SpaceHarp
Performance Systems
User Guide

PERFORMANCE SYSTEM #1

PERFORMANCE SYSTEM #2

PERFORMANCE SYSTEM #3

PERFORMANCE SYSTEM #4

spaceharp
corporation

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1.1 OVERVIEW

SpaceHarp introduces a new way to create music by sensing players' continuous motions over it. It's an instrument built "from scratch" to fully exploit today's amazing music software tools in a radical departure from previous musical instruments. Applications for SpaceHarp range from public walk-up, self-serve "kiosk" installations, to DJs, Pro performers, theme park installations, therapeutic applications and bedroom musicians.

While the SpaceHarp MIDI Controller itself can be directly connected to any MIDI system due to the universality of the MIDI protocol, for turn-key systems installations and applications, including for SpaceHarp controller LEDs sync to DAW presets and for taking full advantage of the power of the SpaceHarp controller, we recommend and supply several alternative system configurations. We describe in detail these Systems in this User Guide, including identification of all devices and parts, how the devices are connected to each other, and how to troubleshoot issues that might arise.

SPACEHARP PERFORMANCE SYSTEMS USER GUIDE

SUMMARY OF SECTIONS

Section 1 Overview (This page.)

Section 2 Applications summarizes the kinds of applications that benefit from SpaceHarp and SpaceHarp Performance Systems.

Section 3 System Devices details the certified Sound-Galaxy compatible equipment, both as included in turn-key systems, and optional items.

Section 4 System Configurations illustrates how the SpaceHarp controller can be combined with various system devices into turn-key and custom systems.

Section 5 System Setup illustrates how to setup turn-key and custom systems including DAW computer, racks, step-by-step checklists, AC and data cable connection diagrams.

Section 6 Troubleshoot Systems gives you precise and quick step-by-step help for getting out of trouble.

Section 7 Hardware Reference covers notices, cautions and warnings, and a cross-index table of all system devices & sub-assemblies.

NAVIGATING THIS GUIDE

You have three ways to jump to any section of this User Guide. (1) Open the bookmarks pane in your PDF viewer. (2) Use the Table of Contents which is hyperlinked. (3) Use the right margin thumb-tabs which are linked.

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1.2 APPLICATIONS

There are many applications for the SpaceHarp controller and Sound Galaxy 2.0 Software, including Location Based Entertainment installations, special events, DJ-EDM stage performances, theme Park attractions, wellness and therapeutic uses and use by bedroom musicians.

We have specified, and we supply in turn-key configurations, several alternative system setups. All of these are certified for trouble-free operation of the SpaceHarp MIDI Controller with Sound Galaxy 2.0 DAW software tools suite. These systems may be used exactly as supplied, or may be customized in various ways; both scenarios are fully illustrated in this User Guide. Where equivalent items of equipment can be substituted with little or no impact, those are also noted.

1.2.1 Single SpaceHarp LBE Installations

Museums, science centers, movie theater chains, family entertainment centers, dance clubs, mixed-use retail, destination resort hotels, store-within-a-store and theme parks are all excellent Location Based Entertainment (LBE) applications for long-term installations of single-SpaceHarp, turn-key Systems. As to business model for these, they may be operated under a people-traffic budget, offered as part of a bundled admission ticket, or offered as a five-minute personal pay-per-play experience.

We recommend our **SpaceHarp Performance System # 3**, the 4U-Rack based system, summarized in Turn-Key System Configurations. Adding music visuals may be appropriate.

1.2.2 Special Events
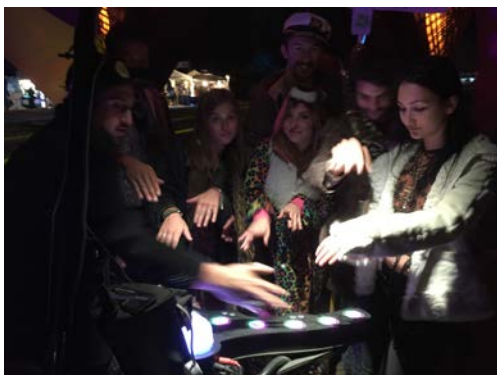
SpaceHarp is great for corporate events, festivals, county and regional fairs, receptions, product launches and trade shows.

Special events can sometimes benefit from two systems: one for a stage performer, and another in a separate space such as in a chill-out room for guests to take turns playing. "Silent Disco" wireless headphones may also be added. The two SpaceHarp attractions – performance and participatory, reinforce each other and generate much excitement.

For both systems in this application we recommend our **SpaceHarp Performance System # 3,** the 4U-Rack based system, summarized in Turn-Key System Configurations. Adding music visuals is often appropriate.

1.2.3 DJ and EDM Performers
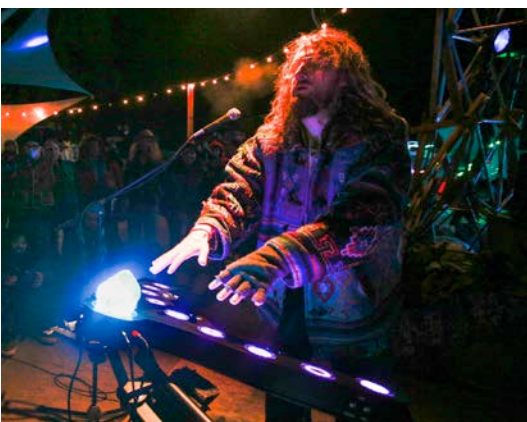
The SpaceHarp controller and Sound Galaxy DAW Tools were developed and created with the participation of EDM performers. The unique behavior of the sonar sensors' height function combined with many effects for DAW instrument plug-ins are ideal for a radical, dramatic and exciting EDM performance.

We recommend our **SpaceHarp Performance System # 3**, the 4U-Rack based system, summarized in Turn-Key System Configurations. Adding music visuals may be appropriate.

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1.2.4 Multiple-SpaceHarp Theme Park Attractions

The Sound Galaxy 2.0 software and SpaceHarp Performance Systems currently support up to four SpaceHarps for live jamming in shared music and visual media content.

At least one solo SpaceHarp session is a good idea before jamming in any group of players. A larger attraction can combine one-player booths, kiosks or mini-domes, together with some larger rooms or domes large enough for four players to share.

4D theaters seating 200-400 are also an excellent application. Pre-qualified attraction guests and/or performers play on an interactive stage with up to four SpaceHarps. The audience is in a 4D theater. SpaceHarps can be wired over MIDI into DMX lighting, 3D Video Effects, Music Visualizations and Laser Show Control computers – for effects that appear both on stage and through the entire venue. We would recommend our customized addition to the 6U-Rack based system, the **SpaceHarp Music & Visual Media Performance System.** This is summarized in SpaceHarp Custom System Configurations. Further details on inter-computer configurations for this are illustrated in System for Visual Media (USB) and System for Visual Media (Ethernet). See our separate **Sound Galaxy 2.0 User Guide** for further information including MIDI specifications.

1.2.5 Wellness and Therapeutic Applications

SpaceHarp spontaneously provides a new kind of therapeutic and wellness experience for players. Music therapy, even using the simplest of instruments such as drums, has been proven to have such well-established benefits that there are over 5,000 music therapists employed by major hospitals. SpaceHarp has the unique feature of allowing anyone who can move, to play real music providing instant gratification while being mistake-free. SpaceHarp's issued US patent covers a "Creative Wellness Response" which entrains players within minutes into a "desirable cognitive state" that is uplifting and empowering in every way. In our experience, thousands of trial players have reported a feeling of "euphoria" and "creative joy" after only a minute or two from starting to play, even in their first SpaceHarp session. We welcome affiliations with principle investigators for research and validation of these applications.

When music visuals are also included, such a SpaceHarp experience can be viewed as an integration of music therapy, dance therapy, creative therapy, physical therapy and creative art therapy – all of which disciplines have been separately shown to have repeatable and profound therapeutic benefits. For an office or clinical setting, to maximize simplicity of operation and provide lower cost, we would recommend our **Performance System #1**, the Minimal Sound Galaxy DAW System Configuration.

1.2.6 Bedroom Musicians

Half of the purchasing power of the US musical instrument, equipment and software market comes from "bedroom musicians." Often not career musicians, they yet have a life-long enjoyment in making music for its own sake, and sometimes "breakout" over the internet. Especially for non-keyboard playing musicians, SpaceHarp offers an alternative "universal instrument" that can provide results similar to a keyboard controller together with DAW software, but without the months or years of learning piano to achieve.

Bedroom musicians are often already using many of the kinds of System Devices that work well with SpaceHarp. They are often experienced DAW users with Ableton Live or similar DAW environments. Thus, they are especially well-suited to adopt SpaceHarp with the Sound Galaxy DAW Tools Suite.

We would recommend our SpaceHarp Performance System #2.

1.3   SYSTEM DEVICES

1.3.1   Overview of System Devices

Suggested "System Devices" are those that are included in our turn-key SpaceHarp Performance Systems. Several Sub-Assemblies can also be used in Custom SpaceHarp Systems.

The following five hardware groups together comprise a complete turn-key **SpaceHarp Performance System:** Stand and Light, SpaceHarp, Pedalboard, Rack and Accessories.

Two alternative rack configurations are illustrated, a 4U- and a 6U-Rack configuration.
Other rack setups are also possible as needed for application-specific equipment. Since SpaceHarp and Sound Galaxy operate using industry-standard MIDI messages, nearly any type of external equipment can be connected including theatrical video, lighting and laser control systems.

Section #	Sub-Assembly
1.3.2	Stand and Light Sub-Assembly
(n/a)	SpaceHarp Controller (see *SpaceHarp User Guide*)
1.3.4	SpaceHarp Pedalboard Sub-Assembly

1.3.5   Rack-Mounted Performance Systems

1.3.6   4U Rack System

- or -

1.3.7   6U Rack System

1.3.8   Optional Accessories

For the full features and functions of SpaceHarp as presented in this User Guide, and in the **Sound Galaxy 2.0 User Guide,** we recommend the equipment items described. We certify issue-free operation with those products. There are also many equivalent devices that can alternatively be used, and those are sometimes mentioned in the following Sections.

A comprehensive list may be found in the Table of All Devices and Parts in the Reference Section.

1.3.1.1   Key to Symbols Used for Parts and Devices Numbering

For added clarity, our numbered callouts for devices and parts use these three types of symbols:

1.3.1.1.1   External Device Not mounted in Rack

1.3.1.1.2   Rack-Mounted Device

1.3.1.1.3   Sub-Assembly (comprised of External and/or Rack-Mounted Device

1.3.2 Stand and Light Sub-Assembly

1.3.2.1 Stand

(1) Ultimate Apex-48 Stand is recommended, and supplied in turn-key bundled systems.

1.3.2.2 Stand Soft Case

(2) Ultimate Apex Stand soft case is recommended, and supplied in turn-key bundled systems.

1.3.2.3 Short Stand Arms

(3) Two TBR-130 13" Tribar Arms for optional uses for laptop or remote tablet mounting.

1.3.2.4 Long Stand Arms for SpaceHarp

(4) Two TBR-180 18" Tribar Arms with custom tabs added for SpaceHarp controller are provided in turn-key bundled systems.

1.3.2.5 Stand to Arms Brackets

(5) Two CMP-485 Super Clamp brackets.

1.3.2.6 Stand to Mic Boom Adapter

(6) AX-48 Pro Threaded Adapter plate.

1.3.2.7 Mic Boom

(7) MC-40B Pro Boom Mic Boom.

1.3.2.8 Stand Cable Clips

(8) Ultimate cable clips (pre-installed.)

1.3.2.9 Quick-Lock Mic Boom Adapter

(9) Quick-lock mic adapter (pre-installed.)

1.3.2.10 Sensor Light

(10) Mini-PAR-16 light with halogen bulb, with AC power cable cable-tied, and boom extended and locked. (mini-PAR fits on either Stand model). See Sensor Illuminator Light.

1.3.2.11 Mic Boom Soft Carry Case

(11) Pre-assembled Pro Mic Boom's soft carry case.

1.3.2.12 Foam Mounting Wedge

(12) One SpaceHarp Foam Mounting Wedge with Velcro.

1.3.2.13 Theatrical Sandbags (optional)

(13) 15-25 lb. sandbag(s) for APEX mount rear, recommended for added safety and stability; Also useful for other stands such as Universal Speaker, Laptop Mic-Stand, C-Stand, etc.

1.3.2.14 Sensor Light Boom Assembly

(14) Comprised of the Mic Boom (7), Quick-Adapter (9), and PAR-16 Light (10).

1.3.2.15 Theatrical Gels

(15) Set of Gels for PAR-16 Light gel holder. See **Section___** for details.

18" Tribars with Custom
L-Brackets added
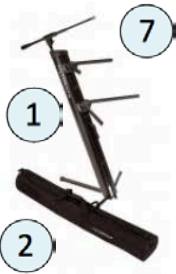
Apex® AX-48 Pro Plus — 1, 2, 7

TBR-130 13" Tribar Arm Pair — 3
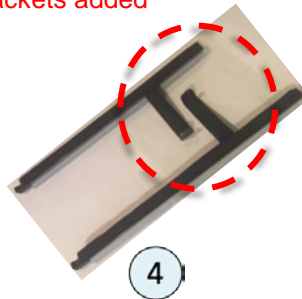
TBR-180 18" Tribar Arms Pair — 4

CMP-485 Super Clamp — 5

Apex® AX-48 Pro (Black) — 1

AX-48 Pro Tote — 2

AX-48 Pro Threaded — 6

AX-48 Pro Mic Boom with Adapter — 7

Cable Clips — 8

Quick-Lock Mic Adapter — 9

mini PAR-16 & Gels — 10, 15

Soft Carry Case — 11

Foam Wedge — 12

20-lb Theatrical Sandbag — 13

Sensor Light, Mic Boom Assembly — 14

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1.3.3 Sensor Illuminator Light

1.3.3.1 Mini-PAR-16 Fixture

(10) The Sensor Light for our Limited Edition model SpaceHarp, that we provide with each SpaceHarp, is a mini-PAR-16. This PAR is small, it's only 3" x 3" x 6". Every SpaceHarp comes with this mini-PAR with a modified U-bracket having an attached 6" flexible gooseneck. The standard gooseneck threads can be in turn attached to various choices of mic stands, booms or mounts. For a theatrical flown or hung Light, simply remove the gooseneck and use the U-bracket with a clamp.
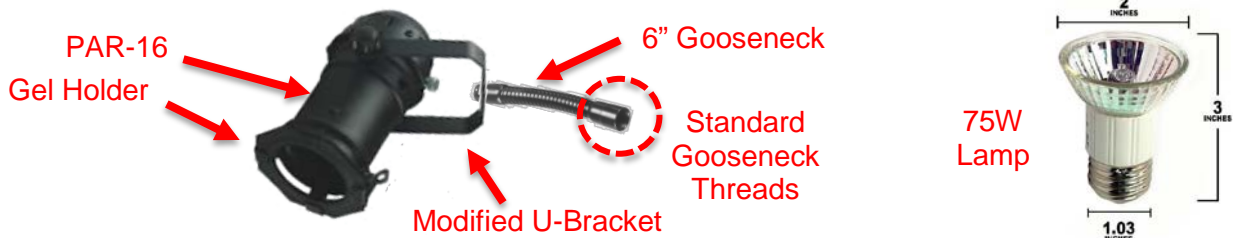
1.3.3.2 Halogen Bulb

The PAR-16 is used with an inexpensive 75W Halogen wide-angle bulb for use with high-temperature ceramic screw base which these PARs have. Always keep one or more spare halogen bulbs on hand in case one burns out or is otherwise damaged.

Replacements for both housing and bulbs are commonly available through pro lighting and sound dealers as well as online. For example, the USHIO 75w 120v MR16 E26 medium base FL30 halogen bulb; https://www.bulbamerica.com/products/ushio-75w-120v-mr16-e26-medium-base-fl30-halogen-bulb.

Every SpaceHarp comes with one bulb inside the provided mini-PAR plus two additional spare bulbs. Note the excellent life of 2,000 hours.

The specifications for these bulbs are as follows:

Base	E26 Medium Screw
Beam Angle (deg.)	30
Beam Spread	Narrow Flood NFL
Bulb Type	Halogen Bulbs
Color Temperature (K)	3000K
Maximum Overall Length (in)	3.00
Rated Life (Hours)	2000
Shape	MR16
Voltage (V)	120V
Wattage (W)	75W

⚠️ **IMPORTANT NOTE:** If you don't have a working halogen bulb for the PAR-16, you may have NO SPACEHARP FUNCTIONS. SpaceHarp can sometimes work with non-fluorescent, directional task lighting, or even with direct sunlight, but there is no guarantee that those light sources will work in any particular situation.

1.3.3.3   Gels for Sensor Light

(15) We also provide a 30% and a 60% neutral density filter plus deep blue and purple gels for the mini-PARs gel holder. The gels have little to no effect on sensing, but do tone down the brightness of the visible shadow to be just light enough to see. Available from your local theatrical lighting supplier, or online.

See for example http://www.guitarcenter.com/American-DJ/Gels-Gobos-Lenses.gc

1.3.3.3.1   30% ND Gel

(15a) Available from theatrical lighting and supply vendors.

1.3.3.3.2   60% ND Gel

(15b) Available from theatrical lighting and supply vendors.

1.3.3.3.3   Deep Blue Gel

(15c) Available from theatrical lighting and supply vendors.

1.3.3.3.4   Deep Purple Gel

(15d) Available from theatrical lighting and supply vendors.
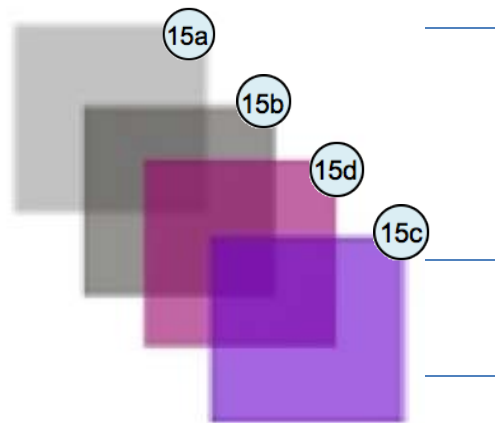
WARNING: If the dark blue or purple gel gets worn-through (it will after a few dozen hours), replace it with a new one. MAKE SURE LAMP IS TOTALLY COLD FIRST else you could get a burn. You'll notice that as the gel wears, the light increases more.

WARNING: DO NOT TOUCH the overhead Halogen sensor illuminator light PAR-16 housing when the lamp is turned ON. If you are changing gels, or changing bulbs, please turn OFF the light, first! *THE LIGHT CAN GET HOT!   DON'T GET BURNED!*

WARNING: DO NOT loosen the overhead light stand knob at its base, or move the light stand, in a way that allows it to fall onto the SpaceHarp which could *cause serious damage to the controller.*

When you setup, always make sure that any threads and knobs for your light mounting are completely tight, BEFORE you place the SpaceHarp underneath it; likewise, when you tear down, remove the controller FIRST, then the light stand.

If you must position the light when it is ON and OVER the controller, then have someone help you by holding any stand with you, to prevent it from falling down. Hold the light by the STAND, NOT by the PAR-16 housing, to prevent a burn injury.

WARNING: DO NOT cover over the SpaceHarp, stand and light setup with such as theatrical blackout cloth or other cover, until you know the illuminator light is OFF and is also completely COLD. *Otherwise, there could be a fire hazard!*

For details of initial setup of Stand and Sensor Light, see Setup Full System.
For Adjusting Stand for Player Height when ready to play SpaceHarp, see the separate document, **SpaceHarp MIDI Controller & Standard Accessories User Guide**.

1.3.4 Pedal Board Sub-Assembly

(16) The functions of 'sustain', 'global octave shift up and down', 'all notes off' 'Mod', plus 'user assignable pedals,' encourages players to "stay in space" by minimizing hand use for common controls.

SpaceHarp pre-assembled Pedal Board is comprised of pedals, pedal board, cables and re-configurable assembly using heavy duty Velcro. For an economical but sufficient setup, these popular products are used.

1.3.4.1 Pedal Board with Heavy-Duty Velcro Mountings

(16a) Gator T-Bone is suggested, and (1) is bundled with SpaceHarp Pedal Board Sub-Assembly. All six of the Pedal Board's devices are firmly attached to the Board with super-heavy-duty Velcro, however they still can be repositioned if desired.

1.3.4.2 Sustain Pedal

(16b) M-Audio SP-2 is suggested, and (1) is bundled with SpaceHarp Pedal Board Sub-Assembly.

1.3.4.3 Expression Pedal

(16c) M-Audio EX-P is suggested, and (2) are bundled with SpaceHarp Pedal Board Sub-Assembly.

1.3.4.4 Momentary Switches

(16d) Boss FS-5U are suggested, and (3) are bundled with SpaceHarp Pedal Board Sub-Assembly.

1.3.4.5 Attached Color-Coded ¼" Cables with Cable-Wrap

C10 For SpaceHarp Pedal Board Sub-Assembly, appropriate cables are color-coded and wrapped. Cables are 6-ft. length and are color-coded, black cable-wrapped together, and ready to connect to the SpaceHarp Controller.

1.3.4.6 Soft Carry Bag for Pedal Board

(17) Gator T-Bone carry case for Pedal Board & Cables Assembly

1.3.5 Sound Galaxy Digital Audio Mobile System

In this Section, we show all of the various hardware components and devices that together comprise a turn-key mobile Digital Audio System running Sound Galaxy 2.0 Suite of DAW tools. When setup, cabled and operated as illustrated in this Guide, smooth operation is assured.

(18) One Pre-Assembled 4U Mobile Rack. Shown here with rack's front cover removed. See 4U Mobile Rack Sub-Assembly for further details.

