SOUND PRESSURE LABORATORY

MULTI CHANNEL SPHERICAL MUSIC SURROUND SYSTEM

WHITE PAPER

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SPL YOU ARE HEARING MUSIC FOR THE FIRST TIME

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OVERVIEW

In 2012 Michael Way founded SPL(Sound Pressure Laboratories), a company that has brought music to the spherical realm. By utilizing a historic movie theatre SPL began interfacing with an antiquated early 80's Dolby surround sound system. Beginning with that foundation SPL proceeded to integrate a digital analogue amalgamation of a Spherical Audio Distribution(SAD) system. A unique signal processing, routing and distribution system because of the real time control and improvisational interaction between artist, engineer, instrumentation, and equipment. SPL utilizes a custom built MIDI Controlled Spherical Emulator(MCSE), Discreet Audio Distribution(DAD), Multi Channel Stereo and Surround Stereo Sub mix(MCS& SSS), The signal processing programs consist of spatial perception, time distance, directional tracking of multiple melodies and harmony. **Music completely surrounds you!**

BRIEF HISTORY

Quadraphonic audio was the industry's first attempt at surround music. The limitations in technology multiple formats and cost of development made it prohibitive. Only a few dared to venture into full production and fewer industrial presentation systems were constructed. With the onset of Dolby and Lucas Films the concept of sound was brought to life and the surround field was achieved. Music followed in suit with SACD(Super Audio Compact Disc). Yet, the fundamentals of music recording were still limited. Even with the breach of the digital analogue environment the capacities and processing were not fast enough and not vast enough to sustain the demands of a spherical music system. Sound Pressure Laboratories has bridged the gap between the digital and analogue environment and created a complete spherical sound system for a live musical experience. We now have the ability to capture and reproduce these perspectives during a live performance, in the studio and for cinema. Our technology can also enhance VR & gaming audio, theatre and any recorded medium. We can then duplicate these perspectives and deliver them to any location or venue in real time or in any format, revitalizing a need for DVD music sales and production. This format exceeds compression standards and limits piracy and copyright infringement by the enormous size of the files. Remote theatre and VR locations and venues are a network audio experience waiting to happen "SPL TheatreNet". Imagine a live concert, sporting event, or speaking engagement. Now it can be viewed in any movie theatre, venue, home or VR headset, globally in real time, with a paid admission. SPL global design systems does just that. NetVR real time events for Streaming VR applications with the ability to view interactive perspectives(stage view, performer view, sky view, etc.). One global concert networking 100 movie theaters in SPL surround, 10 arenas, a coliseum; 50 million headsets, streaming to all, broadcast studios, and homes SPLNET. **The surround field has been waiting for SPL music !**

SPL INTRODUCTION

Creating a spherical music perspective was inspired by nature, NASA, and a passion for music. From the fist time humankind hit two stones together in a canyon. We heard the reverberated reflection of the canyon walls we knew sound was all around us and inside of us. Edison wanted to capture and duplicate it, Bell wanted to send it across the land and sea, and Tesla dreamed of sending it wireless around the globe. With SPL, *"You are hearing music for the fist time"*. **SPL the future of music!**

SPHERICAL SOUND

When you play a drum-set the sound is around you. As a performer that visceral experience drives the energy of the performance. Spherical sound puts the audience on the throne with the percussionist. Enveloping the entire venue and turning the entire space into the instrument and placing the spectator into the music like never before.

