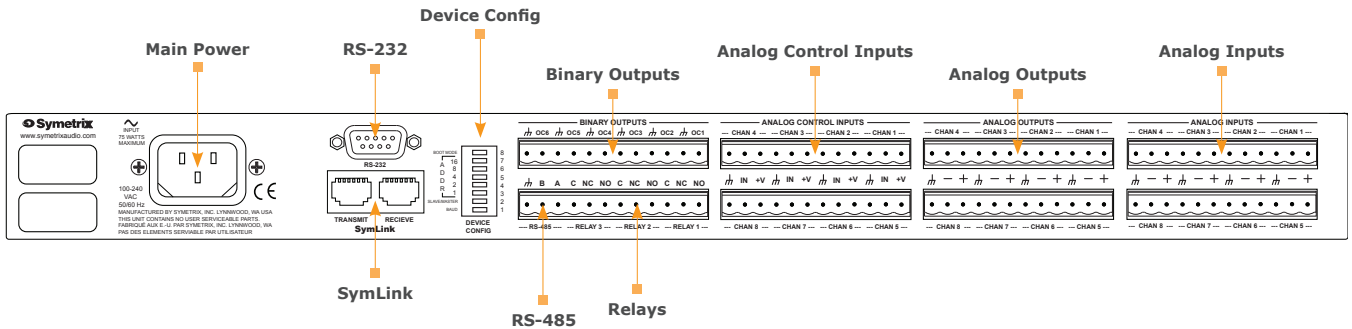|	
Processors	4 x Analog Devices SHARC 21065L @ 66 MHz
Raw processing capacity	264 MIPS, 528 MFLOPS sustained
Analog control inputs	0-10 VDC
Recommended external control potentiometer	10k Ohm, linear
RS-232 host serial I/O	115.2 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-232 accessory serial I/O	38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
SymLink Cable	Shielded CAT5, maximum device to device length = 10 meters
Maximum devices per SymLink Ring	16
Maximum SymLink Rings	31
Maximum stored presets	1000

Audio Specifications

Converter Type	24-bit Sigma Delta
Sampling Rate	48 kHz, +/- 100 ppm
Frequency Response	20-20 kHz, +/- 0.25 dB
A/D dynamic range	> 113 dB, A-weighted
D/A dynamic range	> 114 dB, A-weighted
Total THD+ Noise	< 0.005% @ 1 kHz, -1 dBFS
Delay memory	86 mono seconds
Input impedance	6.67k Ohms, balanced
Output impedance	210 Ohms, balanced
Maximum input level	+24 dBu
Maximum output level	+24 dBu, 100k Ohms
Mic preamp EIN	-129 dBu typical, 22-22 kHz, A-weighted
Phantom power (per input)	+48 VDC, 10 mA
Input CMR	> 70 dB @ 60 Hz
Channel separation	> 100 dB, in through out @ 1 kHz

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 21.6 cm x 4.37 cm / 19 in x 8.5 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 75W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of unit. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

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▶ DSP Hardware

8x8 DSP

Rear Panel

Main Power | RS-232 | Device Config | Binary Outputs | Analog Control Inputs | Analog Outputs | Analog Inputs

SymLink | RS-485 | Relays

▪ **Main Power:** Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 75 Watts max).

▪ **RS-232:** Default serial communications interface for a 3rd party accessory controller. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control. (By default the front port is reserved for SymNet Designer host communications. Host Port Settings: 115 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control.)

▪ **SymLink:** Low-latency 64-channel audio and data bus. TRANSMIT connects to the next downstream SymLink device's receive port. RECEIVE connects to the previous SymLink device's transmit port. This forms the "SymLink Ring". Use shielded CAT5 cables less than 10 meters in length, standard straight-through wiring.

▪ **Device Config:** Configures the RS-232 port host mode baud rate, SymLink Master/Slave status and SymLink device address.

▪ **RS-485:** Connects to a Control I/O, ARC-PS, ARC or other Symetrix SymNet family RS-485 controller, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

▪ **Relays:** 3 SPDT relays rated at 3 Amps, 24 VDC, resistive; 0.3 Amps, 60 VDC, resistive and can be wired normally open or normally closed. These relays can also be used for power failure detection or emergency alarm system integration.

▪ **Binary Outputs:** 6 open collector outputs with a paired common ground pin. O/C outputs go low (0V) when active, and are internally pulled high (5V) when inactive and can drive external LED indicators directly.

▪ **Analog Control Inputs:** 8 analog control inputs able to be used as potentiometer inputs or as switch inputs (+10 VDC reference voltage supplied).

▪ **Analog Outputs:** 8 analog line level audio inputs with individually software-selectable level of -10 dBV or +4 dBu as well as continuous trim.

▪ **Analog Inputs:** 8 analog mic / line level audio inputs with individually software-selectable phantom power and level of -50 dBu, -40 dBu, -20 dBu, -10 dBV or +4 dBu as well as continuous trim.

Architect and Engineer Specifications

SymNet 8x8 DSP Network Audio Solution

The DSP network audio solution shall provide eight balanced mic/line inputs, eight balanced line outputs, eight analog control inputs, six open collector outputs, three binary relay outputs, and one RS-485 interface, all on plug-in barrier-strip connectors. The unit shall include SymLink Bus transmit and receive ports on two RJ-45 connectors. One front panel 9-pin D-sub connector shall be for host computer connection, and one rear panel 9-pin D-sub connector shall be for RS-232 control. Audio inputs and outputs shall be analog, with internal 24-bit A/D & D/A converters operating at a sample rate of 48 kHz. The unit shall support onboard throughput of 8x8 digital audio channels.

All internal processing shall be digital (DSP). SymLink Bus connections shall allow sharing of digital audio within multi-unit systems. A designer software application shall be provided for creating/connecting DSP system

components within each hardware unit. Available system components shall include (but not be limited to) various forms of: mixers, equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, onboard logic, and diagnostics. Serial communications shall be utilized for software control and configuration.

After initial programming, processors may be controlled via dedicated software screens, third-party RS-232 control systems, and/or optional analog or RS-485 remote control devices. A designer software application shall operate on a Windows computer, with network card installed, running Windows 98/2000/XP.

The network audio solution shall be CE marked, CSA tested to UL 60065.

The DSP network audio solution shall be SymNet 8x8 DSP.

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Introduction

The DigIO 12x12 DSP is the essentially the digital I/O version of the 8x8 DSP model in the SymLink series of network audio processors. It is the hardware platform used to execute system designs created in SymNet Designer software. Multiple units can be networked together via the low latency, 64-channel SymLink Bus to provide high channel-count processing systems for use in convention centers, arenas, university and corporate campuses, large houses of worship, theaters, hotels, and casinos.

DigIO 12x12 DSP combines pristine audio quality, a variety of digital audio connectivity options, two Analog Devices SHARC processors, and Ethernet control into a very powerful tool for the modern system designer or integrator. In addition to onboard DSP functions, this unit, along with the optional HomerLink Breakouts, provides a direct digital audio interface to a SymLink Ring. The avoidance of multiple analog-to-digital audio conversion stages is desirable and ultimately improves the integrity of the processed audio.

The power and flexibility offered by the SymLink Bus cannot be overlooked. The sharing of digital audio and control at an average latency of 80 microseconds between hardware units opens vistas in applications

and system capabilities not offered by other systems. 64 configurable bus channels of digital audio can be used and reused across multiple units in a ring to far exceed 64 channels of system I/O.

External control options are plentiful. The DigIO 12x12 DSP supports RS-232 control systems, the complete line of ARC wall panels, and other RS-485 control devices. The rear panel RS-232 port can issue text string commands to compatible third-party devices such as projectors, negating the need for additional external control hardware in some cases.

Onboard digital audio connections include one each AES/EBU 48 kHz input and output pair, and one each optical S/PDIF 48 kHz input and output pair. Dual rear-panel RJ-45 connectors allow interconnection of optional HomerLink Breakout hardware via CAT5 cable. Each HomerLink Bus connection supports 4x4 channels of AES/EBU audio, in pairs, at a latency of one 48 kHz sample. With a recommended cable length of 100 meters, this hardware solution provides a long distance, low latency interface between a FOH console or other remote location, and a SymLink Ring.