1.3.5.1 DAW Host Computer System

(19) We currently support a MacBook Pro for a turnkey system of SpaceHarp with Sound Galaxy 2.0 DAW Software Suite. We show a popular model for music setups, 13" or 15". Refurbished, warrantied units may be employed with considerable cost savings so long as certain requirements are met (see the **System Software Requirements** Section in the **Sound Galaxy 2.0 User Guide**.) Future Sound Galaxy releases will also support Windows DAW computers.

1.3.5.2 Nine-foot Power & Thunderbolt Cable

(20) Cable-wrapped Apple Magsafe Power Adapter/Cable with Thunderbolt Cable.

1.3.5.3   *External Display Monitor (optional)*

(21)   HD-resolution Monitor with 10-foot HDMI cable and AC Power Cable. Useful in a few situations, including for a remote host station (with wireless mouse to the DAW laptop). Also useful for an experienced DAW user adjacent to the laptop for convenient access to not only Sound Galaxy windows but also Ableton Live and the other applications in the Suite.

1.3.5.4   *Speakers*

(22)   Two Amplified Behringer Speakers with two 25-foot balanced audio cables with 3-pin XLR-to-TRS ¼" plugs. (Other speaker alternatives may be used.)

There are many options regarding powered speakers. A separate amplifier and unpowered speakers may alternatively be used, however we recommend amplified speakers for many reasons including optimal EQ and crossover quality, low noise, as well as far easier setup and transport.

In the minimal configuration of the bundled **SpaceHarp Performance System**, we provide compact but good quality 12-inch monitor speakers that can be easily used either as floor "wedges" or on upright stands, such as Behringer BD215D:

In venues or installations having house audio, connections may be made to house only, or, optionally monitor speakers such as these can also be mounted close to the SpaceHarp controller.

Balanced cable connections may be used; the PreSonus' outputs, for example, are ¼" TRS balanced, and the speakers have 3-pin mic / TRS ¼" balanced "combo connector" jacks.

1.3.5.5   *Wireless Mouse (optional)*

(23)   Apple Bluetooth model Magic Mouse 2 is suggested.

1.3.5.6   iOS Remotes for MAX / MIRA

(24) The larger iOS device may be mounted at the SpaceHarp stand.

(25) The smaller iOS device (mini) hand-held by a Host, or vice-versa:

- A WiFI Router in the system is strongly recommended for the optional use of iPad remote device(s).
- While "peer-to-peer" networking may be used, we do not recommend it.
- iPad Mini, iPad, and/or iPad Pro may all be used.
- Multiple devices may be used without issues (for example at SpaceHarp plus a Host).
- All controls "sync multi-way" and remain in sync:
    - Between all remotes;
    - Between remote(s) and all connected (MIDI-learned) controls in Ableton Live and DAW Plug-Ins;
    - Between remote(s) and the MAX windows on the DAW Laptop screen.
    - Between controls in MAX or Ableton and all remote control screens.
- See **Launch Remote Controls** Section in **Sound Galaxy 2.0 User Guide** for how to configure Sound Galaxy software to use this option. Sound Galaxy defaults in its SPACEHARP_AUTO loaders to be ready for such devices to be used.
- MIRA app is used to sync screen controls with MAX running on the DAW Laptop. No local controls files need to be loaded; syncing is automatic and live.
- Up to three different remote control tabs on-screen may be used:
    - PERFORMANCE Tab;
    - MIX Tab; and
    - SPACEHARP SETTINGS Tab.

1.3.5.7   External Drum Device (optional)

(26) HandSonic HPD-15 example shown and supported on beta-release systems. While this unit has drum pads, in our suggested example setup it's used instead as a drum sampler sound module for live SpaceHarp play triggers. It's a good example in that it has particularly rich velocity response and modulation effects, as well as an excellent and large set of dance, classic, ethnic and world presets.

1.3.5.8   Hand Held Microphone (optional)

(27)   Sure or equivalent vocal Microphone, with XLR balanced mic cable.

1.3.5.9   Stereo Headphones (optional)

(28)   Up to 4 sets may be used with the racks' 4-Headphone Distribution Amplifier. High-quality Audio Technica or equivalent headphones are recommended.

1.3.5.10 Professional Grade Wireless Headphones (optional)

(29)   These are ideal for use with Sound Galaxy's Vocoder feature, and for a roaming SpaceHarp Host. Products such as SURE GLXD4 or equivalent may be used. Full User Guide and specifications may be found online at http://pubs.shure.com/guide/GLXD4/en-US.

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1.3.6   4U Mobile Rack Sub-Assembly

18 The specified (or equivalent) other devices are physically bundled together into a 2U to 4U height 19" portable rack, such as a commonly available hard shell mobile rack by Gator. If you are viewing an electronic guide, click a callout number to jump to details.

AC Power Conditioner **37**

PreSonus FireStudio **31**

Belkin Thunderbolt Hub (rear-mounted) **35**

Apple Airport Express Router **32**

USB 2x2 MIDI **34**

4-Headphone DA **38**

Gator 4U Rack **36**

1.3.6.1   Digital Audio Interface

1.3.6.1.1   PreSonus FireStudio Mobile

30 The FireStudio Mobile is an excellent and very popular device, allowing for a couple of microphone or instrument connections, as well as other external audio (such as optional drum machine), with a robust Firewire connection. It is limited to stereo L&R Mains output.

1.3.6.1.2   PreSonus FireStudio 8x8.

31 The PreSonus FireStudio's is a more capable alternative that we also recommend as an interface. Its various outputs support multiple stereo mix outputs useful for having both external house audio and monitor speakers at the controller.

This unit includes MIDI In/Out (making additional MIDI USB device unnecessary), and with 8 IN and 8 OUT audio supports for example, 4.1, 5.1, 6.1, 7.1 surround sound audio, which Sound Galaxy in Ableton Live supports with minor variations of sub mixes. This unit supports multi-channel ADAT optical I/O as well. We provide two alternative versions of each Sound Galaxy Live Set Library file ready-to-go: one with a Stereo Main Mix Down, one setup for a Surround Sound System.

Either the mobile or studio PreSonus units can be connected directly to the Laptop's Thunderbolt jack using a Thunderbolt adapter, or, to a recommended Thunderbolt hub unit which we discuss below.

Other digital audio interfaces may easily be substituted for the PreSonus. All that is required is to re-assign the output assignments one time in the Live Set file and re-saving.

1.3.6.2   Wi-Fi Router

32 While it is possible to configure remote devices using a Laptops internal Wi-Fi, we have found through testing that it's better to have an external router, and **Apple's Airport Express** seems especially good. This makes the setup for key DAW Tools such as TouchOSC Bridge, MIRA and MiraWeb more stable and robust, including when coming out of sleep or upon power-up. Sound Galaxy uses strictly fixed-IP addresses for all devices, never DHCP, and this avoids many potential hassles and keeps everything running super smoothly.

TIP: We highly recommend that during all sessions of operation in Sound Galaxy, the computer and router are both entirely disconnected from the Internet by either Wi-Fi or Ethernet cable. Doing this will ensure fastest and tightest remote controls response with absolute minimal latency.

TIP: While using remote tablet(s) is very convenient, note that by using the PERFORMANCE TAB and MIX TABS on the Laptop screen directly, 100% of all operations can be done without any Wi-Fi remote devices.

TIP: If you are providing your own tablets, note that pre-owned, refurbished tablets that are several generations of models back in time should work fine and are a considerable savings in cost. However, be sure that the supported iOS operating system version meets the minimal requirements of the application developers for Touch OSC (if used) and MAX MIRA/MiraWeb.

1.3.6.3   USB MIDI Devices

If a digital audio unit such as the PreSonus FireStudio is used that includes at least one MIDI IN and one MIDI OUT, an additional MIDI USB interface may not be needed.

1.3.6.3.1 USB MIDI 2x2

33 When using something like a PreSonus FireStudio Mobile, which has no MIDI ports included, you can add such as the MIDIPLU Tbox 2x2 which as all MIDI ports and LEDs on the front, making it nice for rack mounting (see below).

1.3.6.3.2 USB MIDI 1x1

34 Other options include such as an MIO 1x1 USB cable.

MIDIPLUS
Tbox 2x2

USB MIDI
Interface
33

MIO 1x1

USB MIDI
Interface Cable
34

1.3.6.4 Thunderbolt Dock

35 We have found through experience that it is a good idea, especially for public events, permanent installations or performance situations, to add a Thunderbolt 'dock' (or 'hub') (such as the Belkin Express model), to the Sound Galaxy hardware system. There are great advantages in robustness and graceful recovery from common power and cable connection mistakes.
See Full Sound Galaxy Desktop DAW System Configuration, Rack Mounted Sound Galaxy System Configurations and 4U Rack Rear Audio and Thunderbolt Cabling for more details.

35 THUNDERBOLT.

1.3.6.4.1 Advantages of Using Thunderbolt Hub

Several rack devices are cabled to a Thunderbolt Hub device. This is significantly easier and more robust because there is only a single Thunderbolt cable between the System Rack and the laptop. The only disadvantage is Thunderbolt cables' length limit of only 9 ft.

We have found in practice that the FireWire, Ethernet and USB MIDI connected all come back "gracefully" from a Thunderbolt cable disconnection, probably since they all remain "latched" to the Thunderbolt hub at all times there is power, even without the Thunderbolt cable connected. Even for power cycling the whole rack, (like with a power cycling rack-mounted Power Conditioner unit), we have also found that the Thunderbolt hub strategy has the highest robustness, compared to having the three separate cable types connected.

In addition to devices already identified in the previous Sections, this Sub-Assembly adds:

1.3.6.5   4U Case

36   The Gator 4U mobile case is suggested.

1.3.6.6   AC Power Conditioner

37   We recommend a unit such as available from Furman (PL-8-E II shown):

1.3.6.7   4-Headphone Distribution Amp

38   Multiple headphones are helpful in setup, sound checks, rehearsals and for small LBE groups when speakers cannot be used or are only used at low background volumes.

1.3.6.8   1U shelves (for mounting smaller devices)

39   Keeps smaller devices neat, and secure inside rack when transporting and otherwise moving the rack. Velcro and cable-ties provide re-configurable but secure mounting.

1.3.6.9   Cables

40   Commonly available cables used in various Configurations illustrated in this Guide:

40a Apple Thunderbolt	**40b** ¼" TRS Audio
40c Unbalanced ¼" Audio	**40d** MIDI 5-in Serial DIN
40e Edison AC	**40f** AC Power Extension
40g Microphone XLR Balance;	**40h** Firewire 400
40i USB 2.0	**40j** Thunderbolt-Ethernet Adapter
40k Thunderbolt-Firewire Adapter	

1.3.7   6U Road Rack Sub-Assembly

(41)   Here's an example of a professional 19"-rack configuration in a rugged 6U flight-case. If you are viewing an electronic guide, click a callout number to jump to details.

PreSonus FireStudio Mobile Audio Interface (30)

AC Power Conditioner (37)

6U Flight Case

Wireless Microphone Transceiver (29)

8x8 MIDI Interface (43)

4-port Gigabit Ethernet Switch (44)

4-Headphone DA (38)

(42)

Belkin Thunderbolt Hub (rear-mounted) (35)

Apple Airport Express Router (rear-mounted) (32)
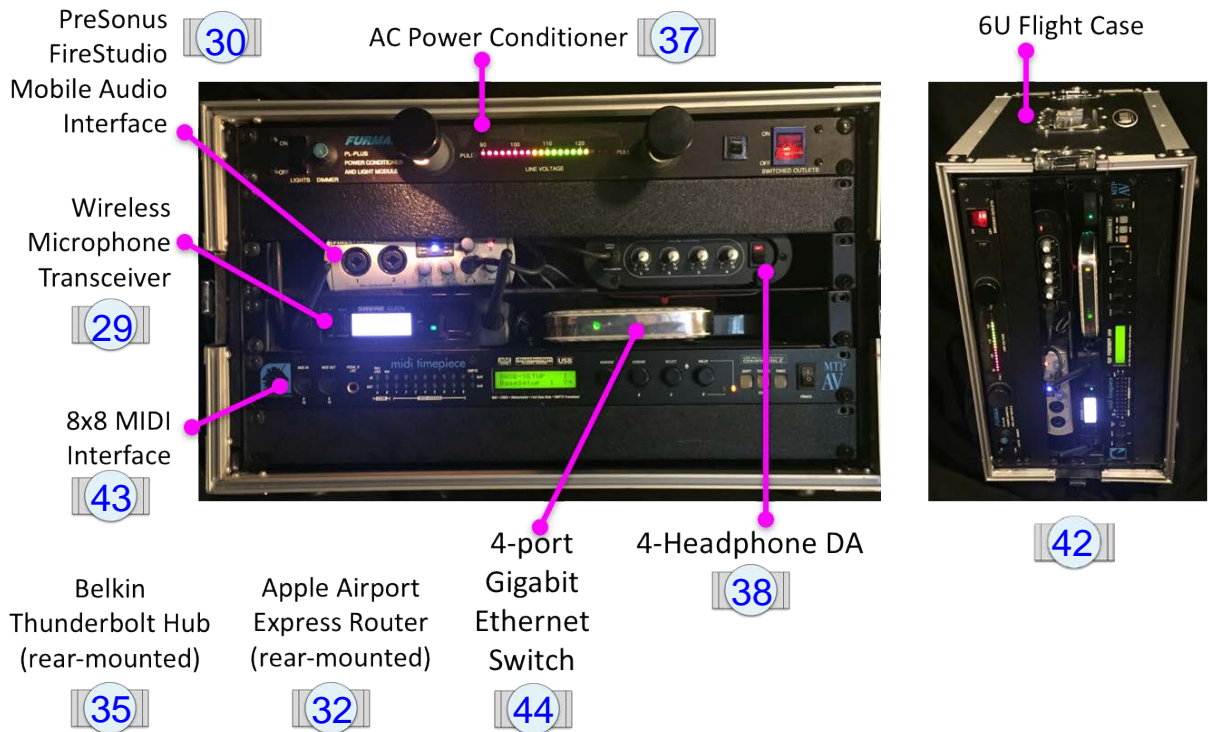
This kind of setup is used for live performances and LBE installations having DMX lighting, lasers, and video visualizers. Our system supports any MIDI-connected media, all of which can be controlled by live SpaceHarp MIDI streams. The 8x8 MIDI interface allows for up to four (4) SpaceHarps to be connected at the same time into shared content in Sound Galaxy. The gigabit switch provides MIDI networking over Ethernet (Apple 'Core MIDI' on Macs and 'RTP-MIDI' on PCs) connecting to external media computers. A wireless microphone base unit is also mounted for Vocals and Vocoder use. The audio Mains Out requirement is L,R stereo, so a digital interface like the compact FireStudio Mobile can be used.

In addition to the previous devices shown in the Sections above, this rack setup includes these additional devices:

1.3.7.1   6U rack case

(42)   The Gator 6U G-Tour is suggested. For frequent air transport, a "shock" type case is suggested.

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1.3.7.2   8x8 MIDI Interface

43 MOTU model such as MIDI Express XT is suggested. In our experience, 8x8 units not relying on USB power are a very good idea, as they tend to remain more stable in connection on AC power cycle or cable re-connection.

1.3.7.3   4-port Gigabit Ethernet Switch

44 Any popular brand and model can be used.

1.3.7.4   1U rack plate

45 For making things neat and keeping any loose cable ends well-secured inside for transport.

1.3.8   Optional Accessories

1.3.8.1   Hot Hand USB Ring

(46) The Hot Hand USB Ring is fully supported for two-axis of accelerometers (rotation and tilt.) That sensor stream may be applied to up to three different effects on up to four different DAW module instruments. See **Using Hot Hand USB** Section in the **Sound Galaxy 2.0 User Guide** for how to connect this hardware option, and for how to configure Sound Galaxy software to use it. Direct wireless link, not WiFi per se.

rotate

tilt

(47) The USB dongle may either be inserted into the DAW Laptop's available USB port, or, into a Thunderbolt dock's USB port (typically inside a rack), when such a dock is used.
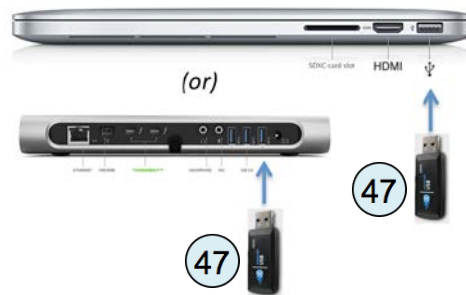
1.3.8.2   iPod Touch / iPhone (iOS Accelerometers)

(48) iOS accelerometers, such as in an iPod Touch or iPhone, are fully supported for two-axis of accelerometers: rotation (usually wrist rotate) and tilt (usually hand tilt.) That sensor stream may be applied to up to three different effects on up to four different DAW module instruments.

When used, this is part of the optional Touch OSC controls setups sized for iPhone or iPod Touch devices. Not usually used with iPads, since it is not so practical to hold a large tablet and play SpaceHarp at the same time (although it's possible).\

- A WiFI Router in the system is required for use with an iPod or iPhone remote device. We don't recommend peer-to-peer links although they are possible.

- Only one iOS device with accelerometers may be connected to Sound Galaxy.
  (Beta-test Sound Galaxy version only.)

- Uses OSC for data stream (not MIDI messages).

- See **Using Apple Remote Device (iOS) Accelerometers** in the **Sound Galaxy 2.0 User Guide** for how to configure Sound Galaxy software to use this option. Sound Galaxy defaults in its SPACEHARP_AUTO loaders to be ready for such devices to be used.

- See **Editing and Modifying Sound Galaxy Section** in the **Sound Galaxy 2.0 User Guide** for using the optional TouchOSC controls (Sound Galaxy 1.x controls); for example, the MIX Tab (one of ten control tabs) is shown below.

- The iPod Touch or iPhone may be used either hand-held while playing, otherwise usually firmly attached to one wrist with any commonly available sports band.

rotate

tilt

1.3.8.3   Android Remotes

1.3.8.3.1   Android for MAX / MiraWeb

(49) Using MiraWeb instead of the MIRA tablet app should be possible, however at this time MiraWeb (at least in our studio experiments) seems to have some issues remaining including slow updates and instability. We don't yet recommend using MiraWeb, however, it looks extremely promising. We hope to announce soon that we can recommend it for Sound Galaxy use.

1.3.8.3.2   Android for TouchOSC

(49) Other than for optional Accelerometer uses, and for advanced Preset Automation editing, we are phasing-out support for use of our TouchOSC screens with Sound Galaxy.

1.3.8.4   1-SpaceHarp Rolling Flight Case

(50) SpaceHarp accessories include an available Flight Case for one SpaceHarp, with a custom cutout made to perfectly fit one SpaceHarp and its Power Supply.

Flight Case for 1 SpaceHarp

- Rugged ATA Wood Flight Case.
- Ship it, fly it, check it or send it with confidence.
- Customized SpaceHarp upgrade to Gator's G-TOUR 24"x36" ATA Case.
- Exterior dimensions 42.32" x 27.56" x 10.63." Weight 46.31lbs. / 21.00kg.
- Precision cut, dense foam insert is triple-layers; top foam layer is closed-cell and easy to wipe clean.
- Red recessed twist latches, spring-loaded rubber-grip and reinforced stackable ball corners.
- 9mm plywood, with laminated Polyethylene in satin-black exterior.

1.3.8.5   2-SpaceHarp Hard-shell Rolling Carry Case

(51)   SpaceHarp accessories include an available hard-shell transport case for two SpaceHarps, with two custom cutouts made to perfectly fit two SpaceHarps.

1.3.8.6   Universal Stand for Speakers

(52)   For optional use with amplified speakers. Provides ideal listening height for most applications. Sandbagging is recommended for maximum safety against tip over.

1.3.8.7   Laptop Stand for Laptop

(53)   On Stage model MSA-5000 is shown for optional use with any standard mic stand and DAW Laptop Computer. Sandbag is recommended on the mic stand base when it seems a good idea for added safety from tipping over if the stand base isn't alone sufficient.
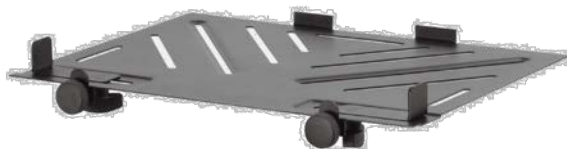
1.3.8.8   Tablet Mount for Mic Stand or Boom

(54) Many models are available, the choice depending upon size of the tablet used and the location of its mounting.

1.3.8.9   Alternative X-type Stand

(55)

Alternative stands include "X-type" keyboard stands such as the Gator Frameworks GFW-KEY-5100 Deluxe 2 Tier model. The upper keyboard arms are adjustable in such a way they make a good support for the upper part of the controller and provide for adjustable tilt.

X-Stands also allow the flexibility to mount the light off-axis from the stand (at either side), using clamp or C-Stand, for a completely unobstructed front-and-center view of the performer in the case of on-stage applications. These stands can adjust only a little (+/= 1 ft.) for player height due to the upper brackets. You'd probably want to use this stand if you're the exclusive on-stage SpaceHarp performer.

1.3.8.10   DMX Lighting Computer System

(56) Here we show Elation Emulation on an additional MacBook Pro laptop computer with DMX dongle.