ARRANGEMENTS

As a symphony composer knows the color of the instrument, time and placement is key to a master piece. With SPL you now can color any place in the room and create direction and depth like no other recording or sound reinforcement processes. The versatility of the live placement of instrumentation is so exact that we can chase 64th notes in a circular pattern so accurately that the bumble bee begins flight taking the spectator along with it. At SPL the engineer and the musician work hand-in-hand like never before. **SPL experience the performer!**

VOCALS AND DIALOGUE

Distribution of voice is the most important part of sound reinforcement and replication. From Bell to Memorex, RCA and beyond the voice representation is the most important part of the human experience in music and dialogue is concerned. SPL system is extremely versatile. No more are we stuck in a center channel world. Sit in the middle of the conversation as the visualization changes perspective the spacial tracking and placement reorients the direction of sound. Reply from across the room. In the middle of the room conversation can now be directed from the actual spatial perspective of the image on screen. Imagine standing in the center of a barbershop quartet and over dubbed harmonies dance around you as the baritone drives a six channel stereo bass-line. **This is only the beginning of the possibilities.**

SURROUND MUSIC

Retrospectively, formatting surround for music with SPL standards is simple. 1ˢᵗ Use percussion and base tones as layers of foundation with subsonic motion. Then add melodies; they become alive moving through space and time. Discreet audio transitions and SPLs' custom emulation MCSE, now migrate through the space time musically. SPL has transformed how we distribute music throughout a surround field; we put the performance into the listener's space; the spectator can experience the performance as if they were performing. **SPL hearing beyond space time!**

SPL PRESENTATION & COMPATIBILITY

SPL systems have been designed to utilize as much existing equipment as possible. To be played back and distributed on existing medium and upscale to any commercial or industrial setting. A SPL Emulation package for live music, live theatre, cinema scoring or TV/DVD broadcast release, fits seamlessly into DOLBY 5.1, 6.1, 7.1, 10.2 , DTS, and ATMOS. It can also be rendered in stereo. SPL surround music can be played back on DVD, SACD or bluray and when rendered to stereo, CD or MP3 it creates depth like no other recording process. SPL music can also accommodate stereo and quadraphonic records. SPL Stereo 2 channel playback provides a unique depth in the audio recording. Front and rear movement is perceivable in audio recordings, up to 6 layers of rear channel stereo panning, in experimental recording projects. A left and right pan and a front rear pan, a center rear panning effect even in a stereo image. Dimensional space location and plotting are clear as day in the transitional space recording process of the MCSE module. **SPL the sound in space!**
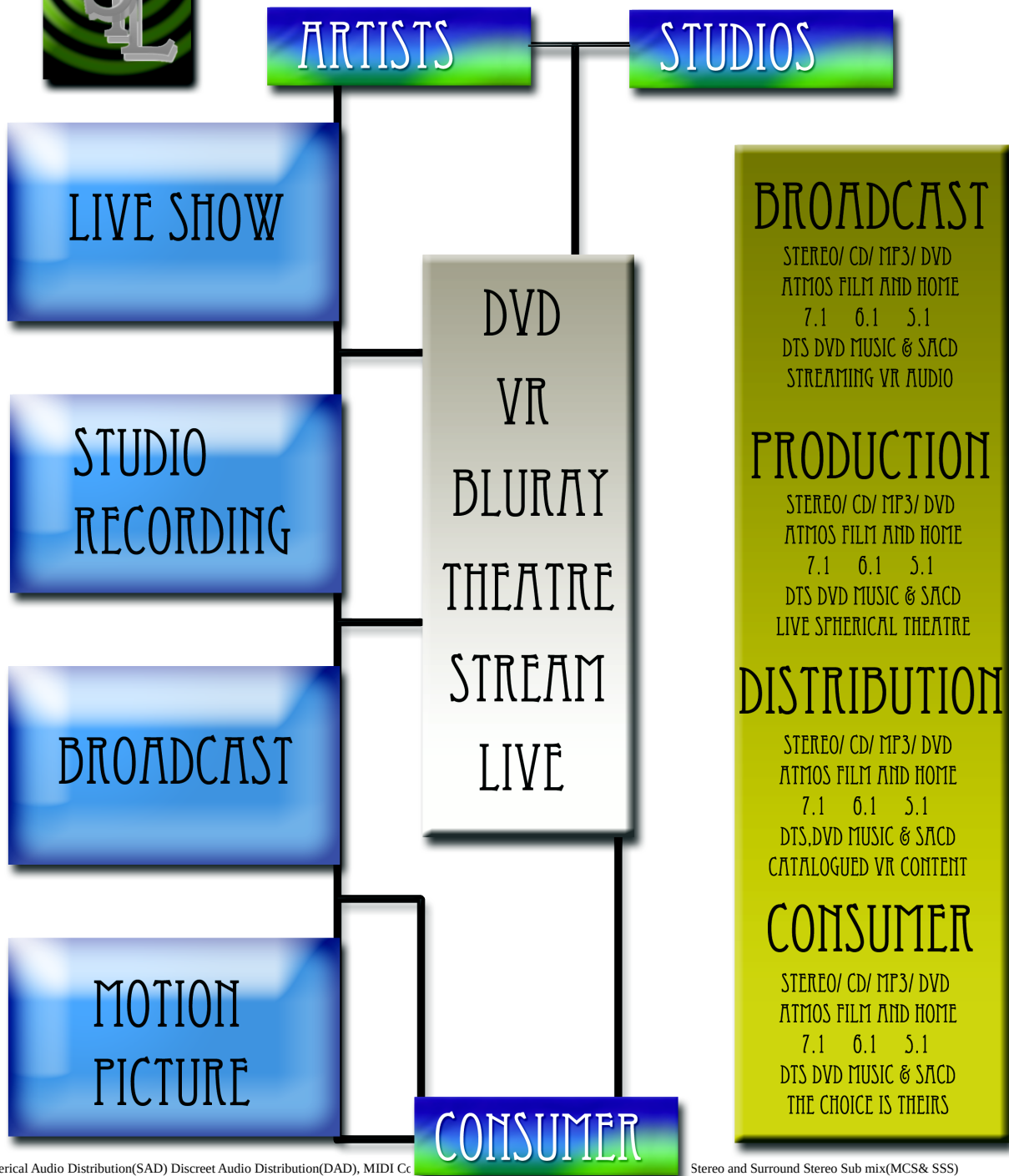
DISTRIBUTION