Specifications

General Specifications

Processors	2 x Analog Devices SHARC 21065L @ 66 MHz
Raw processing capacity	132 MIPS, 264 MFLOPS sustained
RS-232 host serial I/O	115.2 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-232 accessory serial I/O	38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
Ethernet/CobraNet Cable	Standard CAT5, maximum device to device length = 100 meters
HomerLink Cable	Standard CAT5, maximum device to device length = 100 meters
Maximum devices per SymLink Ring	16
Maximum SymLink Rings	31
Maximum stored presets	1000

Audio Specifications

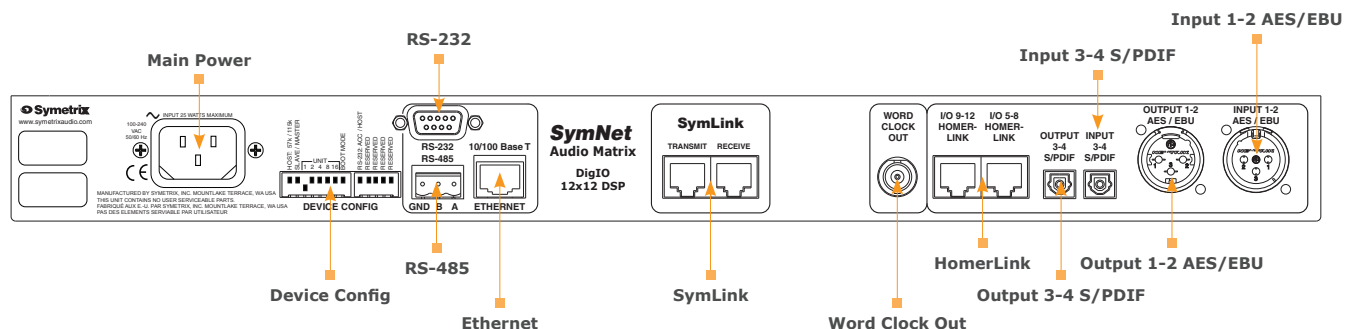|	
Sampling Rate	48 kHz, +/- 100 ppm
Digital Input Sync Range	30-100 kHz (with SRC) 48 kHz, +/- 100 ppm and +/- 90 degrees (w/o SRC, source phase-locked to DigIO Word Clock output)
Sync Output Frequency	48 kHz, +/- 25 ppm (Word Clock)
Frequency Response	20 Hz - 20 kHz @ > 44.1 kHz (with SRC) 20 Hz - 24 kHz @ 48 kHz (w/o SRC)
Dynamic range	> 120 dB, unweighted (with SRC) 144 dB, unweighted (w/o SRC)
Total THD+ Noise	< 0.0003% @ 1 kHz, -1 dBfs (with SRC) N/A (w/o SRC)
Delay memory	43 mono seconds
Input and Output impedance	110 Ohms, +/- 10% (AES)
Maximum input level	0 dBFS (24-bit)
Maximum output level	0 dBFS (24-bit)

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 26.7 cm x 4.37 cm / 19 in x 10.5 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 25W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of unit. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

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▶ DSP Hardware

DigIO 12x12 DSP

Rear Panel

Main Power

RS-232

Input 1-2 AES/EBU

Input 3-4 S/PDIF

RS-485

Device Config

Ethernet

SymLink

Word Clock Out

HomerLink

Output 3-4 S/PDIF

Output 1-2 AES/EBU

▢ **Main Power:** Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 25 Watts max).

▢ **Device Config:** Configures the RS-232 port mode, RS-232 port host mode baud rate, SymLink Master/Slave status and SymLink device address.

▢ **RS-232:** Default serial communications interface for a 3rd party accessory controller. <u>Port Settings:</u> 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

▢ **RS-485:** Connects to a Control I/O, ARC-PS, ARC or other Symetrix SymNet family RS-485 controller, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. <u>Port Settings:</u> 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

▢ **Ethernet:** 10/100 Base-T Ethernet port for SymNet Designer host control over IP. IP control must be setup from SymNet Designer via RS-232 first for security.

▢ **SymLink:** Low-latency 64-channel audio and data bus. TRANSMIT connects to the next downstream SymLink device's receive port. RECEIVE connects to the previous SymLink device's transmit port. This forms the "SymLink Ring". Use shielded CAT5 cables less than 10 meters in length, standard straight-through wiring.

▢ **Word Clock Output:** Provides a SymNet system sample clock reference of 48 kHz.

▢ **HomerLink:** Each HomerLink port transmits 4 AES-3 mono channels and receives 4 AES-3 mono channels over standard CAT5. Connects to a HomerLink BreakOut device or directly to another DigIO using a HomerLink Crossover Adapter (model 810HLXO) as a means of simple digital patching.

▢ **Output 3-4 S/PDIF:** Digital outputs 3-4 in S/PDIF optical format on TOSLINK connectors.

▢ **Input 3-4 S/PDIF:** Digital inputs 3-4 in S/PDIF optical format on TOSLINK connectors.

▢ **Output 1-2 AES/EBU:** Digital outputs 1-2 in AES-3 format on XLR connectors.

▢ **Input 1-2 AES/EBU:** Digital inputs 1-2 in AES-3 format on XLR connectors.

Architect and Engineer Specifications

DigIO 12x12 with HomerLink Breakouts

The network audio solution shall provide AES/EBU stereo input on one 3-pin female XLR connector, AES/EBU stereo output on one 3-pin male XLR connector, optical S/PDIF stereo input on one TOSLINK connector, optical S/PDIF stereo output on one TOSLINK connector, and word clock output on one BNC connector. Digital I/O expansion shall be provided by HomerLink ports on two RJ-45 connectors. Audio inputs and outputs shall be digital operating at a sample rate of 48 kHz. Onboard sample rate conversion shall be provided. The unit shall support onboard throughput of 12x12 digital audio channels.

Available HomerLink Breakouts configurations shall include AES 8x8, AES 4x4, TOSLINK 8x8, TOSLINK 4x4, and TOSLINK/AES. Each shall include appropriate audio connections and one RJ-45 HomerLink connection per 4x4 channel block.

All internal processing shall be digital (DSP). SymLink Bus connections shall allow sharing of digital audio within multi-unit systems. A designer software application shall be provided for creating/connecting DSP system components within each hardware

unit. Available system components software application shall be provided for creating/connecting DSP system shall include (but not be limited to) various forms of: mixers, equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, onboard logic, and diagnostics. Ethernet or serial communications shall be utilized for software control and configuration.

After initial programming, processors may be controlled via a dedicated computer over Ethernet, dedicated software control screens, third-party RS-232 control systems, and/or optional RS-485 remote control devices. A designer software application shall operate on a Windows computer, with network card installed, running Windows 98/2000/XP.

The DSP audio matrix solution shall be CE marked, CSA tested to UL 60065.

The DSP audio matrix solution shall be DigIO 12x12 with HomerLink Breakouts.

▶ SymNet | Network Audio Solutions

► DSP Hardware

Express

Introduction

SymNet Express is a family of 19" rack-mountable digital signal processors (DSP) that are setup and controlled by SymNet Designer software. They are ideal for audio applications such as churches, conference rooms, courtrooms, night clubs and many others. SymNet ARC Wall panels easily integrate with Express hardware and provide simple user control of the system.

There are four analog I/O options available for the Express line: 12x4, 4x12, 8x8, and 4x4. Express units also employ the industry standard CobraNet technology to share audio between units supporting 16 inputs and 16 outputs of CobraNet audio over Ethernet in addition to the analog I/O. Express units are intended for single unit installations as well as installations with meager expansion requirements.

Units are initially configured through the RS-232 port on the rear panel. This same port is used to connect to external control systems from AMX, Crestron, and others. Once the system is initially configured, Express units can be addressed and controlled over Ethernet.

Any of the line of SymNet ARC wall panels can be connected via CAT5 cable to an RJ-45 jack on the rear panel. One channel of analog audio can be routed to or from the wall panel over the CAT5 cable for simple paging or monitoring needs. Express also includes an RS-485 port for extending the ARC and external control capacity.