Lighting
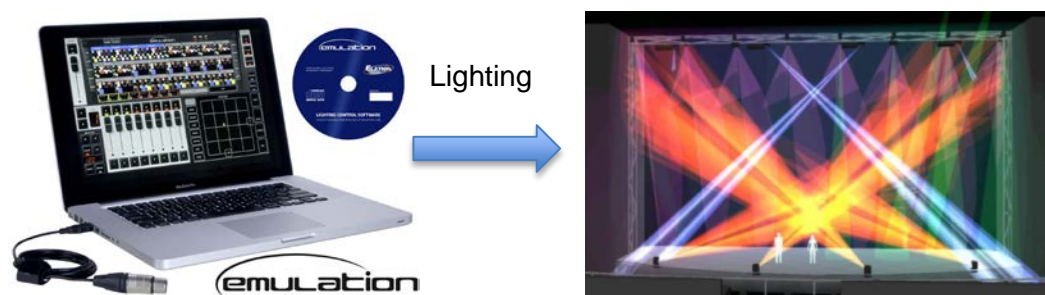
1.3.8.11   Music Visualizer Video Computer System

(57) Here we show a legacy Dell Inspiron Laptop. This example runs legacy visualizer software (Zuma Pro 4.0) that SpaceHarp has an available content library of MIDI- and audio-animated music visualization scenes.

Visualizer
Scenes

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1.3.8.12 Laser Control Computer System

(58) There are many choices for laptop-based Laser Control. Here we show a windows laptop with X-Laser Pangolin QuickShow XL Laser Control Software with FB4 ILDA dongle.

Lasers Control
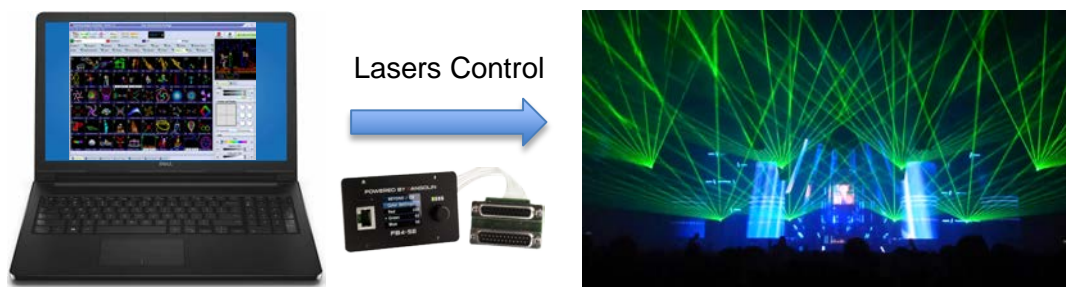
1.3.8.13 Wireless Bluetooth Headphones

(59) Any high-quality Bluetooth Stereo headphones may be used, such as by Beats by Dre.

1.3.8.14 Microphone Stand

(60) Any high-quality Mic Stand may be used, for mics, tablet bracket, laptop bracket, and/or Mic Boom/Light.

(60)
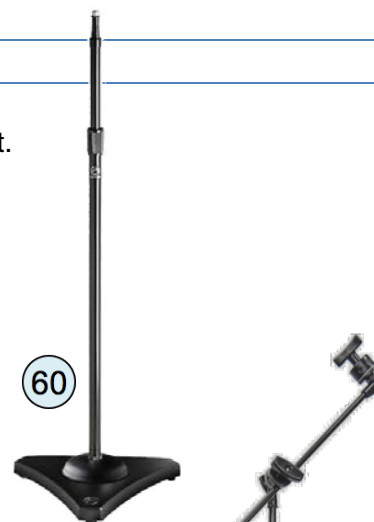
1.3.8.15 C-Stand

(61) Any Professional C-Stand may be used for the Sensor Light (no other boom is needed).

(61)
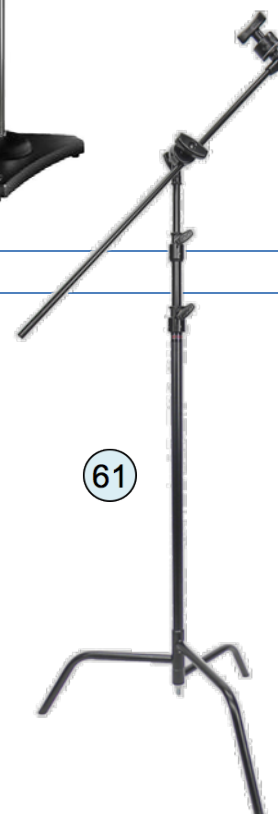
1.4   SYSTEM CONFIGURATIONS

1.4.1   SpaceHarp Turn-Key System Configurations

Combining the Stand & Light, SpaceHarp MIDI Controller, and SpaceHarp Pedal Board with each of the alternative Configurations of Turn-Key DAW System shown below, provides four different 100% turn-key **SpaceHarp Performance Systems: #1** through **#4**. See the separate document, **SpaceHarp Performance Systems Price List** for rental and purchasing options.

1.4.1.1 Headphones-Only Sound Galaxy DAW System Configuration

When rehearsing or recording with SpaceHarp and when no speakers or remote controls are needed, a setup for private sessions using Sound Galaxy DAW software can be reduced down to just this.
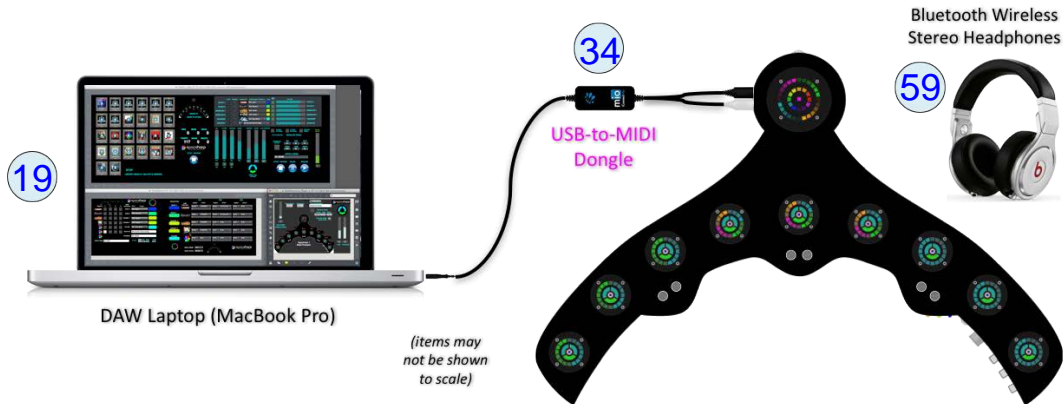
1.4.1.2 Minimal Sound Galaxy DAW System Configuration

Below we illustrate a SpaceHarp System with room audio that is both minimal and convenient for Sound Galaxy 2.0 functions and features. In this configuration, Sound Galaxy control is done entirely using a mouse or trackpad with the MAX screens on the laptop exclusively. Compared to a fully built-out system configuration that we show in the following Sections, there are neither Wi-Fi remote control devices nor any Wi-Fi router to connect with them. There is neither external HDMI monitor nor a wireless mouse shown, although those would be easy to add.
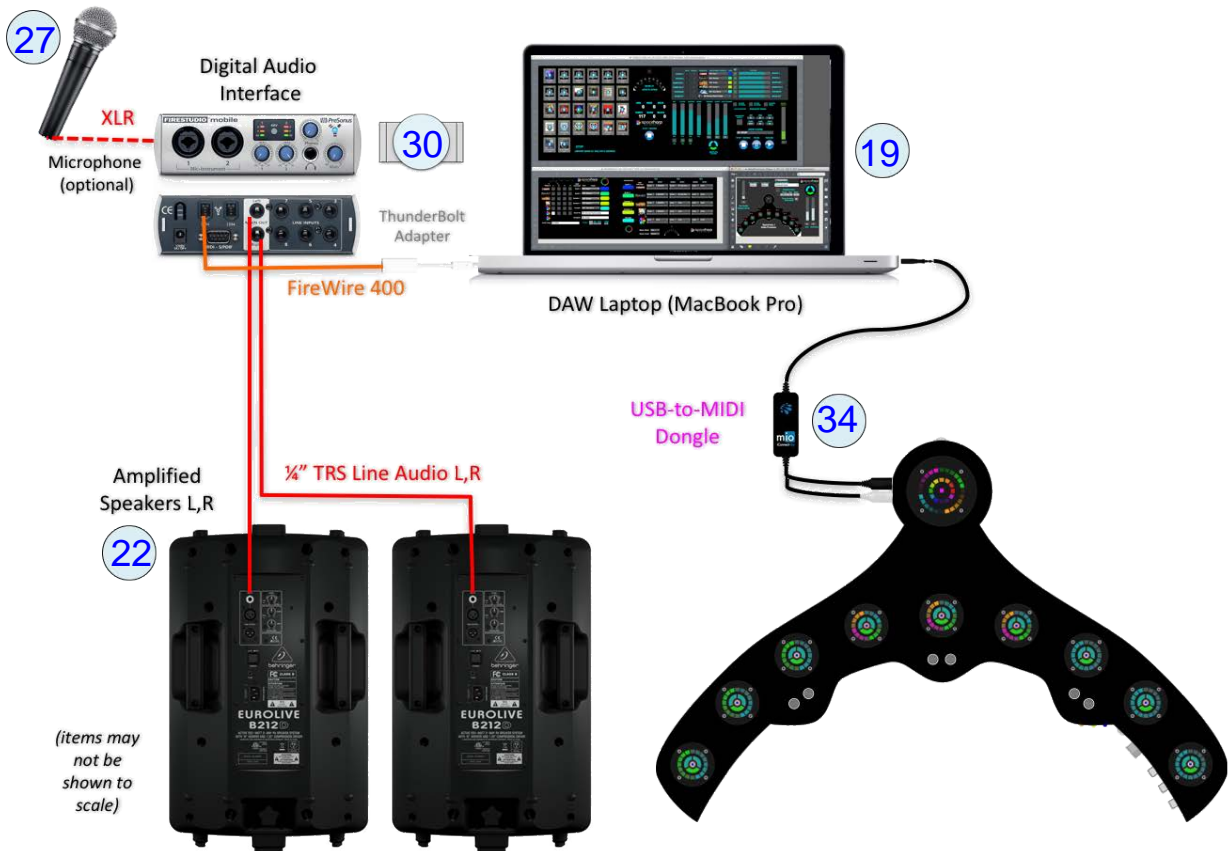
1.4.1.3   Full Sound Galaxy Desktop DAW System Configuration

In this scenario, the specified (or equivalent) other devices are left physically "loose" or separate, and each has its own cable to the Laptop.

One advantage is the ability to have long cables for digital audio FireWire, Ethernet and USB MIDI using available extenders. The disadvantage of this direct cabling scenario is that disconnections of cables from the separate devices (as contrasted to using the Thunderbolt Hub device) often do not recover "gracefully" when plugged back into the laptop. That's presumably because they have become completely "unlatched."

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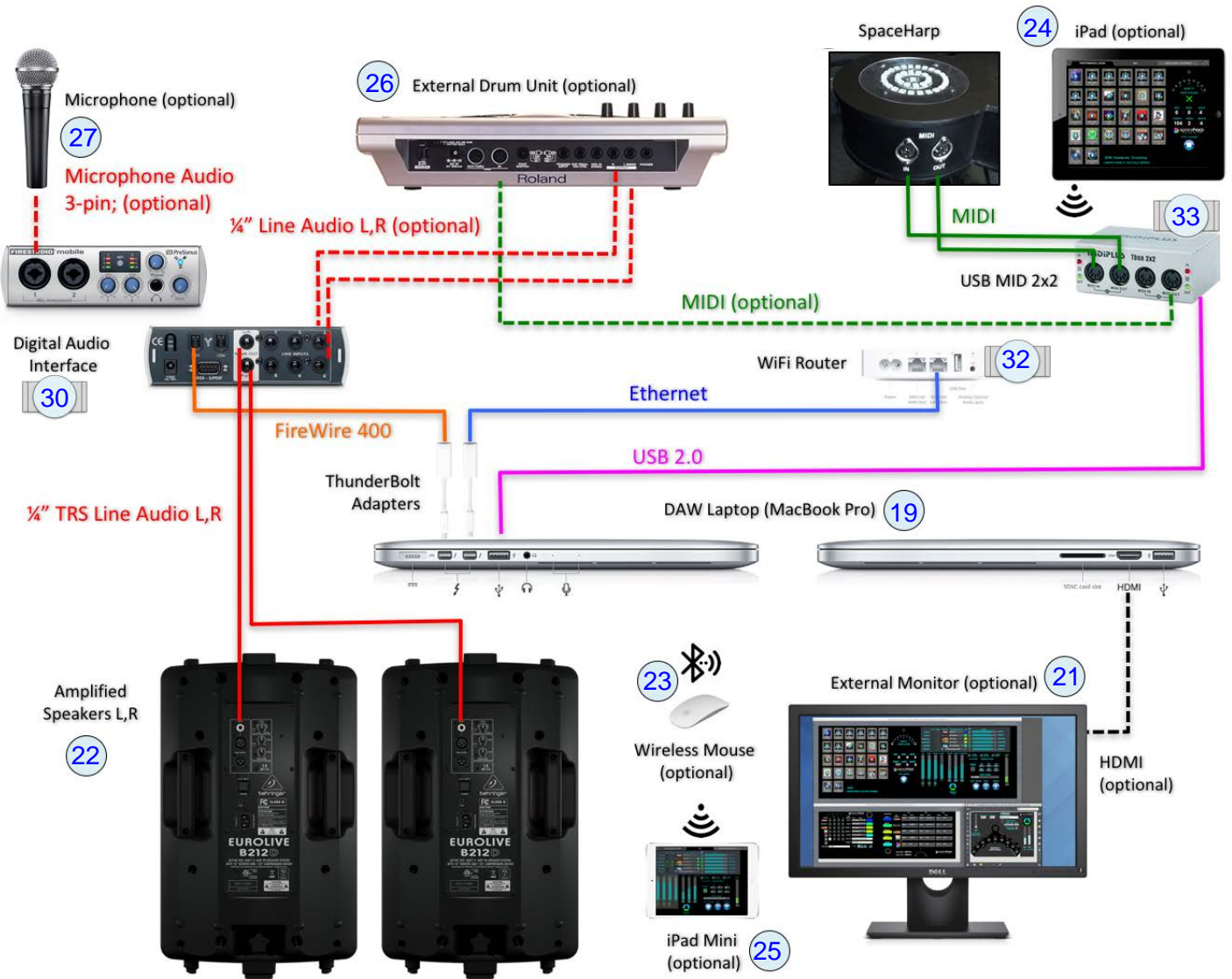
1.4.1.4 Rack Mounted Sound Galaxy System Configurations

A turnkey rack mounted system is cabled according to the following illustration, showing all the devices and cables separately. Our turn-key 4U and 6U Rack Sub-Assemblies are slight variations of what we show below.

For simplicity, we do not also show AC power cabling here. All rack-mounted devices, as well as the DAW Laptop computer should be connected internally to the rack AC Power Conditioner; see 4U Rack System AC Power and Cabling for details of AC connections to the rack.
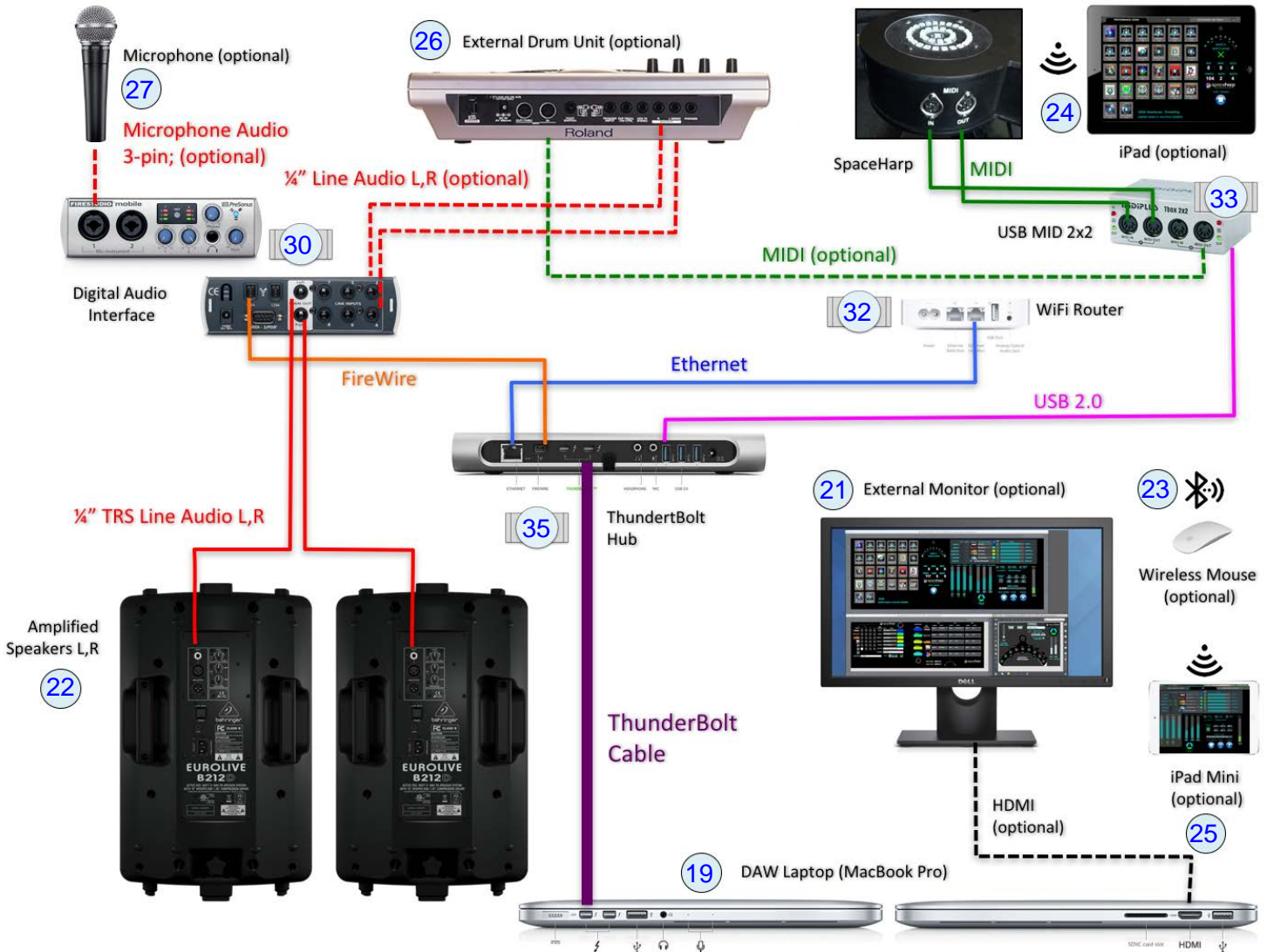
1.4.2   SpaceHarp Custom System Configurations

Combining the Turn-Key Stand & Light, SpaceHarp MIDI Controller, and SpaceHarp Pedal Board with the following associated equipment, provides various alternative scenarios of custom SpaceHarp Systems. Helpful support tips, tricks and techniques may be found in the separate documents, **SpaceHarp Application Notes.**

Stand, Boom and Light Sub-Assembly* *or equivalent alternatives

SpaceHarp LE MIDI Controller

SpaceHarp Pedal Board Sub-Assembly* * or equivalent alternatives

6U Rack Sound Galaxy DAW Sub-Assembly

+ Video Laptop
+ DMX Laptop
+ Laser Laptop
= SPACEHARP MUSIC & VISUAL MEDIA PERFORMANCE SYSTEM
[App Note #1]

Integrated Music Workstation (No Computer)

= WORKSTATION-BASED SPACEHARP MUSIC SYSTEM
[App Note #2]

Mobile Device DAW Apps

= MOBILE APPS-BASED SPACEHARP MUSIC SYSTEM
[App Note #3]

Other DAW (Non-Ableton) System

= DAW DEVELOPER SPACEHARP MUSIC SYSTEM
[App Note #4]

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1.4.2.1 6U Rack Sound Galaxy DAW System for Visual Media (USB)

We show here a "full media stack" mobile or permanent performance system, namely including music, video, lighting and lasers. SpaceHarp supports a convenient four-laptop approach – one for each media dimension, so to speak. Compared to desktop units, this minimizes total control desk space and makes transport and setup vastly easier.

This is a quick and easy way to connect these kinds of external media computers using MIDI when they are within USB or MIDI cable distance from the rack, and when the additional configuration steps and other issues of using MIDI-over-LAN are desired to be avoided.