SPL media is easy to distribute and it is compatible with all existing formats and can amend ATMOS systems beyond current capabilities. SPL surround is currently a 6.1 format for balance in music arrangements. As SACD was a 6 channel audio format, the SPL surround music format is expandable to 180 degrees and for larger venues like arenas and coliseum levels it can be manged to a 360 degree discreet real time translation This can be compressed to stereo without losing fidelity or becoming over-driven and unacceptable. SPL spherical music emulation and distribution systems were designed to extend the reach of live performance, to create an emotional response in cinematic scenes and completely revitalize the surround experience, from consumer to creator and every engineer betwixt.

SPL CHANGES THE INDUSTRY
VERSATILITY OF FORMATTING BETWEEN MEDIA SYSTEMS

ARTISTS — **STUDIOS**

LIVE SHOW

STUDIO RECORDING

BROADCAST

MOTION PICTURE

DVD
VR
BLURAY
THEATRE
STREAM
LIVE

CONSUMER

BROADCAST
STEREO/ CD/ MP3/ DVD
ATMOS FILM AND HOME
7.1   6.1   5.1
DTS DVD MUSIC & SACD
STREAMING VR AUDIO

PRODUCTION
STEREO/ CD/ MP3/ DVD
ATMOS FILM AND HOME
7.1   6.1   5.1
DTS DVD MUSIC & SACD
LIVE SPHERICAL THEATRE

DISTRIBUTION
STEREO/ CD/ MP3/ DVD
ATMOS FILM AND HOME
7.1   6.1   5.1
DTS,DVD MUSIC & SACD
CATALOGUED VR CONTENT

CONSUMER
STEREO/ CD/ MP3/ DVD
ATMOS FILM AND HOME
7.1   6.1   5.1
DTS DVD MUSIC & SACD
THE CHOICE IS THEIRS

Spherical Audio Distribution(SAD) Discreet Audio Distribution(DAD), MIDI Co Stereo and Surround Stereo Sub mix(MCS& SSS)