Specifications

General Specifications

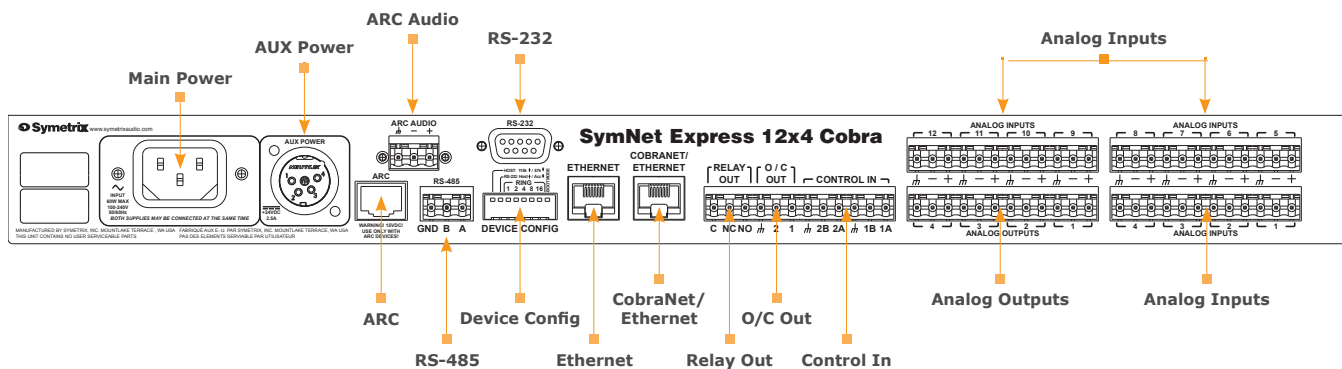|	
Processors	2 x Analog Devices SHARC 21161N @ 100 MHz
Raw processing capacity	200 MIPS, 800 MFLOPS sustained
Analog control inputs	0-5 VDC
Recommended external control potentiometer	10k Ohm, linear
RS-232 host serial I/O	115.2 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-232 accessory serial I/O	38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
Ethernet/CobraNet Cable	Standard CAT5, maximum device to device length = 100 meters
ARC Cable	Standard CAT5, distance dependent upon load.
Maximum devices per SymLink Ring	1
Maximum SymLink Rings	31
Maximum stored presets	1000

Audio Specifications

Converter Type	24-bit Sigma Delta
Sampling Rate	48 kHz, +/- 100 ppm
Frequency Response	20-20 kHz, +/- 0.5 dB
A/D dynamic range	> 110 dB, A-weighted
D/A dynamic range	> 110 dB, A-weighted
Total THD+ Noise	< 0.005% @ 1 kHz, -1 dBFS
Delay memory	43 mono seconds
Input impedance	6.67k Ohms, balanced
Output impedance	204 Ohms, balanced
Maximum input level	+29 dBu with 6 dB pad, +23 dBu w/o pad
Maximum output level	+24 dBu, 100k Ohms; +21 dBu. 600 Ohms
Mic preamp EIN	-129 dBu typical, 22-22 kHz, A-weighted
Phantom power (per input)	+48 VDC, 10 mA
Input CMR	> 70 dB @ 60 Hz
Channel separation	> 100 dB, in through out @ 1 kHz

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 27.4 cm x 4.37 cm / 19 in x 10.8 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 60W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of unit. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

► SymNet | Network Audio Solutions

▶ DSP Hardware

Express

Rear Panel

Main Power: Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 60 Watts max).

Aux Power: Accepts power from Symetrix model PS-7 or user-supplied auxiliary power connection (24 VDC, 2.5 Amps, 60 Watts max).

ARC: Distributes power and RS-485 data to one or more ARC devices.

ARC Audio: Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.

RS-485: Connects to a Control I/O, ARC-PS, ARC or other Symetrix SymNet family RS-485 controller, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

RS-232: Serial communications interface for SymNet Designer on the host PC or a 3rd party accessory controller. (Mode is determined by the "RS-232: Host / Acc" mode switch.) Port Settings (Host): 115 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control. Port Settings (Acc): 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

Device Config: Configures the RS-232 port mode, RS-232 port host mode baud rate and Ring Number (device address).

Ethernet: 10/100 Base-T Ethernet port for SymNet Designer host control over IP. IP control must be setup from SymNet Designer via RS-232 first for security.

CobraNet/Ethernet: 10/100 Base-T Ethernet port for CobraNet audio, 16 send and 16 receive channels. (Future software versions may support SymNet Designer host control over IP+CobraNet on this same port.)

Relay Out: 1 SPDT relay rated at 3 Amps, 24 VDC, resistive; 0.3 Amps, 60 VDC, resistive and can be wired normally open or normally closed. This relay can also be used for power failure detection or emergency alarm system integration.

O/C Out: 2 open collector outputs with a paired common ground pin. O/C outputs go low (0V) when active, and are internally pulled high (5V) when inactive and can drive external LED indicators directly.

Control In: 2 analog control inputs able to be used as 2 potentiometer inputs, 2 mechanical rotary encoder inputs, or as 4 switch inputs (+5 VDC reference voltage supplied).

Analog Outputs: 4, 8 or 12 analog line level audio inputs with individually software-selectable level of -10 dBV or +4 dBu.

Analog Inputs: 4, 8 or 12 analog mic / line level audio inputs with individually software-selectable phantom power and level of -50 dBu, -40 dBu, -20 dBu, -10 dBV or +4 dBu.

Architect and Engineer Specifications

SymNet Express

The series of four DSP audio matrix devices shall include four different configurations of balanced mic/line inputs and balanced line outputs on plug-in barrier-strip connectors. These configurations shall be 12x4, 4x12, 8x8, and 4x4. Each shall be offered with CobraNet compatibility. Additionally each unit shall include two analog control inputs, one open collector output, and one relay output on plug-in barrier-strip connectors, ARC interconnect on one RJ-45 connector, ARC Audio on one plug-in barrier strip connector, and 24V DC backup power on one 4-pin male XLR connector. The units shall include one RJ-45 connector for CobraNet network audio. Audio inputs and outputs shall be analog, with internal 24-bit A/D & D/A converters operating at a sample rate of 48 kHz.

All internal processing shall be digital (DSP). Software shall be provided for creating/ connecting DSP system components within each hardware unit. Available system components shall include (but not be limited to) various forms of: mixers, equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, onboard logic, and diagnostics. Ethernet or serial communications shall be utilized for software control and configuration.

After initial programming, processors may be controlled via dedicated software screens, third-party RS-232 control systems, and/or optional analog or RS-485 remote control devices. A designer software application shall operate on a Windows computer, with network card installed, running Windows 98/2000/XP.

The DSP audio matrix series shall be CE marked, CSA tested to UL 60065.

The DSP audio matrix series shall be SymNet Express.

SymNet | Network Audio Solutions

▶ Expansion Boxes

CobraLink

Introduction

The CobraLink unit functions as a translator between SymLink and CobraNet protocols. It has no onboard DSP. It allows the sharing of digital audio between SymLink rings, Express units, and third-party CobraNet-compatible hardware including amplifiers and powered speaker enclosures. A maximum of thirty one CobraNet addresses, with associated SymLink rings, can be designated in a single system design.

The unit includes 64 channels (32 transmit and 32 receive) of Cirrus Logic's industry-standard CobraNet protocol for audio over Ethernet.

CobraNet-to-SymLink routing is handled entirely from the SymNet Designer software.

This software-controlled-hardware scheme allows system designers an enormous amount of flexibility by supporting broadcast or multicast bussing in incremental send or return bundles up to eight channels, selectable latency options, selectable bit-depth options, and direct network addressability from SymNet Designer over Ethernet. When incorporated in a SymLink Ring, CobraLink hardware occupies the number 1 position.
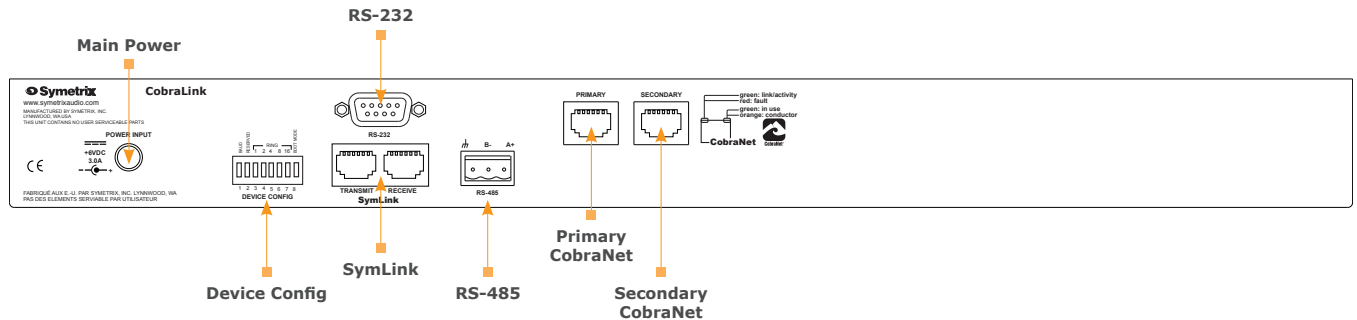
Specifications