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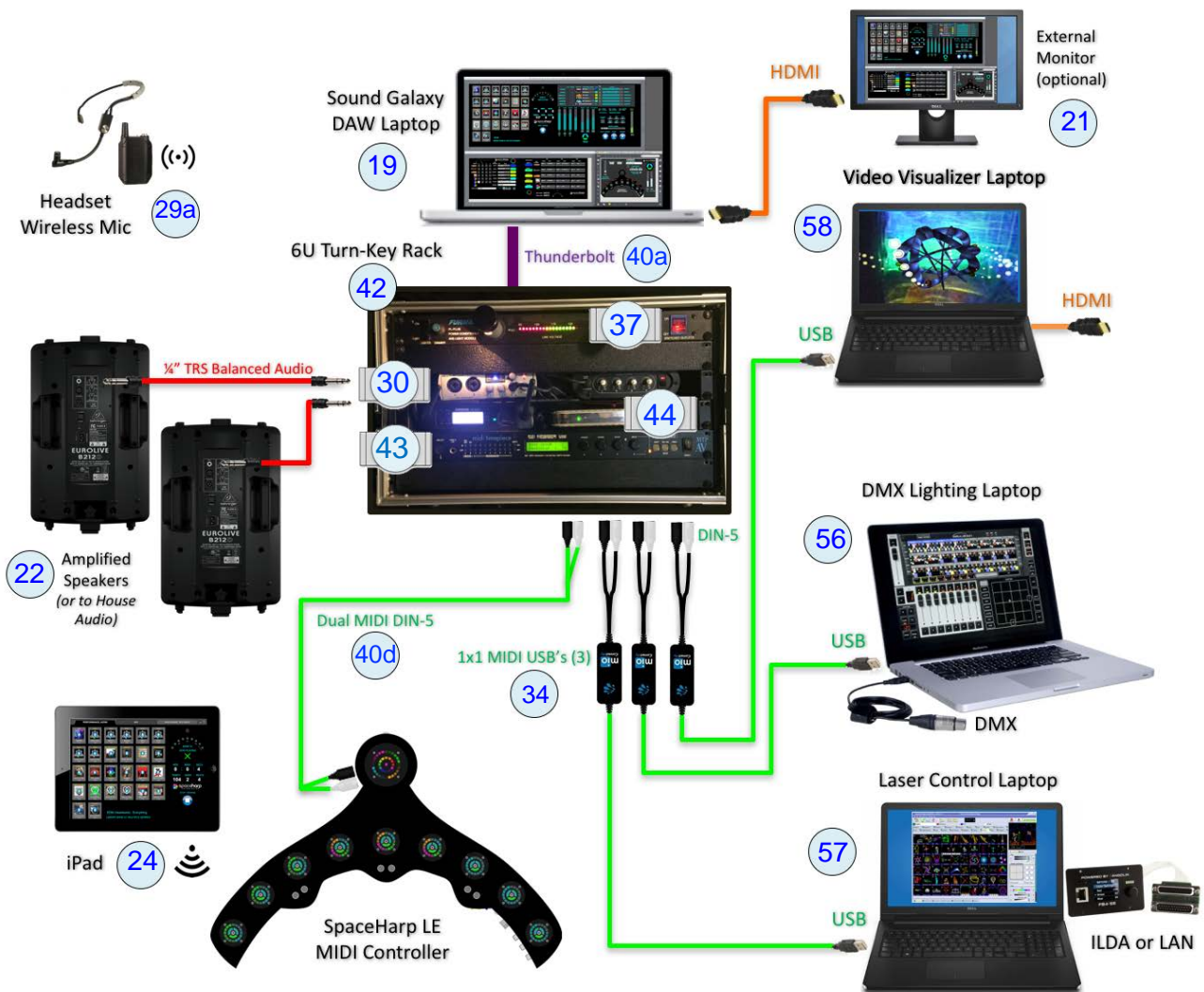
1.4.2.2   6U Rack Sound Galaxy DAW System for Visual Media (Ethernet)

We show the most portable version of this full media stack entertainment system, using four laptop computers. In some applications, however such as for large dome multi-projector video, projection mapping, 5D theme park theaters and so forth, then rack servers would typically be used. The same MIDI-over-LAN protocol link as is used for a four-laptops control booth setup, may also be used for an all rack-mounted control room.

Also, by using Ethernet, any of the external visual media computers can easily be located at a considerable distance from the Sound Galaxy 6U rack and its laptop, using commonly available networking devices and systems. While computer-to-computer over WiFI is also supported by Sound Galaxy, we don't recommend it. However, all media computers on the LAN can also share in the Session 1 WiFi session that all Sound Galaxy remotes are using.
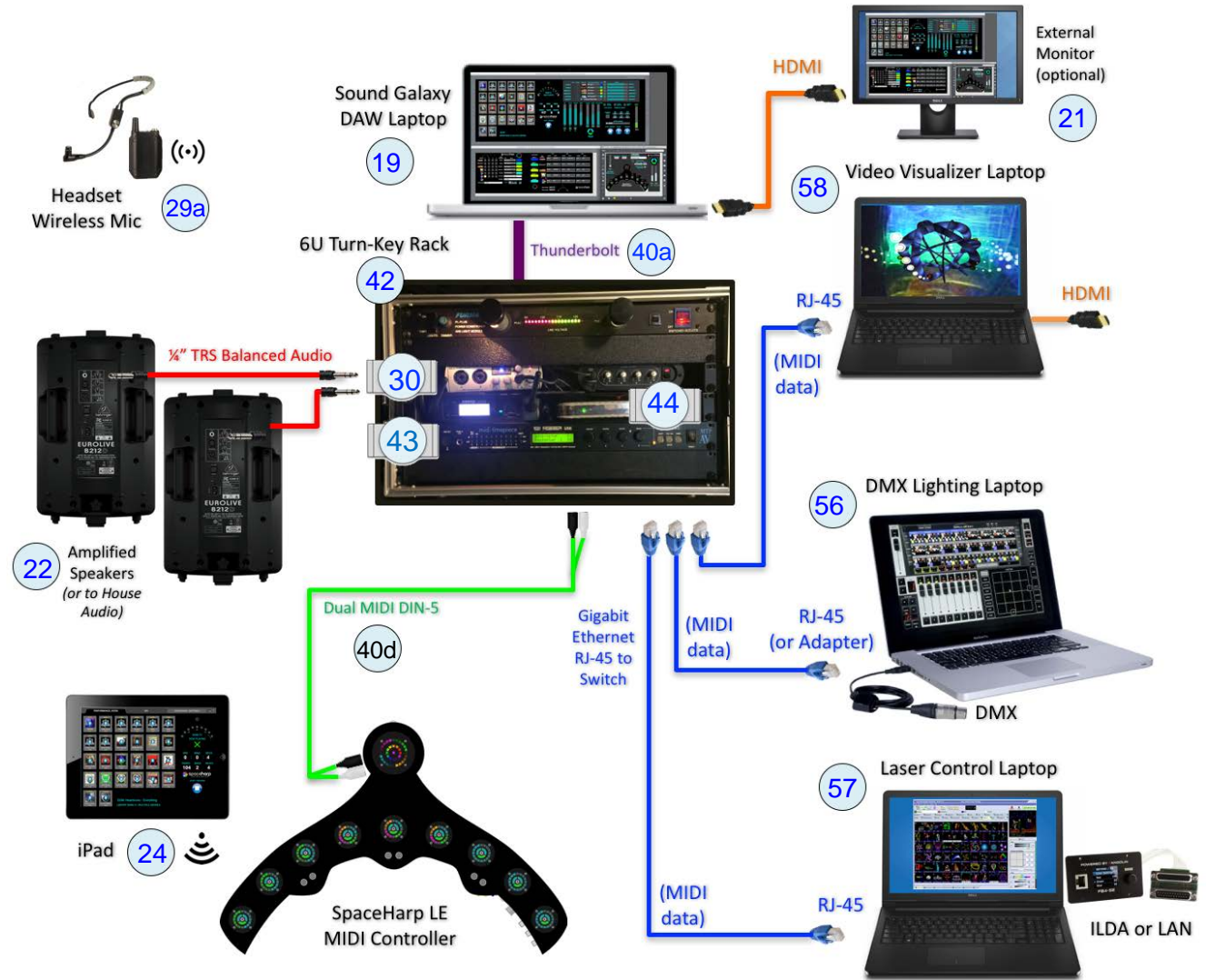
1.4.2.3   Other Custom System Configurations

Further helpful information, tips and tricks for custom SpaceHarp configurations, will be provided in a series of Application Notes for SpaceHarp and Sound Galaxy,

See www.spaceharp.com/application_notes for postings of new App Note releases.
(You may be reading this beta SpaceHarp User Guide prior to initial posts).

1.5 SYSTEM SETUP

1.5.1 Stand and Light Sub-Assembly

Please see the separate document, **SpaceHarp User Guide: Setup: Stand and Light Sub-Assembly**

1.5.2 Place the SpaceHarp Controller on the Stand Assembly

Please see the separate document, **SpaceHarp User Guide: Setup Section.**

1.5.3 Setup the Pedal Board

Please see the separate document, **SpaceHarp User Guide: Setup: Pedalboard**

1.5.4 Setup Rack, Computer, Speakers and Accessories

This Section describes the setup steps for a turn-key, 4U rack-based Sound Galaxy DAW system, suitable for LBE Events, Museums, Installations and Pro Performance stage applications.

These steps assume that the 4U rack has already been pre-assembled and cabled internally with the devices shown. Full rack-internal cabling is illustrated in Rack Mounted Configuration.

The below instructions presume that you have already completed the setup of the SpaceHarp Stand and Light Sub-Assembly (or equivalent). That means, the Stand is setup with the Light Boom Assembly; the SpaceHarp placed on its custom Tribars and Foam Wedge; the SpaceHarp Power Adapter's and Sensor Light's AC cables are at the base of the stand and ready to be plugged into an AC power source.

What remains includes unpacking and connecting the computer and rack, remote control devices, SpaceHarp controller, other external devices and speakers.

If will be helpful for the 4U Rack and DAW system cabling steps, to refer to the diagrams in the following Sections, for AC Power Cables and Audio and Data Cables.

System Quick Setup Checklist is on the following page.

| STEPS | 4U RACK BASED SYSTEM QUICK SETUP CHECKLIST | Cables | | | √ |
		Rack	System	Power	
1 & 2	Connect AC Extension w 4-outlet breakout to AC Power Source			P9	
3	Connect Sensor Light AC Cable to Extension Cord			P8	
4, 5 & 6	Check that Rack-internal cabling is correct and secure	R1 to R5			
7	Connect Rack Power Conditioner to AC Extension			P1	
8 & 9	Unpack system cables from their transport case(s)				
10 & 11	Setup the Speakers; Speaker Stands and Sandbags (if used)				
12 & 13	Check Speaker rear controls; Power = Off; volume low (initially)				
14, 15 & 16	Connect Audio and AC Power to Speakers		C6 & C7	P2 & P3	
17, 18 & 19	Setup DAW Laptop; Laptop Stand (if used)				
20	Connect Laptop Power Supply Cable to AC Power Conditioner rear			P4	
21	Connect Laptop-to-Rack Thunderbolt Cable		C8		
22	Orient Rack in operating position and remove the front case cover				
23	Setup external HD monitor if any, connect AC and HDMI to Laptop		C9	*not shown*	
24	Setup HandSonic HPD-15 & Connect AC, MIDI and audio cables		C4 & C5	P6	
25 & 26	Setup Handheld Mic and/or Wireless Mic and connect audio cables		C2 & C3	P5	
27 & 28	Connect SpaceHarp Controller Power Supply cable & dual-MIDI cable		C1	P7	
29-1 thru 29-7	Power up procedure: Always do in order as shown, 29-1 through 29-8:				
29-1	Rack AC Power Conditioner				
29-2	HandSonic HPD-15 (If present)				
29-3	Wireless Mic base unit (if present & not already rack-mounted)				
29-4	SpaceHarp Sensor Light's dimmer switch				
29-5	SpaceHarp's rear Power Switch				
29-6	Speakers rear power switches				
29-7	Speakers rear EQ levels (double-check)				
29-8	DAW Laptop power switch, if it was OFF				
30	Boot up DAW Laptop, or bring back from sleep mode				
31	Launch Sound Galaxy 2.0 Suite using its Auto-Launcher utilities				
32	Unpack & Launch any Sound Galaxy remote control iPad device(s)				
33	Use the Performance and Mix Tabs as desired to PLAY a song				
34, 35 & 36	Adjust volumes for Sound Galaxy Mix Tab, PreSonus & Headph. D/A				
37	Adjust both Speakers rear audio levels				
38	Gaffer tape down any cables needed for safety				
39	"Caution" Gaffer tape any areas of the floor around the setup				
40	START your edit, rehearsal, stage performance, or Public session.				

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1.5.4.2   Step-by-Step Setup for 4U Rack, DAW Computer, Speakers & Accessories

1.5.4.2.1   Connect AC Extension w 4-Outlet Breakout to AC Power Source   ✔️☐

STEP (1)   Make sure that you have an adequate space and a good AC power source to setup. Typically, it's a good ideal to allow for up to 5 Amps total AC for the systems shown.

> **TIP:** Avoid motors, generators or pumps sharing the same AC circuit, to avoid AC noise sources; even in that case however, the in-rack AC power conditioner should deliver sufficiently clean power.
>
> Ideally, try to use a dedicated AC circuit with no other equipment on it, if possible.
>
> Remember that a power conditioner is passive protection, it cannot "fill-in" brownouts or "restore" voltage drops – if you have those conditions you may need a "UPS" (Uninterruptable Power Supply) battery-based unit. This may be sufficient for all devices with the exception of speakers and the Sensor Light. It will at least make recovery quickest, or allow for a normal shutdown if the AC power will remain off for some time.
>
> Fortunately, laptops do have a battery. Keep it fully charged (icon will appear as shown at left) in order to keep the computer functioning smoothly even through AC dropouts, or when setting up and powering up on a stage.

STEP (2)   Run an AC Extension cord [**P9**] having a 4-socket breakout to the location of the 4U Rack (18). Use only grounded, 15-20 Amp extensions. We recommend outdoor rated for added safety. Any sockets without plugs should keep their socket protection covers down.

1.5.4.2.2   Connect Sensor Light AC Cable to Extension Cord   ✔️☐

STEP (3)   Connect the Sensor Light cable **[P8]** into the extension cord's breakout box **[P9].**

1.5.4.2.3   Check that Rack-Internal Cabling is secure   ✔️☐

STEP (4)   Place the 4U Rack (18) on its smaller end, so that the side marked "REAR" is facing upwards.

STEP (5)   Unlatch the "REAR" Panel of the Case, and set it aside.

STEP (6)   Inspect the 4U Rack internal cables and re-seat any that are loose or disconnected. Refer to diagram 4U Rack Internal Cabling Detail**.**

1.5.4.2.4   Connect Rack Power Conditioner to AC Extension   ✔️☐

STEP (7)   Refer to the diagram at 4U Rack System AC Power Cables.
Gently pull out and uncoil the attached AC power cable P1 from the Rack Power Conditioner (37), and plug it into the AC Extension Cord/Breakout (40f). Secure with gaffer tape if needed for safety.

1.5.4.2.5   Unpack system cables from their transport case(s)   ✔️☐

STEP (8)   Unpack the collection of all "*4U RACK AC CABLES"* from their travel case**.** Have cables and power supplies P2 through P8 on hand and ready to use.

STEP (9)   Unpack the collection of "*4U RACK SYSTEM CABLES"* from their travel case. Have cables C1 through C9 including the wrapped cable (20) on hand and ready to use.

1.5.4.2.6 Setup the Speakers; Speaker Stands and Sandbags (if used) ✔️☐

STEP (10) Position the Speakers (22) horizontally on the floor by their wedge sides, at either side of the SpaceHarp Stand, aimed up to serve as "monitors" to the SpaceHarp player.
-- or--

alt. STEP (10) Setup two Universal Speaker Stands (52) where you want the Speakers (22), and where they are good for the room. Place the speakers onto the Stands and orient them as desired.

STEP (11) If you're using the Universal Speaker Stands (52) you may want to use sandbags (13) them at their bases.

1.5.4.2.7 Check Speaker rear controls: Power Off; volume low (initially) ✔️☐

STEP (12) Make sure the Speakers (22) rear power switches are turned OFF.

STEP (13) Set the levels on the Speakers (22) rear knobs to desired levels. If you have different speakers, adjust the equivalent controls to the extent they are present.

> **WARNING:** DO NOT start out with volumes turned to maximum! You could damage your equipment, or even damage your hearing! Always bring up system volumes gradually.

1.5.4.2.8 Connect Audio and AC Power to Speakers ✔️☐

STEP (14) From the AC Cables collection, attach Edison AC cables to each the Speakers (22), running any additional grounded AC extension cords to the main AC Extension cord or to other AC power sources convenient to the speaker locations in the room. Secure with gaffer tape if needed for safety.

> **TIP:** Have "ground lifters" ('3- to 2-prong' adapters) on hand in case you later discover some grounding hum.
>
> In this setup which includes a headphones D/A, we're using unbalanced ¼" (mono) audio cables. So, having a ground loop "hum" could happen. If it does, see the Section Eliminate Ground Loop Hum.

STEP (15) Refer to the diagram at 4U Rack System Audio and Data Cables.
Insert one end of **CABLE C6** and **CABLE C7** into the ¼" Input Jacks on the Speakers (22). Secure cables with gaffer tape immediately, if needed for safety and speakers tip-over prevention.

STEP (16) Insert the other end of **CABLE C6** and **CABLE C7** into the ¼" Output L,R Jacks on the Headphones DA (38) MONITOR OUT. Refer to the diagram at 4U Rack Rear Audio and Thunderbolt Data Cabling Detail.

1.5.4.2.9 Setup DAW Laptop; Laptop Stand (if used) ✔️☐

STEP (17) Set the DAW Host MacBook Pro (19) on a laptop stand mount, or on a nearby table.

STEP (18) Sandbag (13) the laptop stand's (53) microphone stand base if needed.

STEP (19) Safety-cable, zip-tie, Velcro and/or gaffer-tape the laptop (19) to secure it in position.

1.5.4.2.10 Connect Laptop Power Supply Cable to AC Power Conditioner rear ✔□

STEP (20) Connect the AC Plug inside the Cable-Wrapped Magsafe Power and Thunderbolt Cable (20) into an open AC jack on the rear of the Rack Power Conditioner (37).

1.5.4.2.11 Connect Laptop-to-Rack Thunderbolt Cable ✔□

STEP (21) Connect Thunderbolt cable C8, which is part of the wrapped Cable (20) into any open thunderbolt jack on the Thunderbolt Hub (35) inside the back of the Rack. Connect the other end of the thunderbolt cable to the DAW Laptop (19) thunderbolt jack.

1.5.4.2.12 Orient Rack in operating position and remove the front case cover ✔□

STEP (22) You may now orient the rack in a normal working orientation, and remove the 4U Rack (18) end-panel marked "FRONT". You're done with cabling inside the 4U Rack at this point.

1.5.4.2.13 Setup external HD monitor if any, connect AC and HDMI to Laptop ✔□

STEP (23) If you're using an external HD monitor (21), unpack it and set it up where you want it. Connect its AC/DC Power Adapter AC cable into an extension cord P9 socket or to another AC source if needed.

1.5.4.2.14 Setup HandSonic HPD-15 & Connect AC, MIDI and audio cables ✔□

STEP (24) If you're using a HandSonic HPD-15, connect its audio cable C4 and MIDI cable C5 into the 4U Rack (18) front jacks for PreSonus (31) and MIDI 2x2 (33) respectively. Connect the HPD-15's Power Cable P6 to the 4U Rack (18) rear Rack Power Conditioner (37).

1.5.4.2.15 Setup Handheld Mic and/or Wireless Mic and connect audio cables ✔□

STEP (25) If you're using a handheld mic (27), unpack it and mount on a mic stand (60) or on a mic boom (7) if used.

STEP (26) Connect balanced XLR cable C2 to the PreSonus (31) input channel #1 at the front of the 4U Rack (18).

1.5.4.2.16 Connect SpaceHarp Controller Power Supply cable & dual-MIDI cable ✔□

STEP (27) Connect the SpaceHarp controller's Power Supply cable P7 to the 4U Rack (18)'s Rack Power Conditioner (37).

STEP (28) Connect the SpaceHarp controller's dual MIDI cable C1 to the 4U Rack (18) front MIDI 2x2 (33). Be sure to have only MIDI OUT-to-MIDI IN connections correctly, for both cables.

1.5.4.2.17 Full System Power-Up procedure ✔️☐

STEP (29) Power-up the system in the following order:

1) Rack Power Conditioner (37) Power Switch on its front panel, switch ON.

2) HandSonic HPD-15 (26) (if present) power button at rear.
Push in toggle switch to ON.

3) Wireless Mic Base Unit (29), (if present externally, not inside rack), switch ON.

4) SpaceHarp Sensor Light (10)'s AC cable dimmer switch **P8** slide UP to full ON.

5) SpaceHarp Controller's Power Switch at top, switch to ON.
Follow the procedure in the Startup SpaceHarp section.

6) Speakers (22) rear power switch, turn to ON.

7) Speakers (22) rear EQ levels, adjust as appropriate for your setup.
Leave volumes turned down, for now.

8) DAW Laptop (19), turn ON (if off), or open/bring back from sleep mode.

1.5.4.2.18 Boot-up DAW Software ✔️☐

STEP (30) Boot up the DAW Laptop (19) or bring it back from sleep.

STEP (31) Launch with Sound Galaxy DAW Suite 2.0, using its Auto-Launchers on the DAW Laptop computer. See **Sound Galaxy 2.0 User Guide QuickStart** section.

STEP (32) Unpack and Launch any Sound Galaxy remote iPad device(s).

STEP (33) Use the Performance and Mix Tabs in Sound Galaxy as desired to PLAY a song, or, launch your DAW's master transport for any SpaceHarp track in your custom setup.

1.5.4.2.19 Adjust System Software and Hardware Volumes ✔️☐

STEP (34) Adjust DAW Plug-in Modules, Mains Volume, Backing and Sub Mix volumes in Sound Galaxy MIX TAB using either DAW Laptop (19) screen, or on remote control iPad device (24) or (25).

STEP (35) Adjust the Mains Volume knob on the rack mounted PreSonus (31) as needed.

STEP (36) Adjust the Monitor Out Volume on the Headphones DA (38).
Make sure Monitors are not bypassed: the "Monitors Mute" button should be un-lit.

STEP (37) Adjust both Speakers (22) rear volume levels as appropriate for your situation.

1.5.4.2.20 Gaffer-Tape exposed on-floor Cables and Mark Public Player "Safe" Zones ✔️☐

STEP (38) Gaffer tape down all cables, and make a safety check of all sandbags (13).

STEP (39) Caution gaffer tape any floor boundaries that you should. You want to create a zone that patrons wouldn't casually cross.