AUDIO POST & MASTERING

The SPL production of *"Transmigration," A* Spherical Music Quest, was recorded and mastered on conventional off the shelf equipment. Production sound is captured and inputs like any standard audio I/O process. No special equipment beyond the SPL emulation(MCSE) and distribution packages (DAD/SAD). In most cases it is only a matter of reconfiguration of existing equipment and redistribution of busing and grouping. Adding the surround package is only a matter of adding transducers of choice and amplification to accommodate, balance, and match the front right and left and rear channels. Although old style surround systems underutilized the rear channels allowing them to be lower powered and have less fidelity. SPL system require equal front, center, and rear left and right channels in power and loud speaker systems. In industrial audio applications the power requirements to provide proper filter comb enhances physiological effects. Despite SPL audio professional audio requirements the format will seamlessly configure into a 1980's Dolby sound system as easily as an ATMOS or a stereo Hi-Fi system: 1,2,3 easy as popping in a DVD.

FOLEY EFFECTS

Although SPL yields to ATMOS on their phenomenal spacial tracking and object orientation. SPL has a passion, its origin was a 1935 Historic movie theatre. Built as a medium to score music for movies. The secondary effects of Foley work are ground breaking. No more Doppler echo now track each, every object on screen in the room from the entrance to exit. Be the ball in a tennis match, know from which direction the bullet came from. Hear for the fist time what the Kennedy's heard from the back seat. Place the shoots into the time space emulator. Much like ATMOS tracks an object moving through space, SPL gives you dimensional perspective in music. We can give the exact experience to every inch of the room transforming the room into any experience you choose. Want to be inside the piano, guitar, horn or drum? SPL can put you inside your music. *"You will hear music for the first time"*. We can make every seat in the house an individual experience you can see the show 10 times and never see the same show twice. We can bother 50,000 people with one insect as if it was flying around each individual separately; simultaneously, SPL360! Have control over the surround field during all stages of production live, recording, play back and performance bring surround to every audio enhanced medium. The Foley effects engineers can record and engineer there own surround effects in real time with instant monitoring and editing, **SPL perceivable innovation!**

CAPTURE EDIT AND POST

SPL projects pre and post master can be completed with standard off the shelf equipment, in most cases most production studios all ready own most of the equipment. This makes upgrading your studio easier and more cost effective than any full system upgrade in the history of technology. SPL understands efficiency and we are not replacing your current equipment; we are expanding the underutilized sub grouping and busing that is available on most professional consoles. SPL systems are a reconfiguration and expansion of your current capabilities. The vastly versatile methodology of SPL sound processing systems will greatly expand the creativity of any artist and push the understanding of any recording engineer, live audio engineer or cinematic composer. Approved by James Gardiner, of PAJAMA studios in Oakland, CA. Any over all audiophile will be impressed with the future of music.

Presonous Digital I/O

LIVE PERFORMANCE & VEGAS SHOWS

SPL pro stage requirements are more expansive than studio requirements. Due to real time interaction each instrument needs to have its own emulation package(MCSE), Discreet Audio Distribution package, DAD, SPL media server, SPL1,2,3(MCS&SSS), they can be used as stand alone and be linked for MIDI composers and interface. Distance, time, space, tempo and dynamics are all programmable and adjustable(SAD). Each Instrument has there own variation of inputs that can be synced for virtual interaction in real time. SPL has current proprietary design projects for horns, keys, percussion, strings, and vocals.