General Specifications

RS-232 host serial I/O	115.2 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-232 accessory serial I/O	38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
SymLink Cable	Shielded CAT5, maximum device to device length = 10 meters
CobraNet Cable	Standard CAT5, maximum device to device length = 100 meters
Maximum devices per SymLink Ring	1
Maximum SymLink Rings	31
Maximum stored presets	1000

Audio Specifications

Dynamic range	144 dB
Maximum audio input channels	32
Maximum audio output channels	32

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 21.6 cm x 4.37 cm / 19 in x 8.5 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 6 VDC output, 20W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

▶ **SymNet** | Network Audio Solutions

▶ Expansion Boxes

CobraLink

Rear Panel

Main Power: Accepts power from Symetrix PS-4 (included) power supply only (100-240 VAC, 50-60 Hz, 6 VDC output, 20 Watts max).

Device Config: Configures the RS-232 port host mode baud rate and Ring Number (device address).

SymLink: Low-latency 64-channel audio and data bus. TRANSMIT connects to the next downstream SymLink device's receive port. RECEIVE connects to the previous SymLink device's transmit port. This forms the "SymLink Ring". Use shielded CAT5 cables less than 10 meters in length, standard straight-through wiring.

RS-232: Default serial communications interface for a 3rd party accessory controller. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

RS-485: Connects to a Control I/O, ARC-PS, ARC or other Symetrix SymNet family RS-485 controller, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

Primary CobraNet: 10/100 Base-T Ethernet port connects the SymLink Ring to a CobraNet network. Also provides SymNet Designer host control over IP. IP control must be setup from SymNet Designer via RS-232 first for security.

Secondary CobraNet: 10/100 Base-T Ethernet port allows for a complete secondary CobraNet network if all CobraNet devices on the network have Secondary CobraNet connections.

Architect and Engineer Specifications

CobraLink

The CobraNet interface shall provide CobraNet interconnect on two RJ-45 connectors, SymLink Bus transmit and receive ports on two RJ-45 connectors, RS-485 interface on one plug-in barrier-strip connector, host computer connection on one front panel 9-pin D-sub connector, and RS-232 control on one rear panel 9-pin D-sub connector, CobraNet audio shall operate digitally at a sample rate of 48 kHz. CobraNet audio channel count shall conform to established protocols and shall be limited to 32 transmit x 32 receive.

The unit shall have no onboard digital processing (DSP) capabilities. SymLink Bus connections shall allow sharing of digital audio within multi-unit SymNet systems. CobraNet connections shall allow sharing

of digital audio with other CobraNet-compatible hardware. Software shall be provided for connecting the unit to other SymNet components, and configuring CobraNet communication. Ethernet or serial communications shall be utilized for software control and configuration.

After initial programming, systems including CobraLink may be controlled via dedicated software control screens, third-party RS-232 control systems, and/or optional remote control devices. Software shall operate on a PC computer, with network card installed, running Windows 2000/XP.

The CobraNet interface shall be CE marked, CSA tested to UL 60065,

The CobraNet interface shall be CobraLink.

▶ SymNet | Network Audio Solutions

▶ Expansion Boxes

BreakIn12

Introduction

The BreakIn12 is an analog audio input channel expander for SymLink hardware. It has no onboard DSP, and cannot function in a stand-alone mode. Its sole purpose is to increase system analog input channel count while reducing system cost-per-channel. Each analog input is line/mic-selectable with five coarse gain levels and available 48v phantom power per channel. Onboard SymLink Bus connectors support the interface of BreakIn12 units within a SymLink Ring. Bus assignments and performance characteristics are set via SymNet Designer software.

While DSP requirements vary among system designs, two BreakIn12 units can generally be supported by one 8x8 DSP.

All I/O parameters are accessible via outboard control from third-party control systems, ARC wall panels, or other control devices properly connected to a SymLink Ring.
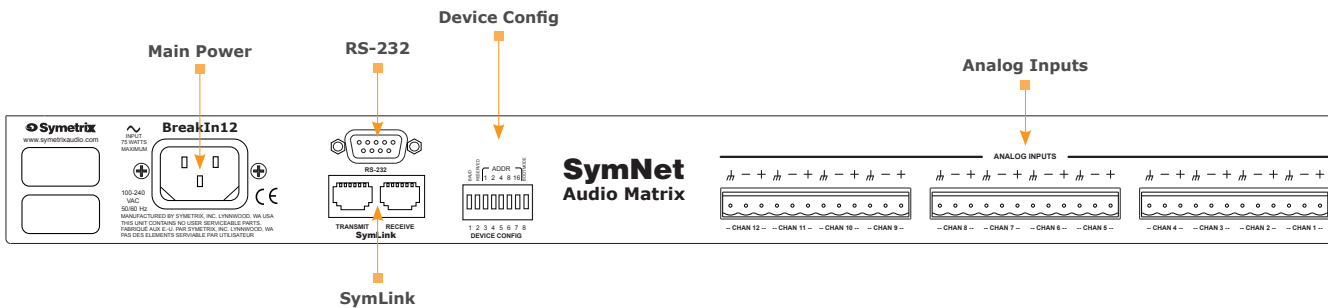
Specifications

General Specifications

SymLink Cable	Shielded CAT5, maximum device to device length = 10 meters
Maximum devices per SymLink Ring	15
Maximum SymLink Rings	31
Maximum stored presets	1000

Audio Specifications

Converter Type	24-bit Sigma Delta
Sampling Rate	48 kHz, +/- 100 ppm
Frequency Response	20-20 kHz, +/- 0.5 dB
A/D dynamic range	> 111 dB, A-weighted
Total THD+ Noise	< 0.003% @ 1 kHz, -1 dBFS
Input impedance	6.67k Ohms, balanced
Maximum input level	+22 dBu
Mic preamp EIN	-128 dBu typical, 22-22 kHz, A-weighted
Phantom power (per input)	+48 VDC, 10 mA
Input CMR	> 70 dB @ 60 Hz
Channel separation	> 110 dB, in through out @ 1 kHz

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 26.7 cm x 4.37 cm / 19 in x 10.5 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 75W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of unit. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

SymNet | Network Audio Solutions

► Expansion Boxes

BreakIn12

Rear Panel

Main Power: Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 75 Watts max).

RS-232: This connection is for factory use only. All communications with the BreakIn12 is via the SymLink bus under the control of a SymNet DSP or CobraLink master unit.

SymLink: Low-latency 64-channel audio and data bus. TRANSMIT connects to the next downstream SymLink device's receive port. RECEIVE connects to the previous SymLink device's transmit port. This forms the "SymLink Ring". Use shielded CAT5 cables less than 10 meters in length, standard straight-through wiring.

Device Config: Configures the SymLink Master/Slave status and SymLink device address.

Analog Inputs: 12 analog mic / line level audio inputs with individually software-selectable phantom power and level of -50 dBu, -40 dBu, -20 dBu, -10 dBV or +4 dBu.

Architect and Engineer Specifications

BreakIn12

The BreakIn12 analog input expander shall provide twelve balanced mic/line inputs on plug-in barrier-strip connectors. The unit shall include SymLink Bus transmit and receive ports on two RJ-45 connectors. Audio inputs shall be analog, with internal 24-bit A/D converters operating at a sample rate of 48 kHz.

The unit shall have no onboard digital processing (DSP) capabilities. SymLink Bus connections shall allow sharing of digital audio within multi-unit systems. Software shall be provided for connecting the unit to other DSP system components.

The analog input expander shall be CE marked, CSA tested to UL 60065.

The analog input expander shall be BreakIn12.