1.5.4.2.21 CONGRATULATIONS! You're ready to Start your SpaceHarp Session ✔️☐

STEP (40) Start your editing, rehearsal, stage performance, or public players session.

1.5.5   4U Rack System Cables

1.5.5.1   4U Rack System AC Power Cables

P1 AC Extension Cord to Rack AC Power Conditioner

P2 AC Extension Cord to Amplified Speaker (L)

P3 AC Extension Cord to Amplified Speaker (R)

P4 Laptop MagSafe to Rack AC Power Conditioner

P5 Wireless Mic Base to Rack AC Power Conditioner

P6 Drum Machine AC Adapter to Rack AC Power Conditioner

P7 SpaceHarp Power Supply to Rack AC Power Conditioner

P8 PAR-16 Light through Dimmer to AC Extension Cord

29 Wireless Mic

26 HandSonic *(optional)*

SpaceHarp

36

P5   P6   P7

Back of 4U 19" Rack

Min-PAR-16

37

31

10

38

35

AC cables solely inside rack are not shown

Dimmer

P1   P8

External Devices, Connector Plugs & Cable Lengths are not shown to scale

Amplified Speakers 22

P4

20

MagSafe Connector

P2

P3

MacBook Pro 19

40f AC Extension Cord
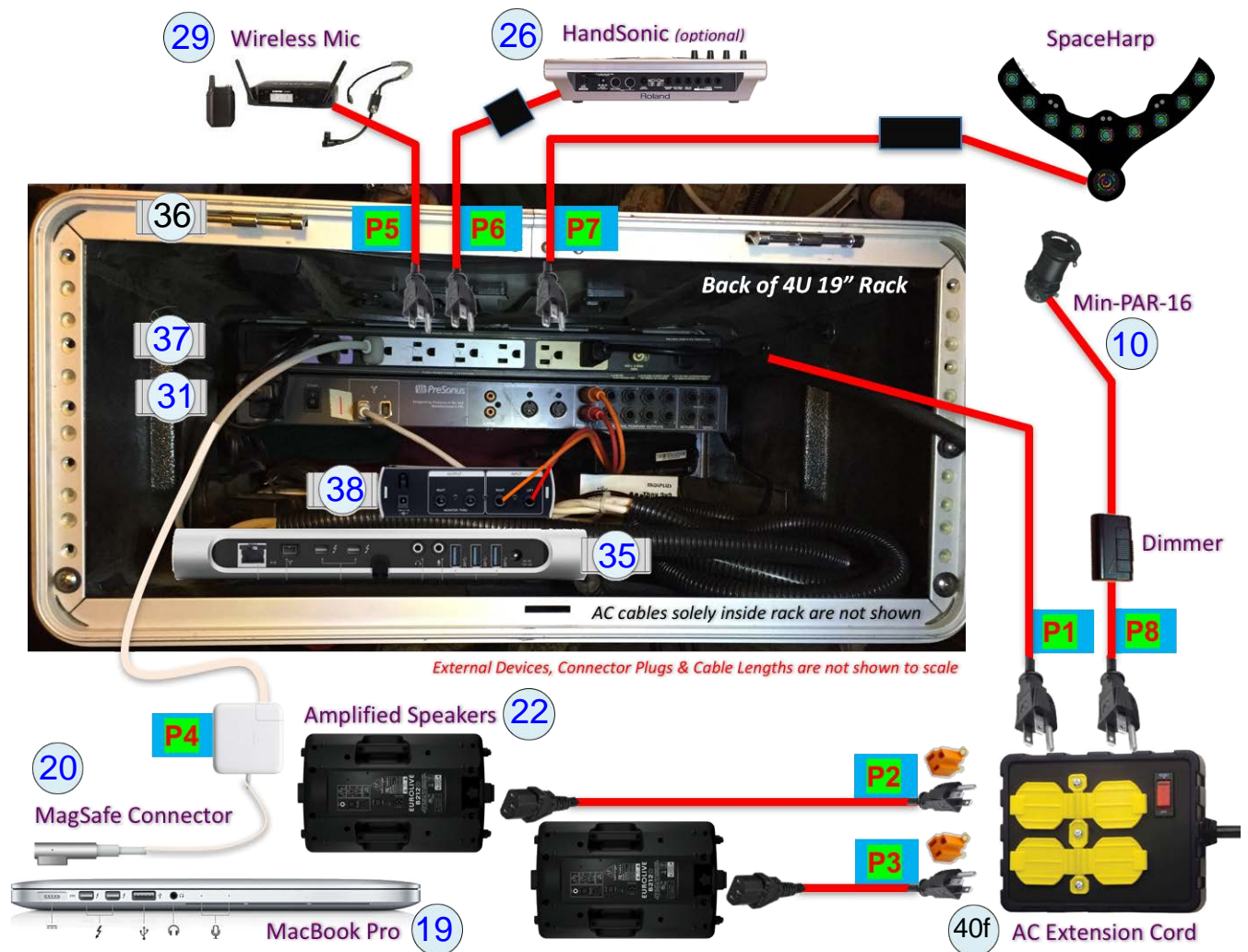
1.5.5.2 4U Rack Audio and Data Cabling Overview

With our turnkey pre-wired rack, your mobile SpaceHarp / Sound Galaxy music system has a much simpler on-site cabling procedure. It's also faster to set up, and more reliable since it has the fewest possible points of cable failure. In a pre-bundled, turnkey system, we provide these nine (9) system (rack-external) cables pre-labeled. We've attached large, bright green number tags - very similar to the flags in the following illustration, for easy reference.

C1 SpaceHarp Dual MIDI to Rack

C2 Mic Balanced Audio to Rack

C3 Wireless Mic Balanced Audio to Rack

C4 Drum Machine Dual Audio to Rack

C5 Drum Machine MIDI from Rack

C6 C7 Speakers Balanced Audio from Rack (2)

C8 Laptop Thunderbolt to Rack

C9 Laptop HDMI to External HD Display
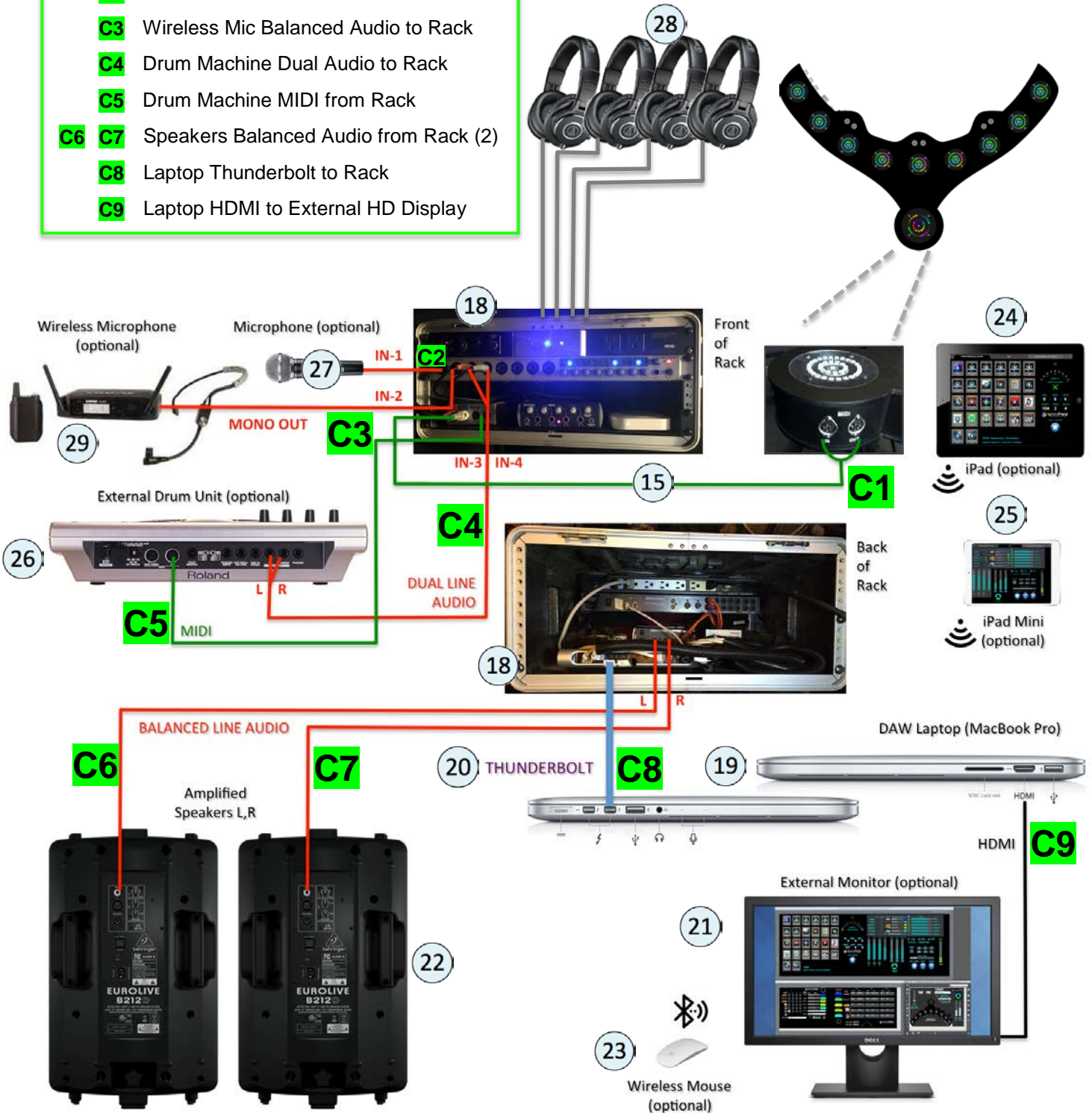
1.5.5.3   4U Rack Front Audio and MIDI Cabling Detail

Wireless Mic
Balanced Audio
(XLR)   **C2**   **C3**   Hand-Held Mic
Balanced Audio
(XLR)

Front of 4U 19" Rack

C4

Drum Machine
Dual Unbalanced
Audio

SpaceHarp
Dual MIDI   **C1**   **C5**   Drum Machine MIDI

(NOTE: External Devices and Connector Plugs Are Not Shown To Scale)

1.5.5.4   4U Rack Rear Audio and Thunderbolt Data Cabling Detail

Back of 4U 19" Rack

C8   **C6**   **C7**   *(NOTE: External Devices and Connector Plugs Are Not Shown To Scale)*

MacBook Pro
Thunderbolt   Amplified Speakers
Unbalanced Audio*   *NOTE:
Unbalanced only when
from Headphone D.A.
Balanced if from
PreSonus Directly

1.5.5.5 4U Rack Internal Cabling Detail

4U Rack internal cabling is secured to rack shelves and case with Velcro and zip-ties, so is unlikely to need attention unless a cable is accidentally pulled out and you need to know where to put it back. All Turn-Key racks have their internal cables marked with large Purple & Green color labels that look identical to those in the below illustration. (The "**R**" stands for **R**ack-Internal Cable.)
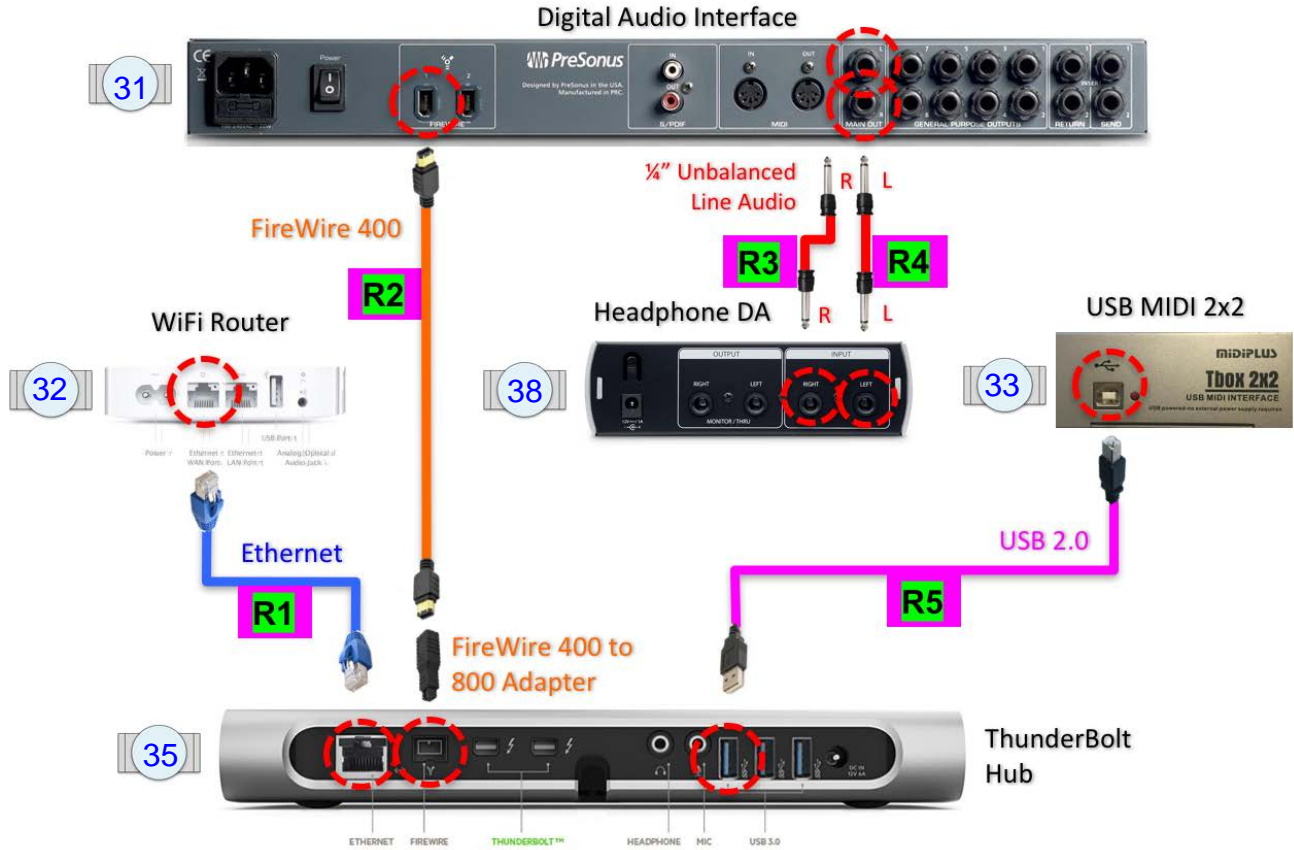
1.5.6   6U Rack System Cables

1.5.6.1   6U Rack System AC Power Cables

The 6U Rack System is very similar to the 4U Rack System AC Power Cables. The equivalent 6U Rack System AC Power Cables diagram will be included in a future release of this User Guide.

1.5.6.2   6U Rack Music & Visual Media System (USB) Audio and Data Cabling Overview

C1   SpaceHarp Dual MIDI to Rack

C6   Speakers Balanced Audio to Rack (L)

C7   Speakers Balanced Audio to Rack (R)

C8   DAW Laptop Thunderbolt to Rack

C9   DAW Laptop HDMI to External HD Monitor

C11   Music Visualizer/Video Effects Laptop to Rack (USB)

C12   DMX Lighting Laptop to Rack (USB)

C13   Laser Control Laptop to Rack (USB)
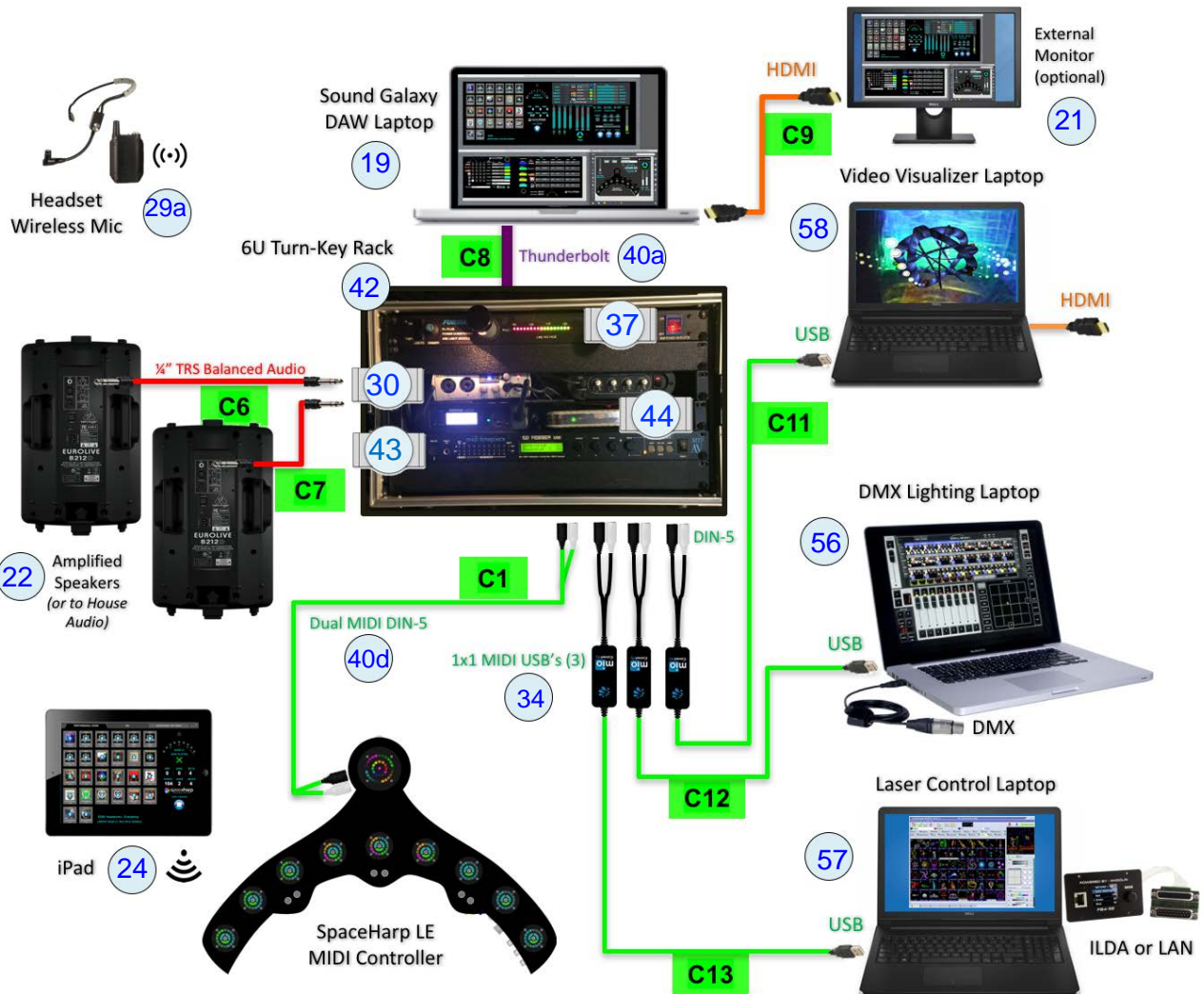
1.5.6.3   6U Rack System 8x8 MIDI Interface Detail

In the **6U Turn-Key Rack** system, **Public MIDI Buses** available also on 8x8 MIDI Interface. Unlike many of the Public buses which may contain MIDI messages on multiple MIDI Channels, in all the DIN-5 serial interface port cases, they are limited to a single MIDI channel. This is because each MIDI port, IN or OUT, is connected only to one MIDI device at a time. It is highly recommended to avoid any serial MIDI cable daisy chaining anywhere in the system, to keep message latency to an absolute minimum.

This MIDI setup, while remaining easy and Turn-Key so far as Sound Galaxy Internal functions, is also designed to connect to various types of optional external equipment using the Public bus information. This is done by directly connected MIDI cables, instead of LAN cables that may be sharing one or more virtual buses using MIDI-over-LAN methods.

Such Public Bus connections are always available in Sound Galaxy and the 6U rack system, whether they are externally connected, or not. Thus, these connections can always be added or experimented with at a later time, and without disturbing any music and other media setups that were previously already running.

The 8x8 MIDI device is pre-configured as follows. Aside from the single channel limit, the DIN-5 serial MIDI ports utilize the same MIDI message protocols as is defined for the corresponding Sound Galaxy Public MIDI Buses.

OUTPUT PORTS 1-8

Port 1 out - to **SpaceHarp 1** LEDs IN	**[BUS 27,** Ch. 2 only**]**
Port 2 out - to **SpaceHarp 2** LEDs IN	**[BUS 27,** Ch. 3 only**]**
Port 3 out - TQ/AS Notes to **External Drum Unit** (& PCs)	**[BUS 21,** Ch. 10 only**]**
Port 4 out - TQ/AS Notes to **Visualizer** (& PCs)	**[BUS 22,** Ch. 11 only**]**
Port 5 out - to **SpaceHarp 3** LEDs IN	**[BUS 27,** Ch. 4 only**]**
Port 6 out - to **SpaceHarp 4** LEDs IN	**[BUS 27,** Ch. 5 only**]**
Port 7 out - to **DMX Lighting Computer I**N	**[BUS 23,** Ch. 12 only**]**
Port 8 out - to **Laser Control Computer** IN	**[BUS 24,** Ch. 13 only]

INPUT PORTS 1-8

Port 1 in - from **SpaceHarp 1** Sensors & Pedals OUT	**[BUS 18,** Ch. 2 only**]**
Port 2 in - from **SpaceHarp 2** Sensors & Pedals OUT	**[BUS 18,** Ch. 3 only**]**
Port 3 in – unassigned	un-assigned & available
Port 4 in – unassigned	un-assigned & available
Port 5 in - from **SpaceHarp 3** Sensors & Pedals OUT	**[BUS 18,** Ch. 4 only**]**
Port 6 in - from **SpaceHarp 4** Sensors & Pedals OUT	**[BUS 18,** Ch. 5 only**]**
Port 7 in - unassigned	un-assigned & available
Port 8 in – unassigned	un-assigned & available

The connected media computers are shown as an example. In practice, various combinations of external media protocols may be used, using the available Public MIDI buses routed to various DIN-5 ports sending to Drum Machine, Video Music Visualizer, DMX Lighting, Lasers, Immersive Video Domes, and/or AR-VR media.