THEATER-STAGE & BROADWAY SHOWS

The sound design for live theatre, Broadway and Vegas style events will benefit from these sound field control systems. They bring the entire audience on stage and it creates a live surround experience. This is common place in IMAX theaters; SPL is the company with live stage performance in mind
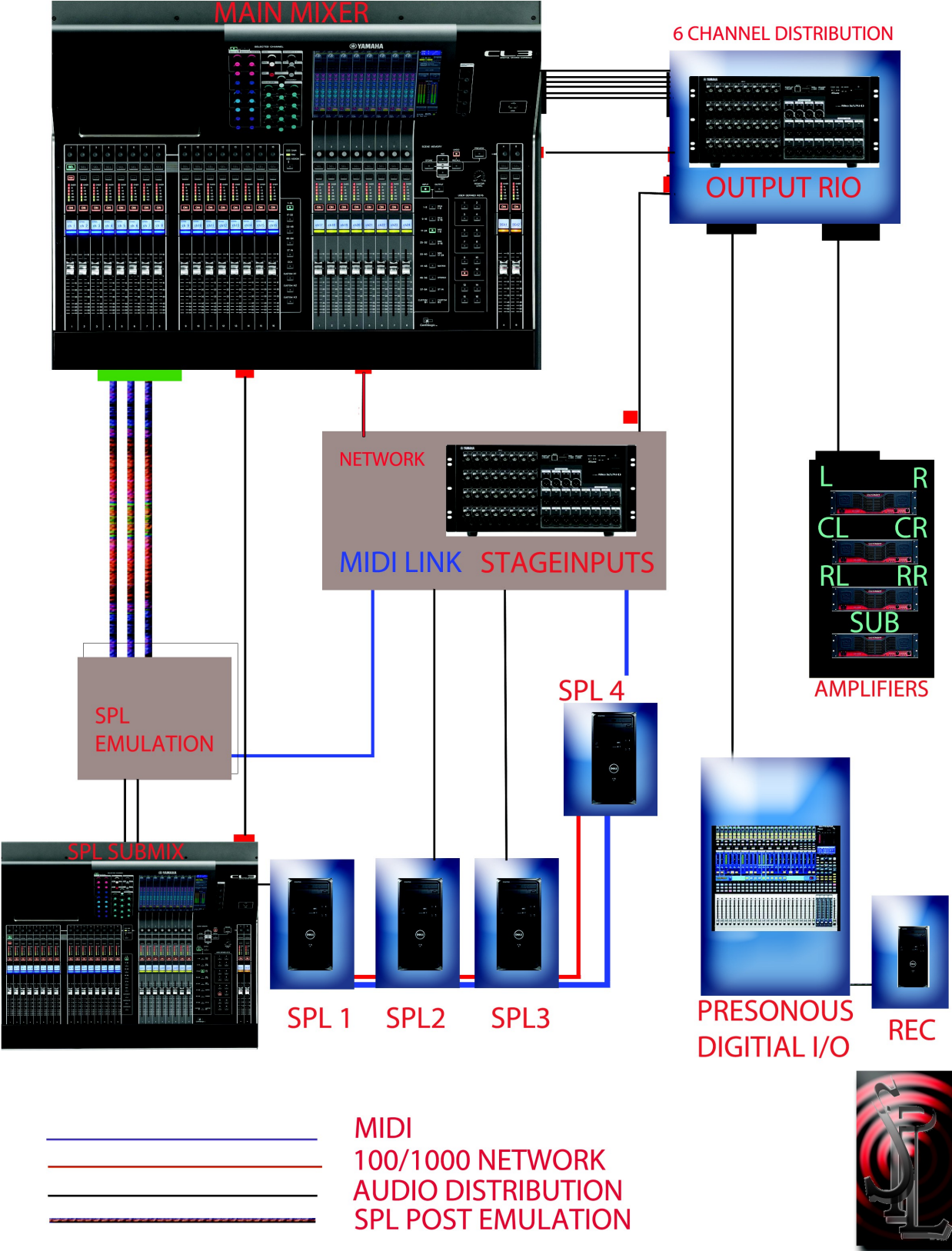
MOTION PICTURES-FEATURE FILMS & HOLLYWOOD

While the industry is currently dominated by only a few companies SPL was created by an artist and engineer for engineers and artists. The passion SPL has in creating an amalgamation of art and engineering is displayed on screen, SPL is the next mile stone. Sound Pressure Laboratory is the first fully spherical music production system for cinema in the history of media production.