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6408 216th St. SW | Mountlake Terrace, WA 98043 | USA | Tel: +1 (425) 778.7728 | Fax +1 (425) 778.7727 | Web: www.SymNetAudio.com

▶ Expansion Boxes

BreakOut12

Introduction

The BreakOut12 is an analog audio output channel expander for SymLink hardware. It has no onboard DSP, and cannot function in a stand-alone mode. Its sole purpose is to increase system analog output channel count while reducing system cost-per-channel. Each analog output is balanced line level with +4 dBu and -10 dBV reference levels per channel. Onboard SymLink Bus connectors support the interface of BreakOut12 units within a SymLink Ring. Bus assignments and performance characteristics are set via SymNet Designer software.

While DSP requirements vary among system designs, two BreakOut12 units can generally be supported by one 8x8 DSP.

All I/O parameters are accessible via outboard control from third-party control systems, ARC wall panels, or other control devices properly connected to a SymLink Ring.

Specifications

General Specifications

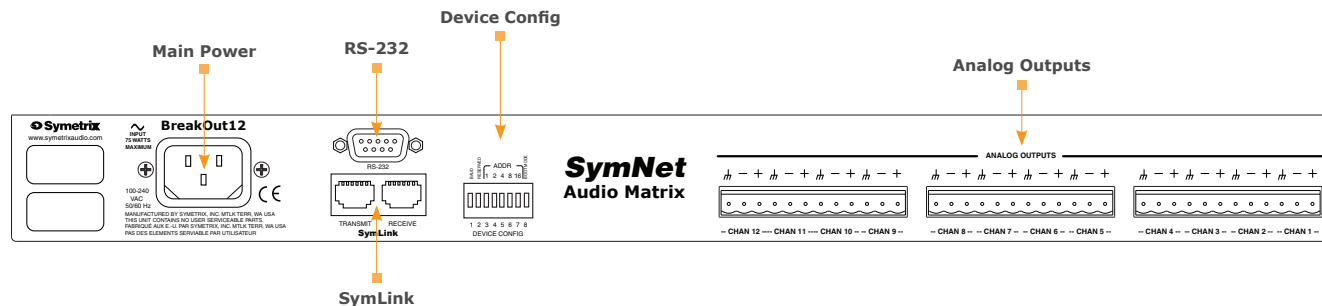|	
SymLink Cable	Shielded CAT5, maximum device to device length = 10 meters
Maximum devices per SymLink Ring	15
Maximum SymLink Rings	31
Maximum stored presets	1000

Audio Specifications

Converter Type	24-bit Sigma Delta
Frequency Response	20-20 kHz, +/- 0.5 dB
D/A dynamic range	> 110 dB, A-weighted
Total THD+ Noise	< 0.0025% @ 1 kHz, -1 dBFS
Output impedance	210 Ohms, balanced
Maximum output level	+24 dBu, 100k Ohms
Channel separation	> 112 dB, in through out @ 1 kHz

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 26.7 cm x 4.37 cm / 19 in x 10.5 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 75W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of unit. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

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▶ Expansion Boxes

BreakOut12

Rear Panel

Main Power: Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 75 Watts max).

RS-232: This connection is for factory use only. All communications with the BreakOut12 is via the SymLink bus under the control of a SymNet DSP or CobraLink master unit.

SymLink: Low-latency 64-channel audio and data bus. TRANSMIT connects to the next downstream SymLink device's receive port. RECEIVE connects to the previous SymLink device's transmit port. This forms the "SymLink Ring". Use shielded CAT5 cables less than 10 meters in length, standard straight-through wiring.

Device Config: Configures the SymLink Master/Slave status and SymLink device address.

Analog Inputs: 12 analog line level audio inputs with individually software-selectable level of -10 dBV or +4 dBu.

Architect and Engineer Specifications

BreakOut12

The BreakOut12 analog output expander shall provide twelve balanced line outputs on plug-in barrier-strip connectors. The unit shall include SymLink Bus transmit and receive ports on two RJ-45 connectors. Audio outputs shall be analog, with internal 24-bit D/A converters operating at a sample rate of 48 kHz.

The unit shall have no onboard digital processing (DSP) capabilities. SymLink Bus connections shall allow sharing of digital audio within multi-unit systems. Software shall be provided for connecting the unit to other DSP system components.
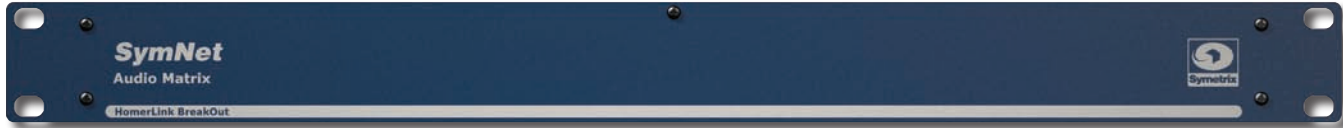
The analog output expander shall be CE marked, CSA tested to UL 60065.

The analog output expander shall be BreakOut12.

▶ **SymNet** | Network Audio Solutions

Engineered by Symetrix

Introduction

HomerLink Breakout boxes provide cost-effective digital audio channel expansion for DigIO 12x12 DSP units. They can also be connected to each other via "crossover" CAT5 cable and function as stand-alone, 8x8 digital audio snake interfaces.

Available in two digital audio formats - AES/EBU pairs on XLR connectors, and optical S/PDIF pairs on TOSLINK connectors – the five 19" rack-mountable models support either 4x4 or 8x8 channel counts of digital audio.

HomerLink is a proprietary interconnect protocol that transports 4x4 channels of AES/EBU audio, in pairs, over a single CAT5 cable with a latency of one 48 kHz sample. It has a recommended maximum cable length of 100 meters. All of the HomerLink Breakout boxes act as format converters between standard digital audio connections and HomerLink.

Specifications

General Specifications

HomerLink Cable	Standard CAT5, maximum device to device length = 100 meters

Audio Specifications

• **Specifications below assume use with DigIO 12x12 DSP. Refer to DigIO 12x12 DSP for full specifications.**

Sampling Rate	48 kHz, +/- 100 ppm
Digital Input Sync Range	30-100 kHz (with SRC) 48 kHz, +/- 100 ppm and +/- 90 degrees (w/o SRC, source phase-locked to DigIO Word Clock output)
Sync Output Frequency	48 kHz, +/- 25 ppm (Word Clock)
Frequency Response	20 Hz - 20 kHz @ > 44.1 kHz (with SRC) 20 Hz - 24 kHz @ 48 kHz (w/o SRC)
A/D dynamic range	> 120 dB, unweighted (with SRC) 144 dB, unweighted (w/o SRC)
Total THD+ Noise	< 0.0003% @ 1 kHz, -1dBfs (with SRC) N/A (w/o SRC)
Input and Output impedance	110 Ohms, +/- 10% (AES)
Maximum input level	0 dBFS (24-bit)
Maximum output level	0 dBFS (24-bit)

Mechanical Data

| Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 15.7 cm x 4.37 cm / 19 in x 6.18 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100-120 VAC @ 60 Hz or 220-240 VAC @ 50 Hz, 9 VDC output, 5 Watts maximum.	Use proper supply for your locale or line voltage. (TOS4 module only)
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	2.0 kg (4.4 lbs.)	

► **SymNet** | Network Audio Solutions

► Expansion Boxes

HomerLink Breakout

Rear Panel

* HomerLink BreakOuts are available in five configurations: 800HLA4 (4-channel AES-3 BreakOut), 800HLA8 (8-channel AES-3 BreakOut), 800HLAT (4-channel AES-3 and 4-channel S/PDIF Optical BreakOut), 800HLT8 (8-channel S/PDIF Optical BreakOut), 800HLT4 (4-channel S/PDIF Optical BreakOut) 800HLAT shown below.
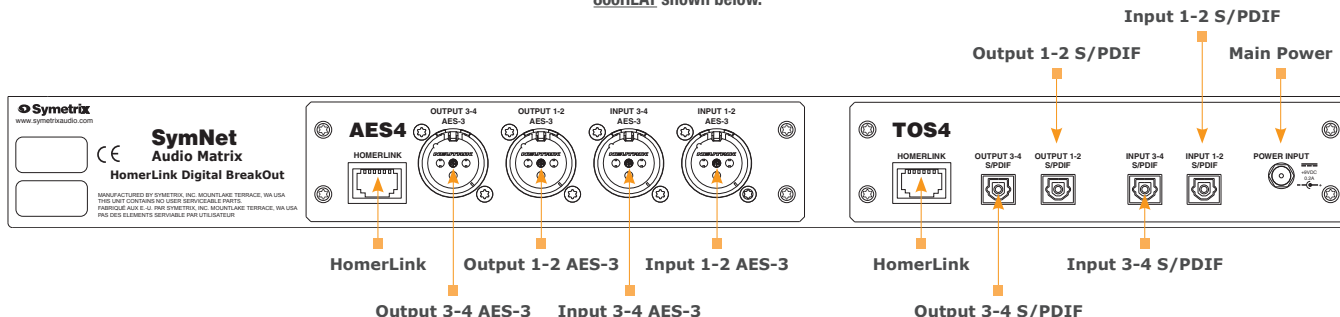
- **HomerLink:** Each HomerLink port transmits 4 AES-3 mono channels and receives 4 AES-3 mono channels over standard CAT5. Connects to a DigIO 12x12 DSP device or directly to another HomerLink BreakOut using a HomerLink Crossover Adapter (model 810HLXO) to create a simple digital snake or format converter.