Turn-key SpaceHarp Music Performance Systems delivery includes customizing the MIDI routing with the rack MIDI 8x8 interface, as needed for that application.

See **Sound Galaxy 2.0 User Guide** for full details on Sound Galaxy MIDI API and the use of our Public MIDI Buses.

This illustration shows the MIDI DIN-5 cabling for a fully built-out, 4 SpaceHarp Music and Visuals Performance System, with Visualizer, Lighting and Laser Show Control computers wired up using USB MIDI 1x1 dongles. Be sure that 8x8 Port #'s, MIDI Channel #'s and Public Bus #'s are not confused.
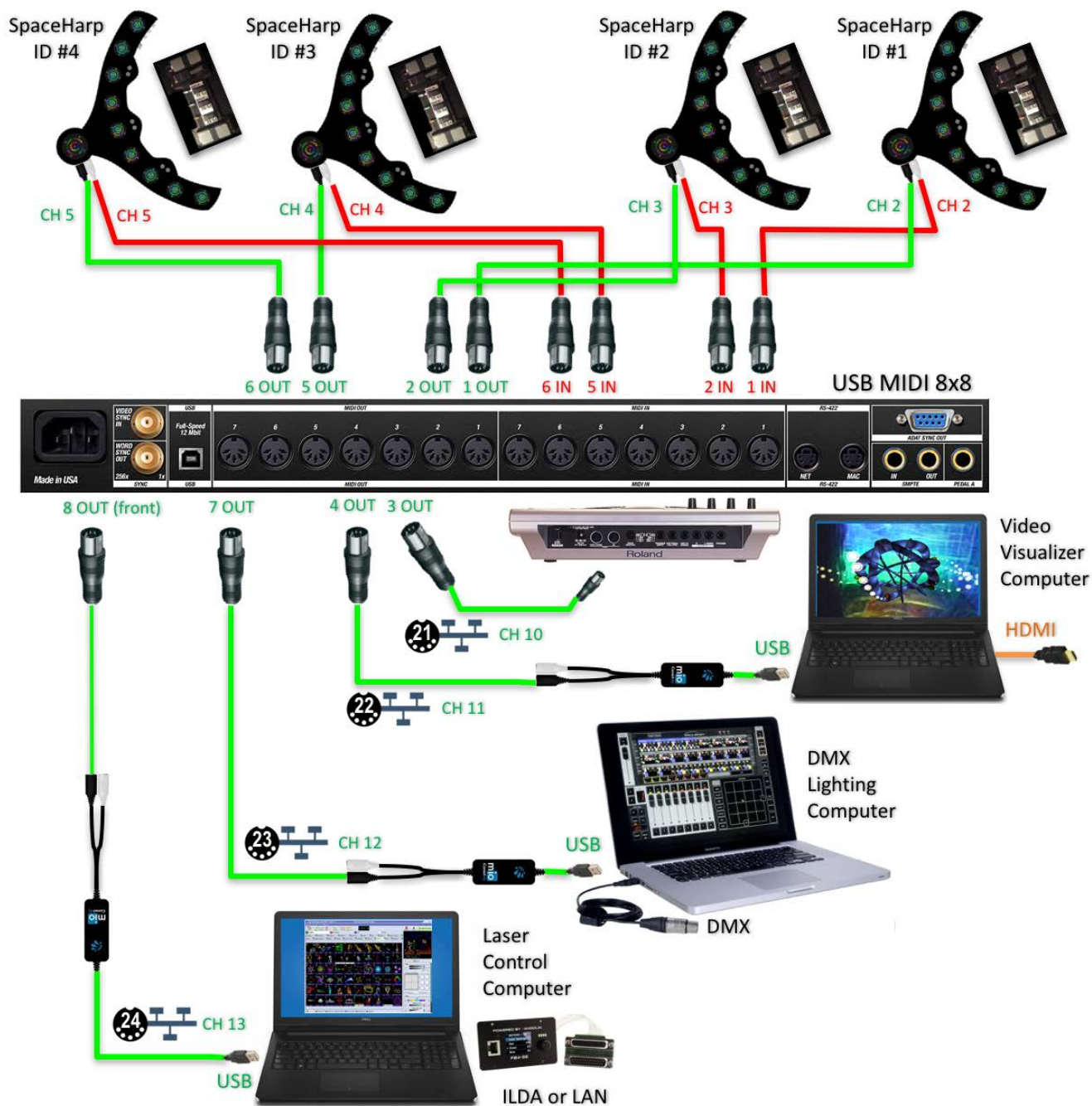
The MIDI outputs from the three external computers are shown as disconnected. They would remain so except in the special cases of recording back external show control MIDI data into device-specific show tracks saved inside the Ableton Live Set file for specific song content (Advanced users only.) In that scenario, the MIDI IN Ports 4, 7 and/or 8 would be used.

In general, cues, scenes, modes and the like would remain on the external show machine, and as Presets mapped to the Program Changes 0-127 for that MIDI Channel. Then, their MIDI direction always remains IN only, simplifying the setup. All that songs would add in the Ableton Template file would be the simple Piano Roll Notes representations that Sound Galaxy uses for Program Change control tracks. This keeps things tidy, and, essentially content-independent on the Sound Galaxy Side, so far as the detailed show control information on the external computers is concerned.

C1	SpaceHarp Dual MIDI to Rack
C6	Speakers Balanced Audio to Rack (L)
C7	Speakers Balanced Audio to Rack (R)
C8	DAW Laptop Thunderbolt to Rack
C9	DAW Laptop HDMI to External HD Monitor
C14	Music Visualizer/Video Effects Laptop to Rack (LAN)
C15	DMX Lighting Laptop to Rack (LAN)
C16	Laser Control Laptop to Rack (LAN)

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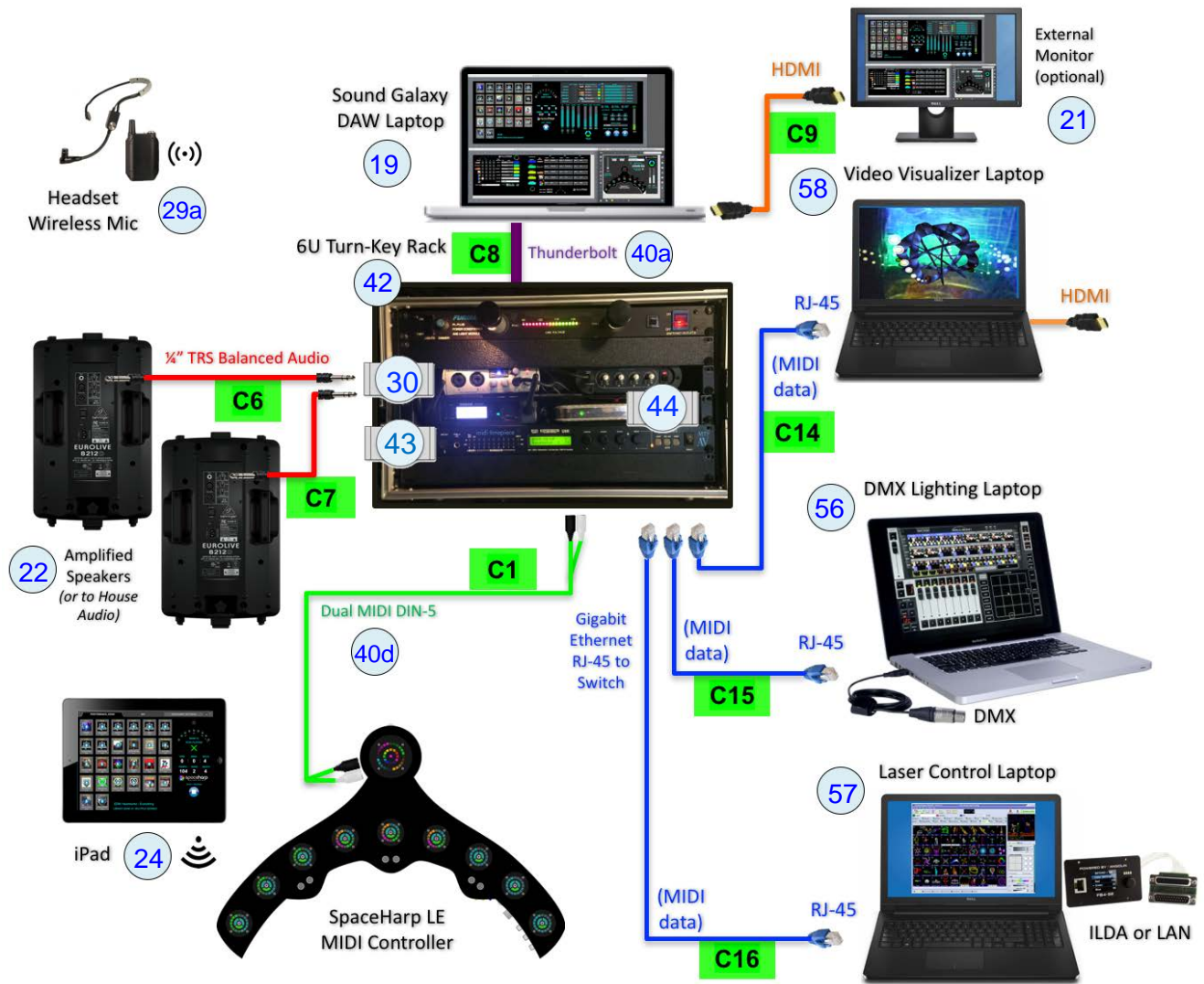
1.5.6.5   6U Rack Front Audio and Data Cabling Detail

The 6U Rack Front Audio and Data cabling is very similar to the 4U Rack Front Audio and Data Cables setup. The equivalent 6U Rack Front Audio and Data Cabling Detail diagram will be included in a future release of this User Guide.

1.5.6.6   6U Rack Rear Audio and Data Cabling Detail

The 6U Rack Rear Audio and Data cabling is very similar to the 4U Rack Rear Audio and Data Cables setup. The equivalent 6U Rack Front Audio and Data Cabling Detail diagram will be included in a future release of this User Guide.

1.5.6.7   6U Rack Internal Cabling Detail

6U Rack internal cabling is secured to rack shelves and case with Velcro and zip-ties, so is unlikely to need attention unless a cable is accidentally pulled out and you need to know where to put it back. All Turn-Key racks have their internal cables marked with large Purple & Green color labels that look identical to those in the below illustration. (The "**R**" stands for **R**ack-Internal Cable.)
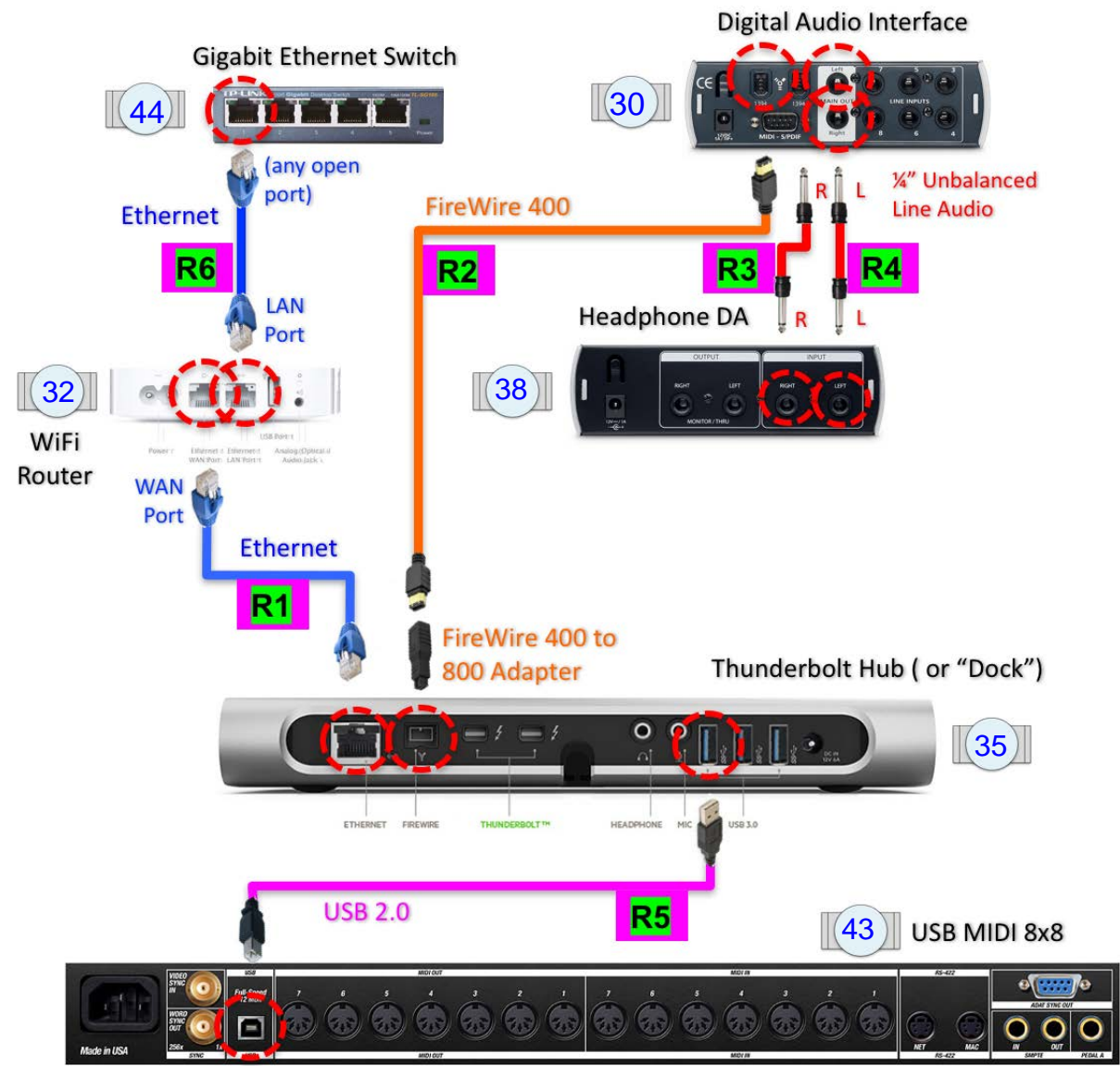
1.6 TROUBLESHOOT SYSTEMS

We include these issues mainly for completeness of this Guide. These problems will rarely if ever arise, and when they do, 95% of the time it's an issue such as having one or more disconnected or wrongly connected cables, some control that is adjusted incorrectly, and/or finding that knobs on the Rack devices have gotten turned unintentionally.

Here we cover the most common system issues you might encounter, and which are easy to fix. 95% of the time, it's cables somehow at fault. In the following sections, we show in detail where to check MIDI cables, Audio and Data Cables.

In general AC cabling issues should be obvious enough to identify and fix. Power Supplies can be more confusing. If you need help and you're using a rack-based system, check our sections on AC cabling and power supplies 4U Rack System AC Power Cables,

1.6.1   Check Controller MIDI channel knob setting

See **MIDI Channel Select Knob** and **Prepare to Turn On** in the separate **SpaceHarp User Guide**.

STEP (1)   Check that the MIDI Channel knob setting is Channel 2 for SpaceHarp #1, Channel 3 for SpaceHarp #2, Channel 4 for SpaceHarp #3, and Channel 5 for SpaceHarp #4.

1.6.2   Secure all MIDI Cable Connections

STEP (1)   If you are using a minimal Sound Galaxy DAW System, check that your MIDI cables are in fact as shown in Minimal Sound Galaxy DAW System Configuration; **or,**

STEP (1)   If you are using a desktop Sound Galaxy DAW System, check that your MIDI cables are in fact as shown in Full Sound Galaxy Desktop DAW System Configuration; **or,**

STEP (1)   If you are using a 4U Rack based Sound Galaxy DAW system, check that your MIDI cables are in fact as shown in Rack Mounted Sound Galaxy System Configurations, and also by checking the cabling diagrams in the 4U Rack System Audio and Data Cables sections; **or,**

STEP (1)   If you are using a 6U Rack based Sound Galaxy DAW system, check that your MIDI cables are in fact as shown in Rack Mounted Sound Galaxy System Configuration, and also by checking the cabling diagrams in the 6U Rack Internal Cabling Detail section, and also in the SpaceHarp Custom System Configurations sections for 6U Racks.

1.6.3   Secure all Audio Cable Connections

If there's an audio noise, distortion or missing audio channel (left or right) issue, the first thing to check are audio cables.

Audio noise or even the total loss of an audio channel can be caused by loose or damaged audio cables or plug connectors. This is a common cause of noise or other audio issues, especially if the cables had been subjected to abuse, such as plugs being removed not at the plug but instead by pulling on the cable.

> **TIP:** Always insert and remove audio plugs by holding the plug, not the cable, in order to avoid damage to the audio plug's internal wire connections. Pulling out by the cable can degrade audio plugs quickly.

1.6.3.1   Check System Audio Cable Connections

STEP (1)   If you are using a minimal Sound Galaxy DAW System, check that all audio cables are in fact as shown in Minimal Sound Galaxy DAW System Configuration; **or,**

STEP (1)   If you are using a desktop Sound Galaxy DAW System, check that your audio cables are in fact as shown in Full Sound Galaxy Desktop DAW System Configuration; **or,**

STEP (1) If you are using a 4U Rack based Sound Galaxy DAW system, check that your audio cables are in fact as shown in Rack Mounted Sound Galaxy System Configurations, and also by checking the cabling diagrams in the 4U Rack System Audio and Data Cables sections; **or,**

STEP (1) If you are using a 6U Rack based Sound Galaxy DAW system, check that your audio cables are in fact as shown in Rack Mounted Sound Galaxy System Configuration, and also by checking the cabling diagrams in the 6U Rack Internal Cabling Detail section, and also in the SpaceHarp Custom System Configurations sections for 6U Racks.

1.6.3.2	*Check Audio Cables from Digital Audio Interface to Speakers*

If you are using TRS (balanced) audio cables that are directly connected from the audio interface to the amplified speakers.

STEP (1) Check the audio cables between the Digital Audio device and speakers:

⬡! Are cables in the correct jacks?
(Mains L, R Out)
Are they firmly plugged in?

Amplified Speakers L,R

¼" TRS Line Audio L,R

⬡! Are cables in the correct jacks?
(Input ¼" or Input XLR)
Are they firmly plugged in?
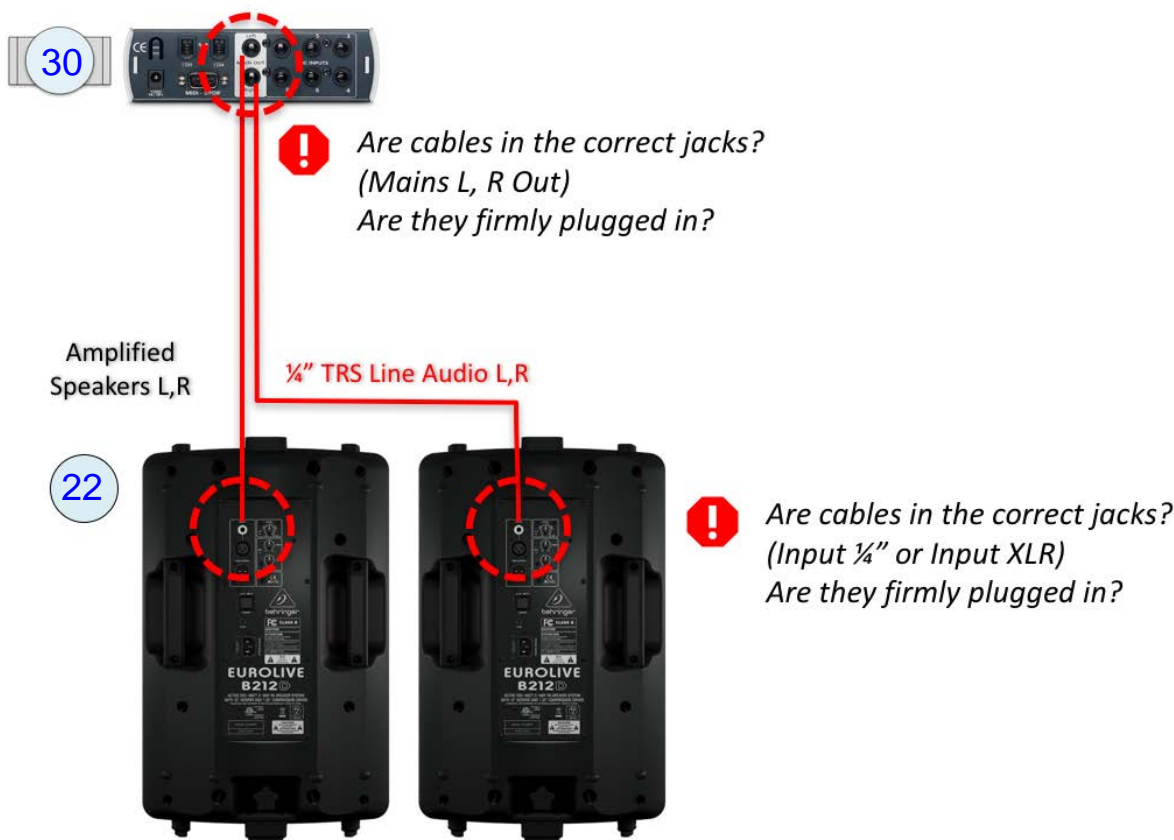
⬡! **WARNING:** Be extremely careful to never connect the audio line out cables from the Digital Audio Interface, or from a Headphones DA Monitor out, to the OUTPUT jack on the amplified speakers. Many speaker models have not only an INPUT ¼" jack, but also another ¼" audio OUTPUT jack for connecting sub-woofers or additional speakers. Since these are both ¼"-compatible jacks it's an easy mistake to make! Connecting an audio output into an audio output could easily damage both the Audio Interface or Headphone DA as well as the Speakers. Always double-check: *"Am I connecting an output to an input?"*

1.6.3.3   Check Audio Cables from Headphones DA to Speakers

If your system is using the 4-headphones distribution amplifier (DA) and thus has its speakers connected to the Monitors OUTPUT jacks of the Headphones DA, then

STEP (1)   check audio cables:

Are cables in the correct jacks? ("OUTPUT")
Are they firmly plugged in?