RECORDING-SONG WRITERS & BROADCAST

SPL designed spherical music for the studio and it drives the abilities of the organic performer beyond the abilities of the current digital limitations. The experimental recording project bridged gaps and created effects never accomplished before in sound recording or any production surround application.. This system was designed for the performer and the engineer. Today, that is often one in the same. When technology becomes the art; the artist must evolve with the medium. The abilities to compose in the surround field is the next advance in music technology. This ability lies side by side with the current advances in VR and immersive audio, spherical music is next. The founder of SPL is a classical musician, a jazz player, C-10 master electrician, IATSE stage engineer; A1, Dante certified AoIP, and a network engineer, Michael Way became an L-acoustic sound reinforcement engineer in 2002. The SPL system was designed by a player for players, by an engineer for engineers. The SPL signal processing and routing system exceeds the current methodology of music recording and performance technology.

SPL YOU ARE HEARING MUSIC FOR THE FIRST TIME

MAIN MIXER

6 CHANNEL DISTRIBUTION

OUTPUT RIO

NETWORK

MIDI LINK   STAGEINPUTS

L   R

CL   CR

RL   RR

SUB

AMPLIFIERS

SPL EMULATION

SPL 4

SPL SUBMIX

SPL 1   SPL2   SPL3

PRESONOUS DIGITIAL I/O

REC

MIDI
100/1000 NETWORK
AUDIO DISTRIBUTION
SPL POST EMULATION

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SPL EQUIPMENT REQUIREMENTS

SPL systems use Yamaha CL line as well as the Rio systems AoIP distribution protocol. The custom routing and distribution systems were the breakthrough technology SPL systems rely on. Sound pressure labs prefers L Acoustic drivers, transducers and amplifiers for any live applications. Most equipment is compatible with SPL distribution and Real time emulation systems(MCSE). Yamaha was the original inspiration for SPL in the spherical music development and SPL systems utilize every aspect as well as push the threshold of the Yamaha line of professional equipment. Live applications require a minimum of 16 inputs on any mixing board which must have an 8 buss output for grouping, 8.1channel spherical music. For distribution, monitoring playback in the studio: 5.1 surround is the minimum playback configuration for monitoring for any SPL recording TOSLINK/SPDIF I/O for our monitoring systems are required. Music and live applications should be configured in a 6.1 or 8.1 sound distribution for balance. The dimension and power of the loudspeakers are complementary to the space of the studio, venue or home. Amplification should be equal to all loud speakers. But a 4:1 ratio is also acceptable from front to rear speakers with proper distribution for multiple smaller rear speakers in surround field. **SPL putting the audience in the performance!**

OUTPUT

Outputs are,: ¼ inch, or XLR. SPL discreet audio distribution systems(DAD) also requires 6 to 8 analogue outputs(1 output for each surround channel), recorded inputs or/ outputs to discreet amplification that reflects the physical location of a transducer. SPL sound design and composure can be recorded in a verity of audio programs SONY Acid, is SPL preference for capturing spherical audio and provides a 5.1 mix down. All, programs and .vst must be MIDI compatible as well as a be able to share data over the 100/1000 network card. Recording playback for live applications or studio monitors can be achieved over discreet audio distribution, (DAD), for live applications and studio reference, digital audio systems are more cost effective and can be obtained as standard industry equipment, via Toslink/SPDIF, (studio applications). Dolby, DTS decoding and codec for SPDIF/Toslink outputs which are compatible with SPL signal distribution and routing. Drivers are available for download from your current recording software company or ASIO for all. Output recording via fire-wire or USB3 for multi-channel recording configuration, 6 or 8 multi channel I/O device may be required with fire wire or USB3. Massive storage device will be an absolute necessity.