- **Output 3-4 AES/EBU:** Digital outputs 3-4 in AES-3 format on an XLR connector. (AES4 module only)

- **Output 1-2 AES/EBU:** Digital outputs 1-2 in AES-3 format on an XLR connector. (AES4 module only)

- **Input 3-4 AES/EBU:** Digital inputs 3-4 in AES-3 format on an XLR connector. (AES4 module only)

- **Input 1-2 AES/EBU:** Digital inputs 1-2 in AES-3 format on an XLR connector. (AES4 module only)

- **Output 3-4 S/PDIF:** Digital outputs 3-4 in S/PDIF optical format on a TOSLINK connector. (TOS4 module only)

- **Output 1-2 S/PDIF:** Digital outputs 1-2 in S/PDIF optical format on a TOSLINK connector. (TOS4 module only)

- **Input 3-4 S/PDIF:** Digital inputs 3-4 in S/PDIF optical format on a TOSLINK connector. (TOS4 module only)

- **Input 1-2 S/PDIF:** Digital inputs 1-2 in S/PDIF optical format on a TOSLINK connector. (TOS4 module only)

- **Main Power:** Accepts power from Symetrix PS-6 or PS-6E (included) power supply only (100-120 VAC @ 60 Hz or 220-240 VAC @ 50 Hz, 9 VDC output, 5 Watts max). (TOS4 module only)

Architect and Engineer Specifications

DigIO 12x12 with HomerLink Breakouts

The network audio solution shall provide AES/EBU stereo input on one 3-pin female XLR connector, AES/EBU stereo output on one 3-pin male XLR connector, optical S/PDIF stereo input on one TOSLINK connector, optical S/PDIF stereo output on one TOSLINK connector, and word clock output on one BNC connector. Digital I/O expansion shall be provided by HomerLink ports on two RJ-45 connectors. Audio inputs and outputs shall be digital operating at a sample rate of 48 kHz. Onboard sample rate conversion shall be provided. The unit shall support onboard throughput of 12x12 digital audio channels.

Available HomerLink Breakouts configurations shall include AES 8x8, AES 4x4, TOSLINK 8x8, TOSLINK 4X4, and TOSLINK/AES. Each shall include appropriate audio connections and one RJ-45 HomerLink connection per 4x4 channel block.

All internal processing shall be digital (DSP). SymLink Bus connections shall allow sharing of digital audio within multi-unit systems. A designer software application shall be provided for creating/connecting DSP system components within each hardware

unit. Available system components software application shall be provided for creating/connecting DSP system shall include (but not be limited to) various forms of: mixers, equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, onboard logic, and diagnostics. Ethernet or serial communications shall be utilized for software control and configuration.

After initial programming, processors may be controlled via a dedicated computer over Ethernet, dedicated software control screens, third-party RS-232 control systems, and/or optional RS-485 remote control devices. A designer software application shall operate on a Windows computer, with network card installed, running Windows 98/2000/XP.

The DSP audio matrix solution shall be CE marked, CSA tested to UL 60065.

The DSP audio matrix solution shall be DigIO 12x12 with HomerLink Breakouts.

► **SymNet** | Network Audio Solutions

Engineered by Symetrix

Introduction

The Control IO is an RS-485-based peripheral for SymNet systems. It is compatible with SymLink and Express hardware. Control IO also has a stand-alone operational mode known as ASCII mode which is compatible with third-party hardware and other non-SymNet devices.

Control IO functions as a hardware interface for analog controls, extending the capabilities and connectivity supported by SymNet DSP models. The unit provides an assortment of external control options that can be assigned to any parameter within a SymNet system design. Programming assignments and firmware version upgrades are handled within SymNet Designer. The Control IO package includes eight analog control inputs, eight open collector outputs, four normally open/normally

closed relays, and four RJ-45 connectors to support four SymNet ARC wall panels, each with a discrete channel of ARC audio. A DB-15 connector functions as a MIDI interface. This allows communication from generic MIDI devices, or the CM Labs Motor Mix control surface that can be configured to function as a mixing console-type interface for SymNet.

In ASCII mode the Control IO may be integrated into other third-party hardware and systems, such as those from AMX, Crestron, and others. Compatible systems must be capable of communicating with Control IO over RS-485. All of the capabilities listed above apply, with the exception of ARC wall panel support. ARC wall panels are proprietary and only work with SymNet systems.

Specifications

General Specifications

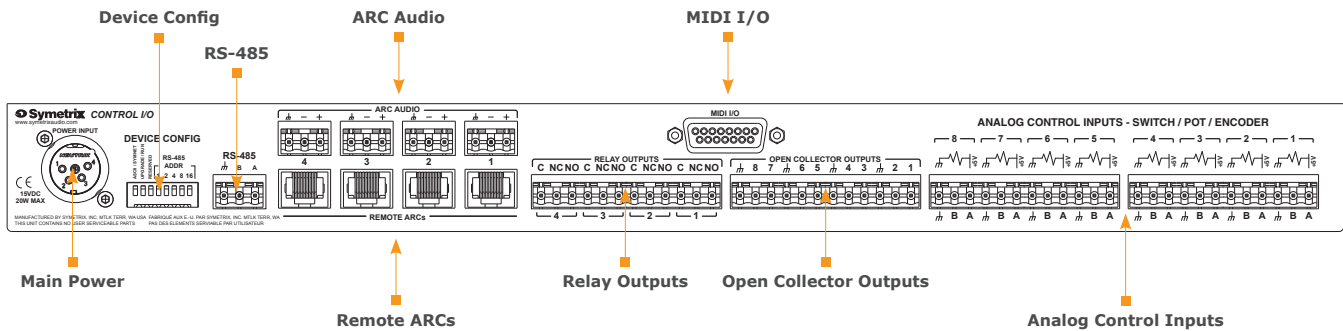|	
Analog control inputs	0-5 VDC
Recommended external control potentiometer	10k Ohm, linear
Recommended external control encoder	Mechanical, rotary
O.C. maximum external power supply voltage	50 VDC
O.C. maximum external power supply current sinking	100 mA
O.C. maximum output current	17 mA
O.C. off output voltage	4 VDC typical
O.C. output resistance	240 Ohms
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
ARC Cable	Standard CAT5, distance dependent upon load.
Maximum devices per RS-485 bus	32

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 15.6 cm x 4.37 cm / 19 in x 6.1 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	2.0 kg (4.4 lbs.)	

► **SymNet** | Network Audio Solutions

▶ Expansion Boxes

Control I/O

Rear Panel

Device Config   **ARC Audio**   **MIDI I/O**

RS-485

Main Power   **Remote ARCs**   **Relay Outputs**   **Open Collector Outputs**   **Analog Control Inputs**

◻ **Main Power:** Accepts power from Symetrix PS-4 (included) power supply only (100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts max).

◻ **Device Config:** Configures the RS-485 device address.

◻ **RS-485:** Connects the SymNet system's RS-485 bus, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

◻ **MIDI I/O:** Allows external MIDI control via a standard DB15 "joystick" to (2) DIN 5 MIDI IN and MIDI OUT cables adapter. (Adapter not included).

◻ **ARC Audio (x4):** Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.

◻ **Remote ARCs (x4):** Distributes power and RS-485 data to one or more ARC devices.