Amplified Speakers L,R

¼" Unbalanced (mono) Line Audio L,R

Are cables in the correct jacks? (Input ¼" jacks)
Are they firmly plugged in?
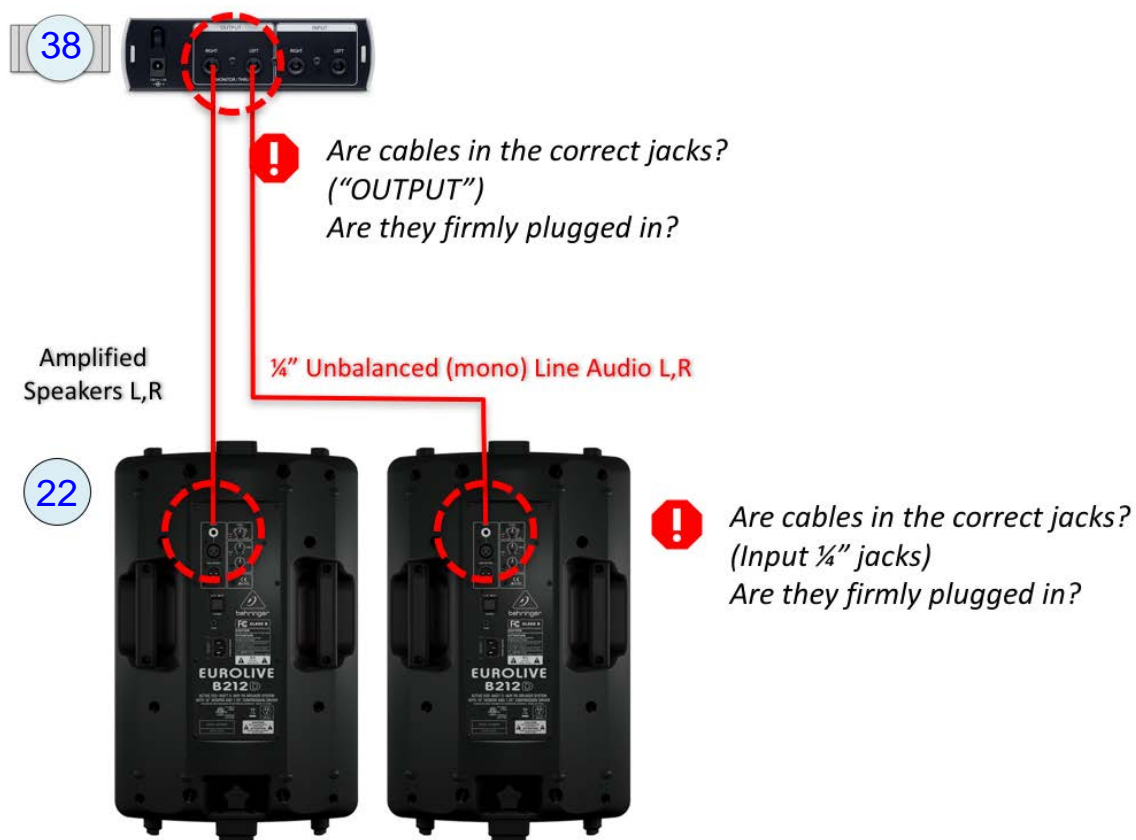
1.6.4   Check Rack-Internal audio cables

If you're using a turn-key 4U or 6U Rack System, check the audio cables inside the rack, which connect the Digital Audio Interface and the 4-Headphone DA. Make sure that the cables are plugged into the correct jacks, and that they are pushed firmly all the way in. See 4U Rack Internal Cabling Detail or 6U Rack Cabling Detail depending on which Rack System you're using. In both cases, check to make sure that Rack Cables [R3] and [R4] are correct.

1.6.5   Eliminate Ground Loop Hum

If you hear a "hum" or "buzzing" sound even after securing all relevant AC and audio cables, you probably have an 'AC ground loop.' This is more commonly an issue when using unbalanced audio cables such as between the Headphone DA Monitors OUT and the amplified speakers.

Here's the steps to take, to try and greatly reduce or eliminate ground loop 'hum' from your System. See the diagram below, which illustrates graphically what to do. Unfortunately, you'll have to bypass the 4-Headphones DA in the rack and make it unavailable. You can however, use one pair of headphones using the headphones jack on the front of the Audio Interface.

Since circumstances for audio hum can range from a minor annoyance at home to a major problem in a public venue, we've included a number of potential remedies, from easy, to worst-case scenario.

STEP (1) Turn your Amplified Speaker rear volume controls all the way down, or better yet, turn their power completely OFF. Don't turn them back on until after you've finished changing all the cables in this procedure.

STEP (2) Switch the Power Switch OFF for your Rack's AC Power Conditioner (when using one.)

STEP (3) Situate yourself where you can easily and safely access the rear inside of the Rack. Be careful of thunderbolt cable to DAW Laptop and any other cables, to avoid equipment damage.

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Digital Audio Interface

¼" Unbalanced Line Audio — R L

R3   **R4**

R L

REMOVE THESE CABLES AND SET THEM ASIDE

Headphone DA   38

¼" Unbalanced Line Audio

C6   **C7**

REMOVE THESE CABLES AND SET THEM ASIDE

Amplified Speakers   22
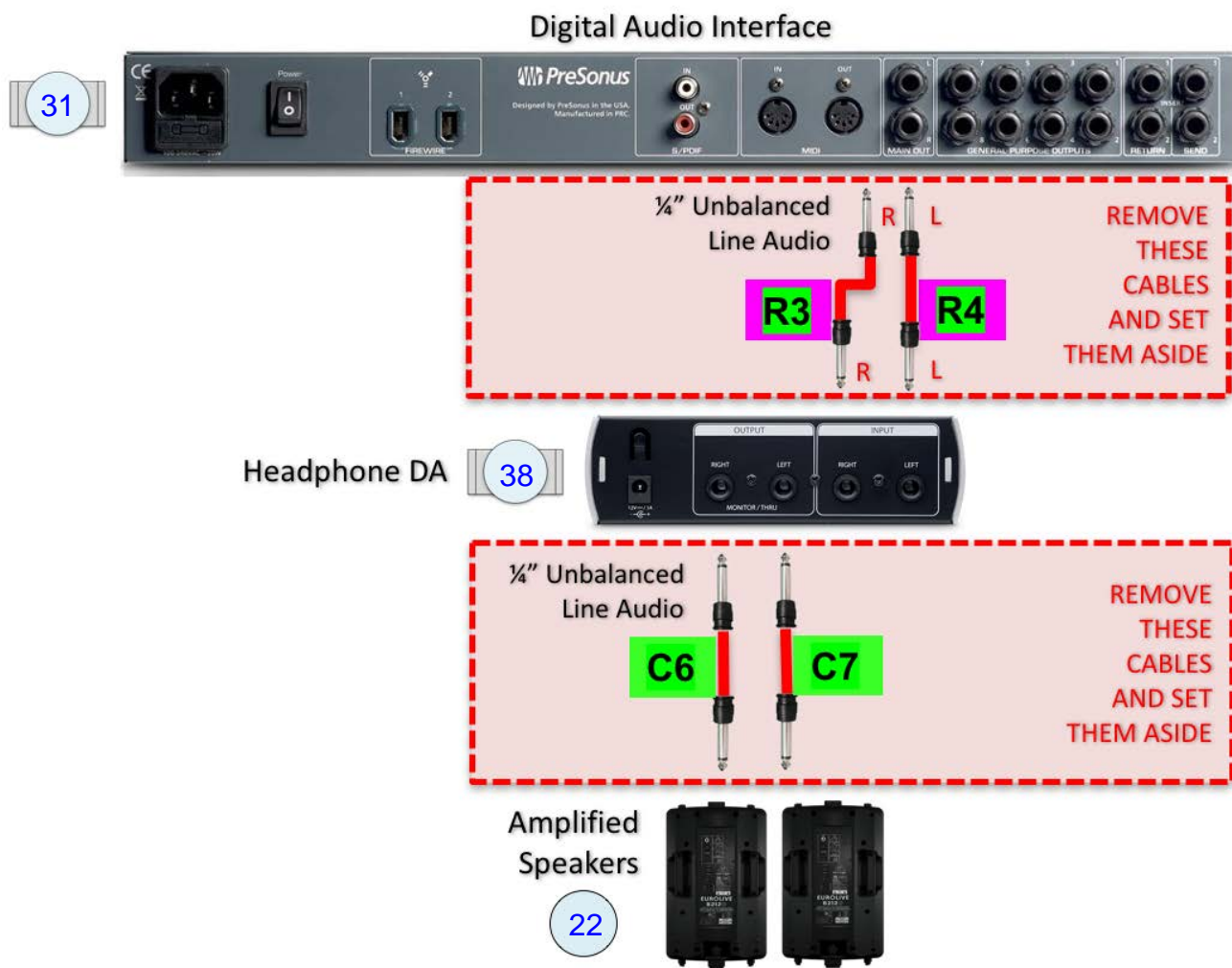
STEP (4) Entirely unplug and remove the two internal Rack Cables [R3] and [R4] . Pull while holding the plugs, not by pulling the cables. Set them aside.

STEP (5) Unplug the ¼" unbalanced (mono) audio cables [C6] and [C7] from the OUTPUT jacks of the Headphones DA. Pull while holding the plugs, not by pulling the cables.

STEP (6) Unplug the cables [C6] and [C7] at their other ends from the Amplified Speakers' IN jacks. Pull while holding the plugs, not by pulling the cables. Set them aside.

STEP (7) Take the system cables [C6b] and [C7b] from their transport case. These are the "balanced" versions (stereo TRS) of the cables [C6] and [C7].

STEP (8) Plug the system cables [C6b] and [C7b] into the MAINS L and R jacks on the Audio Interface.

STEP (9) Plug the system cables [C6b] and [C7b] into the INPUT jacks at rear of the Amplified Speakers.

Digital Audio Interface

Headphone DA (Disabled)

¼" Balanced TRS Line Audio

C6b **C7b**

Replace with TRS Balanced Audio Cables

¼" Balanced TRS Line Audio

Amplified Speakers
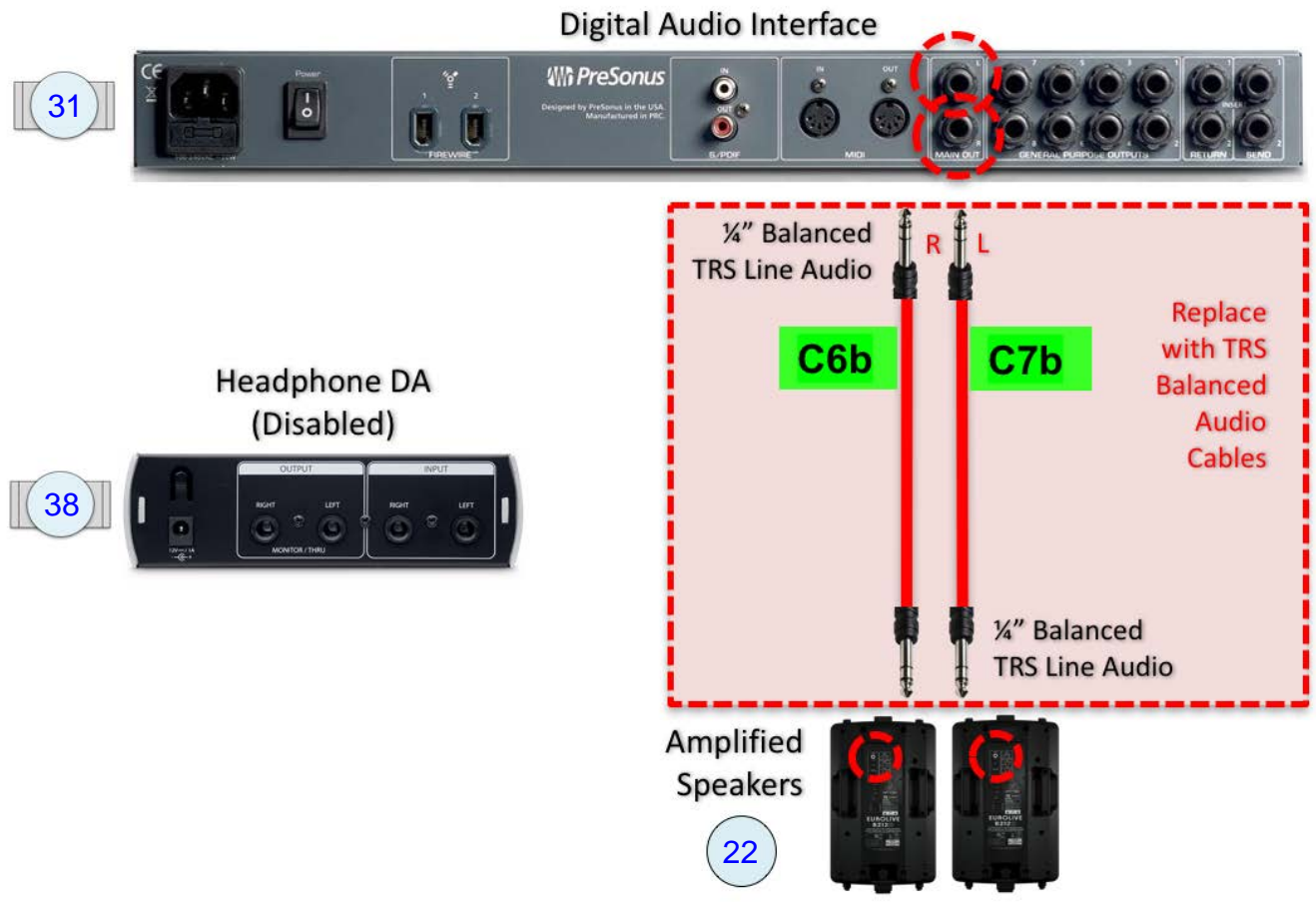
STEP (10) Switch the Rack AC Power Conditioner back ON.

STEP (11) Switch the Amplified speakers back ON and adjust their volume knobs as appropriate.

You now should hear very little (if any) ground loop "hum." The balanced audio setup should have worked to greatly reduced it.

If you *still* have a noticeable hum, then you might have to try one of these additional solutions

STEP (12) Try changing to another AC circuit at your location, if available. If you use an extension cord to reach it, make sure it's a 15-20 Amp, heavy-duty grounded type and outdoor-rated to be safe.

STEP (13) (and/or) Try adding a UPS (Uninterruptable Power Supply) in-line to your AC source.

(and/or) Try another ground loop suppressing device, such as one of these devices. We show two examples, one using unbalanced cables to the speakers, the second providing a balanced choice.

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1.6.5.1   Buzz Kill Isolator Box
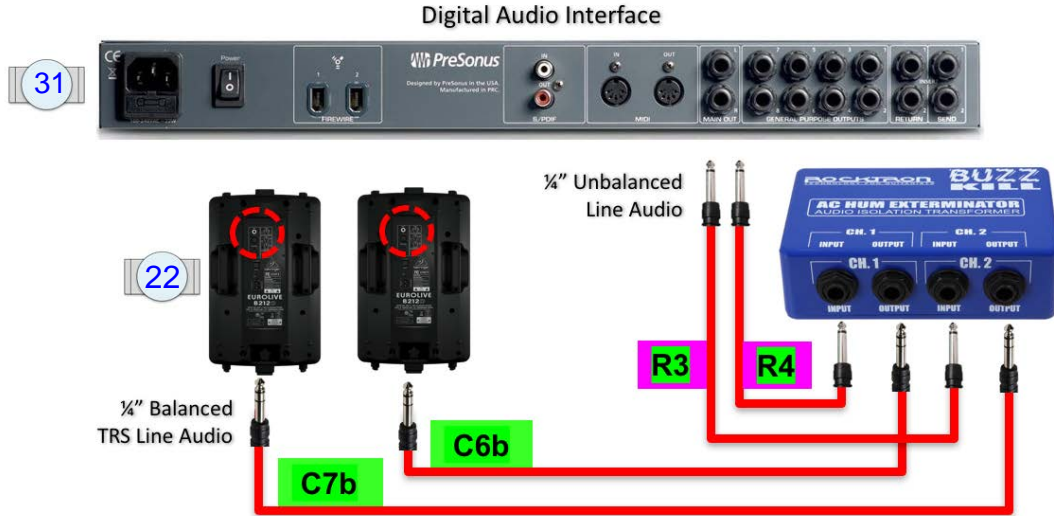
Digital Audio Interface

STEP (14) Plug the short cables you set aside in STEP (4) above, [R3] and [R4] into the Audio Interface MAINS L,R OUTPUT.

STEP (15) Plug cables [R3] and [R4] into the INPUTS of the "Buzz Kill" device.

STEP (16) Plug the cables [C6] and [C7], or [C6b] and [C7b] into the OUTPUTs of the "Buzz Kill" device.

STEP (17) Plug the cables [C6] and [C7], or [C6b] and [C7b] into the Speakers rear ¼" INPUT jacks.

1.6.5.2   Hum Buster Isolator Box (alternate)
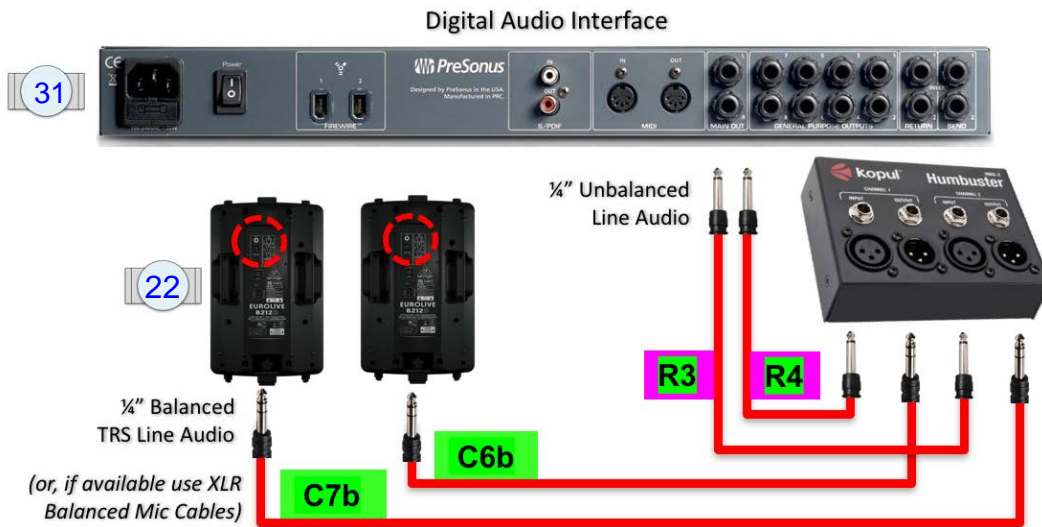
Digital Audio Interface

STEP (14) Plug the short cables you set aside in STEP (4) above, [R3] and [R4] into the Audio Interface MAINS L,R OUTPUT.

STEP (15) Plug cables [R3] and [R4] into the INPUTS of the "Humbuster" device.

STEP (16) Plug the cables [C6] and [C7], or [C6b] and [C7b] into the OUTPUTs of the "Humbuster" device.

STEP (17) Plug the cables [C6] and [C7], or [C6b] and [C7b] into the Speakers rear ¼" INPUT jacks.

If you have XLR cables on hand, use those instead for STEP (16) and STEP (17) above.

1.6.6 Adjust Volume Controls in the DAW System Audio Chain

Most issues with audio in a performance system that includes software and hardware elements, have to do with the fact that there is a "chain" of volumes. Audio screen controls, software, system hardware and speakers are connected in a series -- one into the other. It is important to realize this fact and thus to follow some good practices, in order to avoid noise and distortion, and to achieve the cleanest audio result.

Here's a handy guide to the chain of volumes and mutes found in all DAW environments, and with our particular controls to attend to. Notably, the controls at the below left are automatically synced over MIDI, whereas the right-hand controls relate to digital audio signals and audio hardware.

The two sets of controls in the chain marked with the "DO NOT ENTER" symbols are those that in a turn-key context shouldn't be touched, as they are already automatically handled. If you're an experienced DAW User, you may use these controls with caution. All other controls in the "chain" may be adjusted manually, using common audio good practice. We give a close-up illustration of each level of control in the following sections. If reading electronic Guide, click on callout to jump to Section.