Spherical Audio Distribution(SAD) Discreet Audio Distribution(DAD), MIDI Controlled Spherical Emulator(MCSE) Multi Channel Stereo and Surround Stereo Sub mix(MCS& SSS)

INPUTS

In live stage applications one SPL custom emulator package(MCSE) will be needed for each conventional mono, lowZ, or stereo input, (i.e. guitar keys, sax, vocals, percussion or ambient effects). For multi track recording a single unit can be used while only controlling a single instrument at one time. Routing multiple instruments simultaneously is possible with one unit but it limits post production editing. The SPL time space emulators require 6 to 8 inputs for spherical audio recording (SAD), per conventional mono or stereo input. SPL1,2,3 media servers will be required for studio composure and discreet audio distribution(DAD). A total of 18 inputs will be necessary.

SPL spherical music can be achieved and distributed in many ways. All industry I/O are compatible. Distribution and arrangement determine routing and matrix assignment. Mono instruments can be routed through the SPL time space emulator(MCSE), or be distributed to 6 or 8 channel stereo or directly(SSS); independent discreet channels for dynamic effects. The arrangement is the art, SPL is where the artist, engineer and composer become one. Stereo inputs can be distributed in standard stereo front or rear, 6 or 8 channel stereo or it can be "monoized" for spherical distribution and discreet effects enhancements(SAD,DAD)…..Each instrument can be emulated individually, in groups or separately. Multi track recording can be achieved with one unit while a live presentation can require multiple emulators linked to maximize individual routing, Mass MIDI controlled spherical emulator(MMCSE).

STORAGE

While our our daily requirements consume a vast amount digital storage space it is slowly becoming a commodity. A media production company need more storage than most companies. If its live content we need data storage for content, distribution and processing power for control. If it is studio content we need massive storage for multi track recording, multiple takes, reedits, remix, you know how much storage engineers consume in the studio. This is the sole reason spherical music and recording has been impossible until now. When recording in 6 channel audio every instrument requires 6 channels for pre-master mix-down. If it is an 8.1 version each instrument each recorded conventional stereo track will need dedicated 8 channels,(4 stereo mixes), of recording, for each vocal, instrument, track or effect overlay. One track of just music can be up-to an entire gigabyte for a single 3minnte song. The 104 minute SPL release: *"Transmigration",* the fist spherical music production title is an 8 gigs post master audio production, and only 7 tracks. The entire media A/V content filled an entire bluray. SPL exceeds current capacities of your storage medium and an upgrade of your digital storage device will be more than likely. A minimum requirement will be 10 TB of storage per processor(4). **SPL Exceeding limitations.**

PROCESSING AND COMPUTER REQUIREMENT

CPU i5 dual core (or comparable apple products) requirements for capture and playback. 5 separately rack mounted PC are required to produce and record SPL6channel Spherical Music. These MIDI linked networked array of processors or MCSE, will discreetly distribute music to the sound field and give the artist the ability to create movement in music. (SAD) systems discreetly distribute audio. (DAD) distributes discreet audio to all channels. MCSE will distribute real time digital sequencing and give the artist/composer the ability to discreetly mix edit and compose real time spherical music. (SAD) the back bone of the system and the key element that makes surround music possible is multi channel stereo and surround stereo sub mix(MCS&SSS) SPL AoIP routing and distribution protocol is the art in the engineering and will become a standard for *"TheatreNet,""SPLNet"and"VRNet,"* distribution. An isolated AoIP network will be required for audio routing and distribution. Multi monitor display and networked mouse and keyboard control is controlled by the Sound Pressure Laboratory Server. The SPL SERVER contains: MIDI time clock and server control over the SPL dedicated primary network for file sharing and networked data access.

Mission Statement

Liberation of music with a seamless
amalgamation of performer and engineer!
Exceeding the pinnacle of excellence in
spherical music recording and performance!