◻ **Relay Outputs:** 4 SPDT relays rated at 3 Amps, 24 VDC, resistive; 0.3 Amps, 60 VDC, resistive and can be wired normally open or normally closed. This relay can also be used for power failure detection or emergency alarm system integration.

◻ **Open Collector Outputs:** 8 open collector outputs with a paired common ground pin. O/C outputs go low (0V) when active, and are internally pulled high (5V) when inactive and can drive external LED indicators directly.

◻ **Analog Control Inputs:** 8 analog control inputs able to be used as 8 potentiometer inputs, 8 mechanical rotary encoder inputs, or as 16 switch inputs (+5 VDC reference voltage supplied).

Architect and Engineer Specifications

Control I/O

The external control interface shall provide eight analog control inputs, eight open collector outputs, and four relay outputs on plug-in barrier-strip connectors. The unit shall provide four ARC ports on RJ-45 connectors, four ARC Audio channels on plug-in barrier-strip connectors, MIDI interface on one 15-pin D-sub connector, and RS-485 interface on one plug-in barrier-strip connector.

The unit shall function as an external control interface for SymNet and other systems. A designer software application shall be provided for assigning control within DSP system components. RS-485 communications shall be utilized for software control and configuration.

The external control interface shall be CE marked, CSA tested to UL 60065.

The external control interface shall be Control IO.

▶ SymNet | Network Audio Solutions

6408 216th St. SW | Mountlake Terrace, WA 98043 | USA | Tel: +1 (425) 778.7728 | Fax +1 (425) 778.7727 | Web: www.SymNetAudio.com

▶ Wall Panels

ARCs

Introduction

The SymNet series of Adaptive Remote Controls, commonly referred to as ARCs, provide straightforward, intuitive user control of SymNet systems. This family of RS-485 based wall panels falls into two groups – Menu ARCs and Modular ARCs.

Menu ARC Overview

The **ARC-2** is a menu-style ARC with its 8-character backlit display. Capable of supporting up to thirty-one scrolling characters, the display provides instant user feedback for control assignments, default settings, and actions. With a capacity of twenty-four menu items, each with sixteen sub-menu items, the ARC-2 is able to provide user control over gain, recall presets, activate source selectors - virtually any parameter in SymNet is assignable to an ARC-2. The three buttons are used for menu navigation, to change values, and to lock the panel out disabling/enabling of the remote. All firmware upgrades and control assignments, including item labeling and parameter limits, are handled within SymNet Designer.

Modular ARC Overview

The **Modular ARC**s provide system control in wall panels that are very straightforward and non-technical. The five base models can be customized with EX expansion panels to create more complex control devices, with a total of two knobs and four sets of switches per RS-485 address. All control assignments and firmware upgrades are handled from SymNet Designer. All Modular ARCs include an onboard logic input, open collector/LED driver output, connection point for an optional key lock, connection points for a single channel of ARC audio, and mount on standard Decora inserts.

ARC-SWK is a dual-gang controller that combines the functional attributes of the K1 and the SW4 into a single control. In addition to the assignable functions of the knob and buttons, the SWK can function as part of a room-combining solution along with the BGM Combiner modules in SymNet Designer. It also has a "Select and Set" mode that allows the buttons to call to certain parameters that can then be adjusted using the encoder. A dual-gang white mounting plate is included.

Architect and Engineer Specifications

Adaptive Remote Control (ARC)

The series of remote control wall panels shall be designated in two groups – Menu ARC, and Modular ARC. The Menu ARC (ARC-2) shall include one 8-character backlit alpha-numeric display, one momentary button for menu selection, and two momentary buttons for value increment/decrement. The Menu ARC shall mount in a standard U.S. single-gang backbox. Power and control shall be connected via two RJ-45 connectors, or screw-type barrier-strip.

Modular ARC wall panels shall consist of multiple models that mount in standard U.S. single- or dual-gang backboxes, and shall be compatible with standard Decora faceplates. ARC-K1 shall include one push-button rotary encoder, one eight-segment LED stack, and two status LED indicators; ARC-SW4 shall include four momentary buttons with four corresponding status LED indicators; EXK shall include one push-button rotary encoder, one eight-segment LED stack, and two status LED indicators, EX4 shall include four momentary buttons with four corresponding status LED indicators; ARC-SWK shall consist of one ARC-K1 tied to one EX4. ARC-Mic shall include one onboard electret condenser microphone and one momentary push-to-talk button, tied to one EX4; ARC-XLR shall include one 3-pin female XLR connector and one momentary push-to-talk button, tied to one EX4.

Adaptive Remote Controls shall function as external user controllers for SymNet systems. A designer software application shall be provided for assigning control within DSP system components. RS-485 communications shall be utilized for software control and configuration.
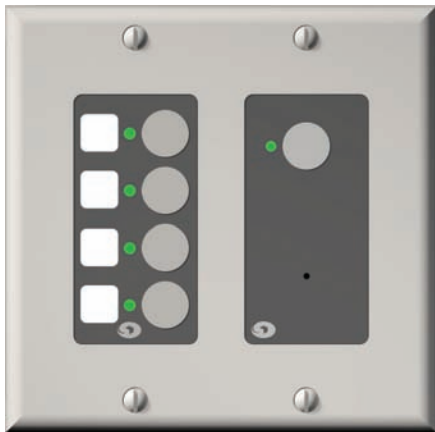
The series of wall panels shall be CE marked, CSA tested to UL 60065.

The series of wall panels shall be Adaptive Remote Control - ARC.

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6408 216th St. SW | Mountlake Terrace, WA 98043 | USA | Tel: +1 (425) 778.7728 | Fax +1 (425) 778.7727 | Web: www.SymNetAudio.com

Modular ARCs... continued

ARC-Mic is a dual-gang controller with an onboard electret condenser microphone and push-to-talk button mounted alongside an SW4 button set. It is typically used as an in-wall paging station, but can be used in other applications such as talk-back, intercom, or as a microphone for ambient noise sensing. A dual-gang white mounting plate is included.


ARC-K1 is a push-button rotary encoder with an eight-segment LED stack on a single-gang Decora insert. It has two additional LEDs, labeled "A" and "B" that illuminate to indicate which of the two available controls is active. A single-gang white mounting plate included.
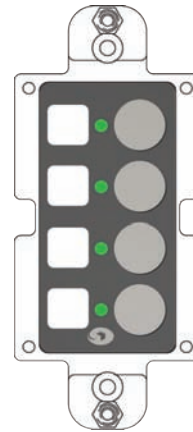
EX4 is an expander version of the ARC-SW4. It is identical in functionality, but will not operate as a stand-alone control. It must be added on to another Modular ARC. It is mounted on a standard Decora insert but does not include a wall plate.
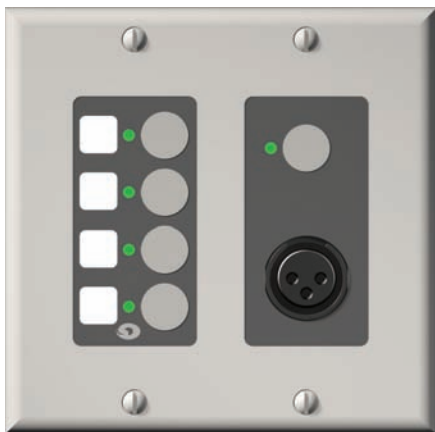
ARC-XLR is a dual-gang controller with a line-level input on an XLR connector with push-to-talk button mounted alongside an SW4 button set.
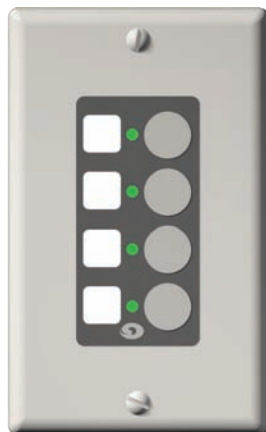
ARC-SW4 consists of four momentary push-button switches with corresponding tri-color LEDs mounted on a single-gang Decora insert. The buttons have two different operational modes: independent or mutually exclusive. A single-gang white mounting plate is included.

EXK is an expander version of the ARC-K1. It is identical in functionality, but will not operate as a stand-alone control. It must be added on to another Modular ARC. It is mounted on a standard Decora insert but does not include a wall plate.