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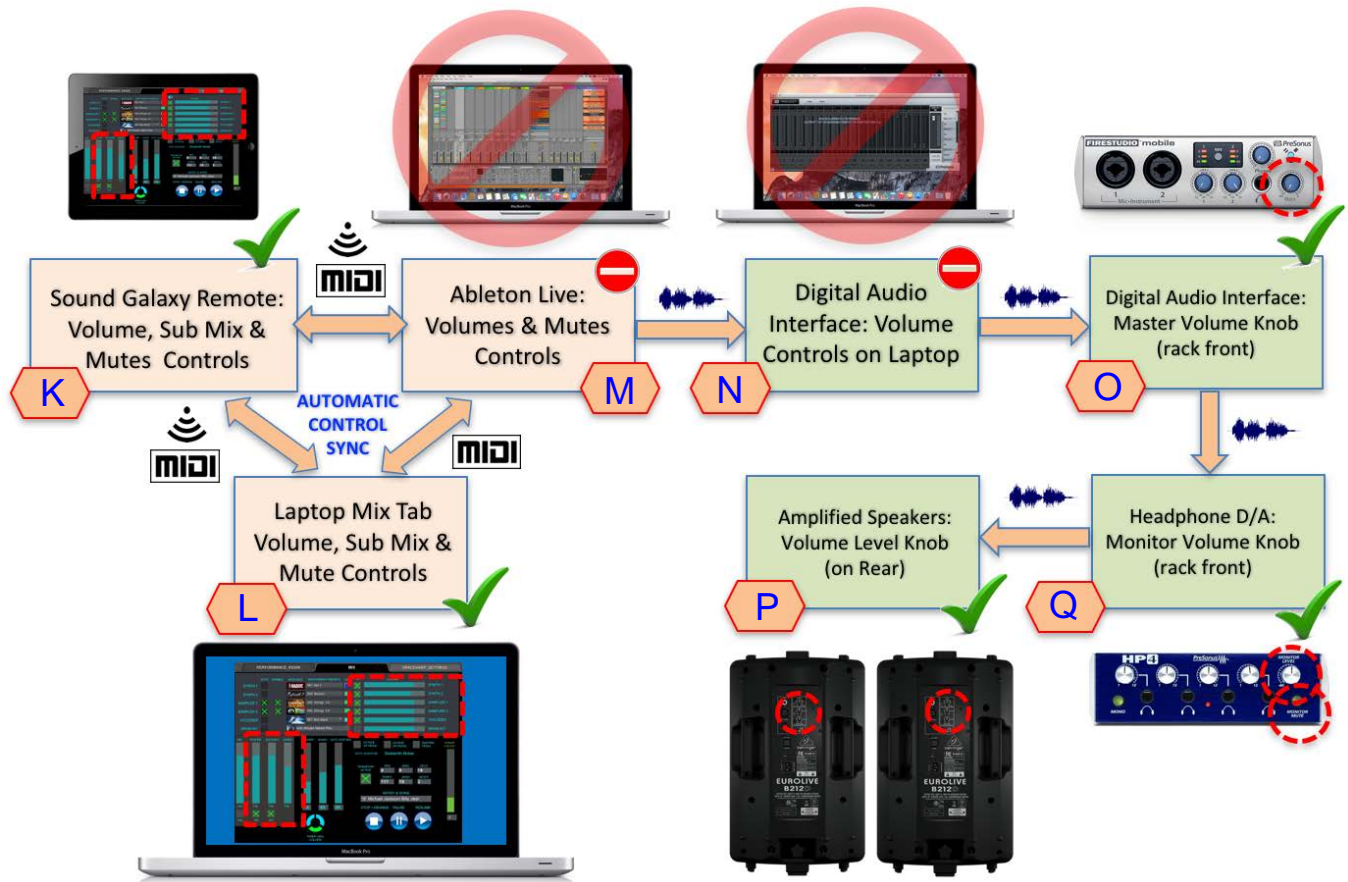
K *1.6.6.1   Adjust the Volumes and Mutes on Sound Galaxy Remote(s)*

Adjusting the volumes, sub mixes and mutes on the iPad Sound Galaxy Mix Tab automatically sync with the Laptop's Mix Tab Window and are thus equivalent. Adjust as appropriate.

L *1.6.6.2   Adjust the Volume and Mutes in Sound Galaxy Mix Tab on DAW Laptop*

Adjusting the volumes, sub mixes and mutes on the laptop Sound Galaxy Mix Window automatically sync with the remotes Mix Tab and are thus equivalent. Adjust as appropriate.

M *1.6.6.3   Adjust Volumes and Mutes in Ableton Live Application on DAW Laptop*

All controls on the remotes and the Sound Galaxy Mix Tab automatically sync with Ableton Live volume and mute controls. However, not all controls in Ableton Live are also in the Mix Tab in Sound Galaxy, so only use those controls in Ableton directly if you're an experienced DAW user.

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N   *1.6.6.4   Bypass Universal Control (DA Interface Utility Mixer)*

If it's somehow not already bypassed as shown below, in most all circumstances set the "MIXER BYPASSED" in the PreSonus Universal Control, their DA utility on the DAW Laptop. Use their mixer with caution if you're experienced DAW user.

O   *1.6.6.5   Adjust Master Volume Control on Digital Audio Interface*

Make sure the master volume level is set appropriately on the hardware interface you're using.

P   *1.6.6.6   Adjust Monitor Volume and Monitor Mute on Headphone DA*

Make sure the master volume level is set appropriately on the headphone Distribution Amplifier, and also that the 'Mute Monitors' button isn't engaged.

Q   *1.6.6.7   Adjust Amplified Speaker Volume and EQ Controls*

Be sure the speakers are switched on, and adjust their rear level knobs appropriate to your situation.

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1.7.1 Warnings, Cautions and Notices

1.7.1.1 Explanation of Symbols Used in this Guide

IMPORTANT NOTE: The exclamation point inside the triangle symbol, is intended to alert the user to the presence of important operating instructions in this Guide. These are most often specific actions to avoid doing, in order to prevent unpredictable results, or which result in the unstable or other unintended functioning of the unit.

ELECTRICAL SHOCK HAZARD: The lightning flash inside the triangle symbol, is intended to alert the user to the presence of un-insulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock, as to the particular circumstances described in that section of this Guide.

FIRE HAZARD: The flames inside the triangle symbol, is intended to alert the user to the possibility of fire and/or burn injury, as to the particular circumstances described in that section of this Guide.

WARNING: The exclamation point within a "stop sign" symbol is intended to alert the user to the potential for serious damage to the unit and/or it's connected system and/or accessories. This symbol is also used to warn the user against "manual tampering" with some of the behind-the-scenes MIDI setups in the system, which are used and managed by all the Sound Galaxy Suite of DAW applications.

TIP: The "light bulb" symbol is intended to alert the user to a helpful tip, an interesting good practice, a time saving measure or other useful information. This symbol doesn't indicate anything required or critical, but rather something that is often just a good idea.

1.7.1.2 Important Safety Instructions

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Do not expose to rain, water mist or moisture.
- Clean only with dry cloth.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

- Only use attachments/accessories specified provided by the manufacturer.

- Use only with the stand, bracket, or table specified and/or recommended by the manufacturer, or sold with the apparatus. When a stand is used, use caution when moving the stand/apparatus combination to avoid injury from tip-over.

- Unplug this apparatus during lightning storms or when unused for long periods of time.

- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

- Do not open the unit.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
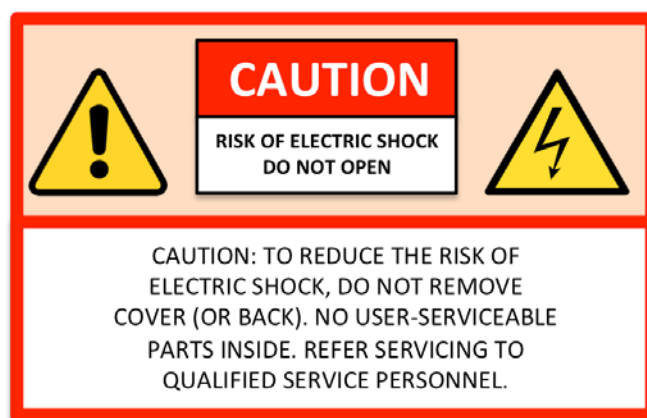
The above warning label is located on the back (underside) of the unit.

1.7.1.3 Warnings

Always follow the basic precautions listed below to avoid the possibility of serious injury or even death from electrical shock, short-circuiting, damages, fire or other hazards. These precautions include, but are not limited to, the following:

1.7.1.3.1 Power Supply / Power Cord

- Do not place the power cord near heat sources such as heaters or radiators. Also, do not excessively bend or otherwise damage the cord, or place heavy objects on it.

- Only use the voltage specified as correct for the controller. The required voltage, DC 5V 10A +tip, is also labeled at the SpaceHarp's DC Power connection jack.

- Use only the supplied power adapter with its supplied cord/plug.

- Check the electric plug periodically and remove any dirt or dust which may have accumulated on it.

- Be sure to connect to an appropriate AC outlet with a protective grounding connection. Improper grounding can result in electrical shock or damage to the controller.

1.7.1.3.2 Do Not Open

- This instrument contains no user-serviceable parts. Do not open the instrument or attempt to disassemble or modify the internal components in any way. If it should appear to be malfunctioning, discontinue use immediately and have it inspected by qualified SpaceHarp Corporation service personnel.

1.7.1.3.3 Water Warning

- Do not expose the instrument to rain, use it near water or in damp or wet conditions, or place on it any containers (such as vases, bottles or glasses) containing liquids which might spill into any openings. If any liquid such as water seeps into the instrument, turn off the power immediately and unplug the power cord from the AC outlet. Then have the instrument inspected by qualified Yamaha service personnel.

- Never insert or remove an electric plug with wet hands.

1.7.1.3.4 Fire Warning

- Do not put burning items, such as incense or candles, on the unit. A burning item may fall over and cause a fire.

1.7.1.3.5 If you notice other unusual problems

If one of the following problems happens, immediately turn off the power switch and disconnect the Power Adapter from the SpaceHarp and from the AC power. Then have the SpaceHarp controller and power supply inspected by SpaceHarp service personnel.

- The power cord or plug becomes frayed or damaged. Replace it.

- The unit or its power adapter emits unusual smells or smoke. Replace it.

- Some object has been dropped into one of the six Sonar Sensor apertures, and which otherwise won't come loose from turning the controller upside down (carefully).

1.7.1.4 Cautions

Always follow the basic precautions listed below to avoid the possibility of physical injury to you or others, or damage to the instrument or other property. These precautions include, but are not limited to, the following:

1.7.1.4.1 Power Supply / Power Cord

- Do not place the power adapter or its cord near heat sources such as heaters or radiators. Also, do not excessively bend or otherwise damage the cord, or place heavy objects on it.

- Do not connect the instrument to an electrical outlet using a multiple-connector. Doing so can result in lower sound quality, or possibly cause overheating in the outlet.

- When removing the DC Power Supply plug from the instrument, always hold the plug itself and not the cord. Pulling by the cord can damage it.

- Remove the Power Adapter's electric plug from the AC outlet when the instrument is not to be used for extended periods of time, or during electrical storms.

1.7.1.4.2 Position and Transportation

- Do not place the instrument in an unstable position where it might accidentally fall over.

- Before moving the instrument, remove all connected cables, to prevent damage to the cables or injury to anyone who might trip over them.

- When setting up the product, make sure that the AC outlet you are using is easily accessible. If some trouble or malfunction occurs, immediately turn off the power switch and disconnect the Power Adapter from the unit. Even when the power switch is turned off, electricity is still flowing to the product at the minimum level. When you are not using the product for a long time, make sure to unplug the Power Adapter's power cord from the wall AC outlet.

1.7.1.4.3   Connections

- Before connecting SpaceHarp to other electronic components, turn off the power for all components. Before turning the power on or off for all components, set all volume levels on Amplified Speakers or Amplifiers to the minimum.

- Be sure to set the volumes of all components at their minimum levels and gradually raise the volume controls while playing the instrument to set the desired listening level.

1.7.1.4.4   Other Cautions

- Never insert or drop paper, metallic, or other objects into the Sonar Sensor apertures. This could cause physical injury to you or others, damage to the instrument or other property, or operational failure.

- Do not rest your weight on, or place heavy objects on the SpaceHarp, and do not use excessive force on the buttons, switches or connectors.

- Do not use the SpaceHarp and its connected digital audio interface or other device using headphones for a long period of time at a high or uncomfortable volume level, since this can cause permanent hearing loss. If you experience any hearing loss or ringing in the ears, consult a physician.

1.7.1.5   Notices

1.7.1.5.1   Specifications Subject to Change

The information contained in this manual is believed to be correct at the time of printing. However, SpaceHarp Corporation reserves the right to change or modify any of the specifications without notice or obligation to update existing units.

1.7.1.5.2   Disposal of Unit

Should this product become damaged beyond repair, or for some reason it's useful life is considered to be at an end, please observe all local, state, and federal regulations that relate to the disposal of products that contain lead, batteries, plastics, etc.

1.7.1.5.3   Repair Service Charges

Service charges incurred due to lack of knowledge relating to how a function or effect works (when the unit is operating as designed) are not covered by the manufacturer's warranty, and are therefore the owner's responsibility. Please study this manual carefully and consult SpaceHarp Corporation before requesting repair service.

1.7.1.5.4   Physical Handling

Do not expose the SpaceHarp controller to excessive dust or vibrations, or extreme cold or heat (such as in direct sunlight, near a heater, or in a car during the day) to prevent the possibility of panel disfiguration, damage to the internal components or unstable operation.

- Do not place vinyl, plastic or rubber objects on the controller, since this might discolor the ABS plastic top panel.

- When cleaning the controller, use a soft and dry/slightly damp cloth. Do not use paint thinners, solvents, alcohol, cleaning fluids, or chemical-impregnated wiping cloths.

1.7.1.5.5 About this Guide

- The figures and computer display screens as shown in the Sound Galaxy User Guide portion of this document are for instructional purposes only, and may look somewhat different from those in your particular system setup.

- Apple, iTunes, Mac, Macintosh, iPhone, iPad and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries.

- iOS is a trademark or registered trademark of Cisco in the U.S. and other countries and is used under license.

- The company names and product names in this manual are the trademarks or registered trademarks of their respective companies.

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1.7.2 Table of all Devices & Parts

TYPE OF ITEM	NUM.	DESCRIPTION	SUB ASSEMBLY INCLLUDES / NOTES
SUB ASSEMBLY	00	Preferred Stand, Boom & Light Assembly	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15a-d,
Loose Part	1	APEX 48 STAND	(Recommended & Supplied in Turn-Key Systems)
Loose Part	2	APEX STAND SOFT CASE	(Recommended & Supplied in Turn-Key Systems)
Loose Part	3	13" TRIBAR ARMS (std)	(Optional Accessory)
Loose Part	4	18" TRIBAR ARMS MODIFIED FOR SPACEHARP	(Supplied with all SpaceHarp Controllers)
Loose Part	5	APEX SUPER CLAMPS	(Recommended & Supplied in Turn-Key Systems)
Loose Part	6	APEX adapter plate	(Recommended & Supplied in Turn-Key Systems)
Loose Part	7	Pro Mic Boom	(Recommended & Supplied in Turn-Key Systems)
Loose Part	8	Cable Clips	(Recommended & Supplied in Turn-Key Systems)
Loose Part	9	quick lock mic adapter (two parts)	(Recommended & Supplied in Turn-Key Systems)
Loose Part	10	PAR-16 LIGHT w BULB and CABLE/dimmer	(Supplied with all SpaceHarp Controllers)
Loose Part	11	Pro Mic Boom Soft Carry Case	(Recommended & Supplied in Turn-Key Systems)
Loose Part	12	SpaceHarp Foam Mounting Wedge	(Supplied with all SpaceHarp Controllers)
Loose Part	13	15-25 lb. Sandbag	(Recommended & Supplied in Turn-Key Systems)
SUB ASSEMBLY	14	Sensor Light, Mic Boom, quick lock	6, 7, 8, 9, 10,11, 15a, 15b, 15c, 15d
Loose Part	15	GEL FILTERS	(Supplied with all SpaceHarp Controllers)
Loose Part	15a	30% ND gel	(Supplied with all SpaceHarp Controllers)
Loose Part	15b	60% ND gel	(Supplied with all SpaceHarp Controllers)
Loose Part	15c	Deep Blue gel	(Supplied with all SpaceHarp Controllers)
Loose Part	15d	Deep Purple gel	(Supplied with all SpaceHarp Controllers)
SUB ASSEMBLY	16	SpaceHarp PEDAL BOARD	16a 16b, 16c, 16d, 16e, 17
Loose Part	16a	Gator T-Bone Pedal Board (board only)	(Recommended & Supplied in Turn-Key Systems)
Loose Part	16b	M-Audio SP-2 Sustain Pedal	(Recommended & Supplied in Turn-Key Systems)
Loose Part	16c	M-Audio EX-P Expression Pedals (2)	(Recommended & Supplied in Turn-Key Systems)
Loose Part	16d	Boss FS-5U Momentary Switches (3)	(Recommended & Supplied in Turn-Key Systems)
Loose Part	16e	1/4" Cables with Color-Coding & Cable Wrap	(Recommended & Supplied in Turn-Key Systems)
Loose Part	17	PEDALBOARD SOFT CASE	(Recommended & Supplied in Turn-Key Systems)
SUB ASSEMBLY	18	4U RACK ASSEMBLY	30, 32, 33, 35, 36, 37, 38, 39
RACK DEVICE	30	Digital Audio Mobile Interface (PreSonus)	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	31	Digital Audio Studio 8x8 Interface (PreSonus)	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	32	WiFi Router	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	33	2x2 USB MIDI Interface	(Recommended & Supplied in Turn-Key Systems)
Loose Part	34	1x1 MIO USB Interface	(Optional Accessory)
RACK DEVICE	35	THUNDERBOLT DOCK	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	36	4U Gator 19" Rack Case	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	37	AC POWER CONDITIONER	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	38	4-HEADPHONE DA (rack)	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	39	1U Rack Shelf	(Recommended & Supplied in Turn-Key Systems)

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Type of Item	NUM.	DESCRIPTION	SUB ASSEMBLY INCLLUDES / NOTES
Loose Part	19	DAW Laptop Computer (MacBook Pro)	(Recommended & Supplied in Turn-Key Systems)
Loose Part	20	9-ft Laptop combined Power and Thunderbolt Cable	(Recommended & Supplied in Turn-Key Systems)
Loose Part	21	External HD Monitor	(Optional Accessory)
Loose Part	22	POWERED SPEAKERS (2)	(Recommended & Supplied in Turn-Key Systems)
Loose Part	23	Wireless Mouse	(Optional Accessory)
Loose Part	24	iPad tablet	(Optional Accessory)
Loose Part	25	iPad mini tablet	(Optional Accessory)
Loose Part	26	HandSonic HPD-15	(Optional Accessory)
Loose Part	27	Hand-held Microphone	(Optional Accessory)
Loose Part	28	Stereo Headphones (wired)	(Optional Accessory)
Loose Part	29	Wireless Microphone System (2 parts: base/headset)	(Optional Accessory)
SUB ASSEMBLY	40	All cables, referred to collectively	(as required per Configuration)
CABLES	40a	Thunderbolt Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40b	TRS Audio Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40c	unbalanced audio Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40d	MIDI (two - to SpaceHarp & to HPD-15)	(Recommended & Supplied in Turn-Key Systems)
CABLES	40e	Edison Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40f	AC Extension Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40g	Microphone XLR Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40h	Firewire Cable (400)	(Recommended & Supplied in Turn-Key Systems)
CABLES	40i	USB 2.0 Cable	(Recommended & Supplied in Turn-Key Systems)
CABLES	40j	THUNDERBOLT ADAPTER Ethernet	(Recommended & Supplied in Turn-Key Systems)
CABLES	40k	THUNDERBOLT ADAPTER Firewire	(Recommended & Supplied in Turn-Key Systems)
SUB ASSEMBLY	41	6U RACK ASSEMBLY	31, 32, 33, 35, 37, 38, 39, 42, 43, 44, 45
RACK DEVICE	42	6U Gator 19" Road Rack Case	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	43	8x8 MIDI Interface (for 6U RACK)	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	44	4-port Ethernet Gigabit Switch	(Recommended & Supplied in Turn-Key Systems)
RACK DEVICE	45	1U Rack Plate	(Recommended & Supplied in Turn-Key Systems)
Loose Part	46	Hot Hand USB Ring	(Optional Accessory)
Loose Part	47	Hot Hand USB Dongle	(Optional Accessory)
Loose Part	48	iPod / iPhone	(Optional Accessory)
Loose Part	49	Android Remotes	(Optional Accessory)
Loose Part	50	Rolling Flight Case for 1 SpaceHarp	(Optional Accessory)
Loose Part	51	Hard-shell carry case for 1 or 2 SpaceHarps	(Optional Accessory)
Loose Part	52	UNIVERSAL SPEAKER STANDS	(Optional Accessory)
Loose Part	53	LAPTOP STAND (for mic stand)	(Optional Accessory)
Loose Part	54	Tablet microphone mount	(Recommended & Supplied in Turn-Key Systems)
Loose Part	55	X_STAND ALTERNATIVE (???)	(Optional Accessory)
Loose Part	56	EXTERNAL DMX LIGHTING COMPUTER	(Optional Accessory)
Loose Part	57	EXTERNAL LASER CONTROL COMPUTER	(Optional Accessory)
Loose Part	58	EXTERNAL VIDEO CONTROL/VISUALIZER COMPUTER	(Optional Accessory)
Loose Part	59	WIRELESS BLUETOOTH HEADPHONES	(Optional Accessory)
Loose Part	60	Mic stand (for Light Boom)	(Optional Accessory)
Loose Part	61	C-Stand (for Light)	(Optional Accessory)

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