▶ **SymNet** | Network Audio Solutions

Introduction

The ARC-PS is a nineteen inch rack-mountable power supply capable of supplying power and control over CAT5 cable to a maximum of ten ARC wall panels. Panels can be connected in a "star" configuration, "daisy-chain," or a combination of the two. RS-485 from a SymNet DSP is connected to the ARC-PS euroblock connector. The unit includes eight RJ-45 connectors for CAT5 cable, and corresponding euroblock connectors for eight discrete channels of ARC audio.
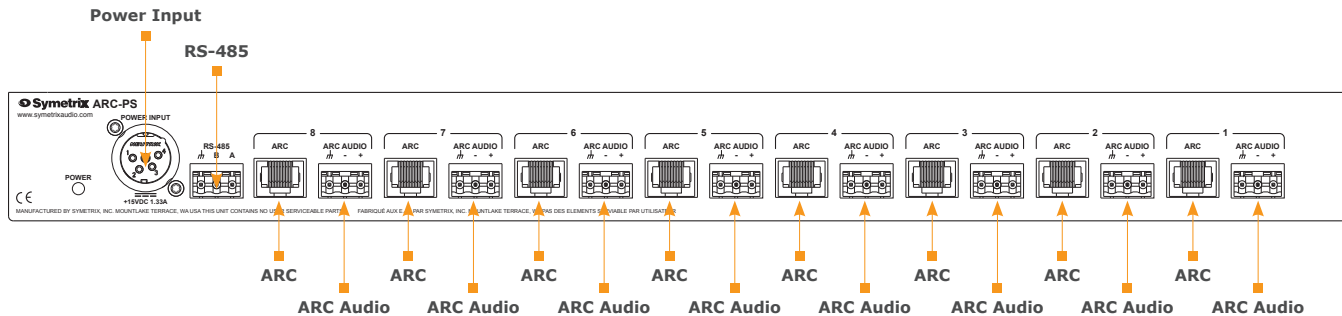
Specifications

General Specifications

RS-485 serial I/O	Data pass-through wired in parallel with STP cable.
ARC Cable	Standard CAT5, distance dependent upon load.
ARC output voltage	15 VDC (dependent upon power supply)
ARC maximum output current	1.3 A per port, 1.3 A total

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 10.2 cm x 4.37 cm / 19 in x 4.0 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	2.0 kg (4.4 lbs.)	

► **SymNet** | Network Audio Solutions

▶ Accessories

ARC-PS

Rear Panel

Power Input

RS-485

Symetrix ARC-PS
www.symetrixaudio.com

POWER INPUT

RS-485
B   A

8   ARC   ARC AUDIO   7   ARC   ARC AUDIO   6   ARC   ARC AUDIO   5   ARC   ARC AUDIO   4   ARC   ARC AUDIO   3   ARC   ARC AUDIO   2   ARC   ARC AUDIO   1   ARC   ARC AUDIO

POWER

+15VDC 1.33A

MANUFACTURED BY SYMETRIX, INC. MOUNTLAKE TERRACE, WA USA THIS UNIT CONTAINS NO USER SERVICEABLE PARTS   FABRIQUÉ AUX E.U. PAR SYMETRIX, INC. MOUNTLAKE TERRACE, WA. PAS DES ELEMENTS SERVIABLE PAR UTILISATEUR

ARC   **ARC**   **ARC**   **ARC**   **ARC**   **ARC**   **ARC**   **ARC**

ARC Audio   **ARC Audio**   **ARC Audio**   **ARC Audio**   **ARC Audio**   **ARC Audio**   **ARC Audio**   **ARC Audio**

☐ **Main Power:** Accepts power from Symetrix PS-4 (included) power supply only (100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts max).

☐ **RS-485:** Connects the SymNet system's RS-485 bus, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair.

☐ **Remote ARCs (x8):** Distributes power and RS-485 data to one or more ARC devices.

☐ **ARC Audio (x8):** Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.

Architect and Engineer Specifications

ARC-PS

The ninteen inch rack-mount wall panel power supply shall provide eight ARC ports on RJ-45 connectors, eight ARC Audio ports on plug-in barrier-strip connectors, and RS-485 interface on one plug-in barrier-strip connector.

The unit shall function as a power supply and RS-485 data router for SymNet ARC wall panels.

The rack-mount wall panel power supply shall be CE marked, CSA tested to UL 60065.

The rack-mount wall panel power supply shall be ARC-PS.

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Domestic

ATGI

Bob Edsall   bob@atgi.ws

9 Elk Mountain Road

Asheville, NC 28804

T: +1 (828) 252-9313   F: +1 (828) 252-9332

AL, GA, MS, NC, SC, TN

MICHAEL CHAFEE ENTERPRISES

Michael Chafee   mchafeeent@cs.com

1891 Porter Lake Drive #104

Sarasota, FL 34240

T: +1 (941) 343-0775   F: +1 (941) 343-0772

Florida

STARIN MARKETING

Neal Weber   www.starinmarketing.com

1531 South Calumet Rd

Chesterton, IN 46304

T: +1 (317) 577-4290   F: +1 (219) 929-4377

IL, IN, MI, MN, WI, OH, ND, SD

EATON SALES & MARKETING

Charlie Eaton   charlie@eatonsales.net

65 Main Street

Binghamton, NY 13905

T: +1 (800) 782-3670   F: +1 (607) 771-3439

Upstate New York

NOREAST MARKETING

David Bierut   noreast@comcast.net

119 Deerfield Road

Windsor, CT 06095

T: +1 (860) 285 0636   F: +1 (860) 285 0686

New England

TOWLES MARKETING

Mark Towles   mark@towlesmarketing.com

8030-34 Main Street, 3rd Floor Front

Ellicott City, MD 21043

T: +1 (410) 465-7100   F: +1 (410) 465-7860

DC, DE, MD, S. NJ, PA, VA, WV

JOHN B. ANTHONY / METRO REPS

Mike Oltz   moltz@johnbanthony.com

16 Passaic Ave, #6

Fairfield, NJ 07004

T: +1 (973) 808-4188   F: +1 (973) 808-1055

New York Metro, Northern NJ

PACIFIC COAST VISIONS

Barry Bindell   bbindell@pcvisions.net

4340 E. Kentucky Ave., Suite 270

Glendale, CO 80246

T: +1 (303) 393-7047

WY, CO, NM, UT, Billings MT

TREMAIN MARKETING GROUP

Michael Tremain   michael@tremainmarketing.com

7 East Gregory Blvd.

Kansas City, MO 64114

T: +1 (816) 931-9664   F: +1 (816) 931-4456

IA, KS, MO, NE, Southern IL

LOPPNOW & ASSOCIATES

Jim Loppnow   jiml@loppnowassoc.com

1420 NW Gilman Blvd. #2857

Issaquah, WA 98027

T: +1 (425) 392-3936   F: +1 (425) 392-3973

AK, WA, Northern ID, Western MT, OR

AUDIO GEER

Alan Geer   alan@audiogeer.com

613 17th Street

Huntington Beach, CA 92648

T: +1 (714) 960-0600   F: +1 (714) 960-0656

AZ, S.CA, S.NV

TROUT FARM TECHNICAL SALES

John Hood   johnh@troutfarm.cc

4219 South Market Suite A

Sacramento, CA 95834

T: +1 (800) 480-8544   F: +1 (800) 408-2145

Northern CA, Northern NV, Hawaii

MARKETING CONCEPTS

Michael Austin   michaela@mar-con.com

2482 Southwell Road

Dallas, TX 75229

T: +1 (210) 732-3033   F: +1 (210) 732-3044

AR, LA, OK, TX

International

WORLD MARKETING

Francis Williams   francis@w-m-a.com

26 Penwinnick Road, St. Austell

Conrwall, PL25 5DS, UK

T: +44 (0) 1726 874184   F: +44 (0) 1726 874185

Europe, Africa, Middle East

S~WAVE MARKETING

Kris Jackson   kris@swavemarketing.com

1996 Valley Rim Road

El Cajon, CA 92019

T: +1 (619) 444-6060   F: +1 (619) 444-7070

Asia, Australia, South Pacific, India

SYMETRIX – Asia Applications Specialist

Hock Thang   hthang@symetrixaudio.com

1 Jalan Taman, Unit No: 10-05

Singapore 329022

T: +65 90091263

Asia

AUDIO AGENT

Dave Christenson   davec@audio-agent.com

155 108th Ave. NE, Suite 210

Bellevue, WA 98004

T: +1 (425) 605-0658

Latin America, Caribbean