KHAV - SL Studio KH HD
Cabling Diagrams & Specifications
Standard Installation using analog cameras (Sony EVI-D70/Sony EVI-D80)

- Adjusted analog video infrastructure to be as simple as possible. Now analog to SDI converters are used in conjunction with two BlackMagic DeckLink Mini Recorders to go SDI-HD as early as possible and make most infrastructure SDI-HD only. This allows future upgrading to native SDI-HD cameras without major infrastructure changes.
- Small corrections on parts lists.
- New network switch that supports future use of HD-SDI cameras with Power Over Ethernet (PoE+) capabilities.
- Adjustments to Thunderbolt connectors to latest USB-C form factor.
    - *If you have an older style Thunderbolt connector on your iMac that is NOT USB-C, please purchase the following equipment in place of what is listed in the "Components List". (Diagram connections are exactly the same.)*
        - *Item #30 - Sonnet Echo Express SE II (ECHO-EXP-SE2)*
        - *Item #301 - Apple 6.6' Thunderbolt Cable (MD861LL/A)*
        - *Item #500 - Cable Matters Mini DisplayPort to HDMI Cable (101019-6)*
- For additional installation information, please visit http://www.teamkh.org/jwd/kb/faq.php?id=90.

Table of Contents

Introduction

This document contains a template for a Kingdom Hall Audio / Video system for combined use by both hearing and sign language congregations. It leverages the same infrastructure so all audiences can benefit from HD video presentations and a modern distribution architecture.

SL Studio KH HD is a modernized version of SL Studio KH that uses the branch recommended SDI-HD infrastructure to distribute the video signal. It also uses a professional studio grade HDMI/SDI-HD video mixer to provide crossfaded switching between camera feeds and media. All media stays digital, delivering the quality that is available for download from jw.org without degradation.

SL Studio KH HD is a single application with the following integrated features:
- Seamless semi-automatic switching between camera feeds for stage, audience, and media using crossfading.
- Support for controlling studio grade PTZ cameras. Perfectly framed audience participants can be switched on screen in less than 4 seconds using seating overlay presets and nose-pointing technology.
- Automatic blackout for fast camera movements when presets are selected and that camera is live.
- Automatic switching to stage camera after media finishes playing.
- One button update and synchronization of approximately 400GB of media for sign language publications (by using companion SL Studio Media Updater app).
- Simple selection of media by just typing in the desired scripture(s), ranges of scriptures, song numbers, publications (book abbreviation, chapter, paragraph), magazine (article, paragraph(s), question).
- Drag & drop capability for media, including pictures and all other media types supported (JPG, PNG, GIF, PDF files, etc.).
- Create playlists by adding currently selected media to the list (one button add), or drag & drop media onto the playlist to enter it. Playlists can be saved and used at a later time on all SL Studio systems in KHs and AHs, and even other KHAudio systems.
- Import text file list of needed media into playlists for ultra fast and light weight meeting part setup.
- Full scrolling capability through selected media. Select chapters within a media file from scrollable list (media chapters can be verses in a bible chapter, or paragraphs in a publication). Single step frames. Set frame accurate In/Out points of media for playback (allows you to play portions of a verse or any point that is not on a media chapter boundary).
- Step through playlist for presentation. Skip over or backup any entry in the playlist. Select different media in addition to the playlist entries and then simply continue with the rest of the playlist. Allows for dynamic changes if needed.
- All equipment controlled, configured and switched on/off automatically using a single click by the operator (assuming controllable devices are used).

KHAudio/Video is a single application with the following integrated features:
- Microphone signal mixing (up to 16 channels).
- Song, background music and external track playback.
- Recording to date/time stamped MP3 files.
- Internet based conferencing for homebound or isolated publishers, eliminating old style telephone lines.
- Video, slides and streaming media playback.
- Playlist handling for more complex presentations (compatible with KHAV Playlist Editor, SL Studio Personal/Group/KH/AH and Cobalt Sound System for AHs).
- Direct digital audio connections to KHs on same network (double KHs) or over internet for overflow situations or special programs.
- Fully configurable audio processing including dynamic voice compression, parametric filtering, equalization, bandpass filtering, telephone compression, FM compression, delays, etc.
- Optional auto-gating and auto-mixing (avoiding unnecessary feedback).
- Specific features for KH use like Auto Mute Roving Mics, Auto Recording & Splitting, Auto Conference Connection, etc.
- KHConf and MetroConf real-time callers list and count.
- Fast setup and configuration with built-in spectrum analyzer.
- Full integration with SL Studio KH, leveraging video equipment already present in KHs with sign language congregations.
- Optional integration with the KH Control System, automatic shutdown of equipment, lighting controls for media presentations.

In this document you will find all the necessary schematics (following branch recommended video infrastructure) for a completely integrated system, along with routing schemes, components lists, cable lists, etc. Budgeting can be derived from these lists by researching the given part numbers or other specs. Many components can be viewed as optional (dashed outlines) and you can mix and match your specific configuration to your needs. If your KH happens to have an SL Studio KH system and/or a KH Control system, then KHAudio can be configured to integrate with those systems, leveraging the already installed infrastructure. This can be useful for automatically switching off lights that interfere with certain presentations, switching certain equipment or sharing video equipment. In such cases all equipment can be controlled from within the KHAudio application. No running around with IR remotes etc.

Network Cabling Infrastructure

The system uses an Ethernet network to allow for fast pre-meeting media downloads, presentation control from the KHAV Player app (see Apple App Store), and integration with SL Studio KH, the KH Control System and/or other equipment controllers and devices. IP controllable monitors can be turned on and properly configured by KHAudio if such protocols are publicly available (coming soon). For equipment that is controllable over serial connections, KHAudio will use the CAMX Controller to control such equipment. Any KHs that have SL Studio KH, already have such controller. The older CAMC Controller is not sufficient for SL Studio HD installations.

The network connections are also leveraged for Voice over IP (VOIP) based telephone connections to conferencing systems like KHConf or MetroConf.

All network cabling and components to be installed for 1 Gb infrastructure.
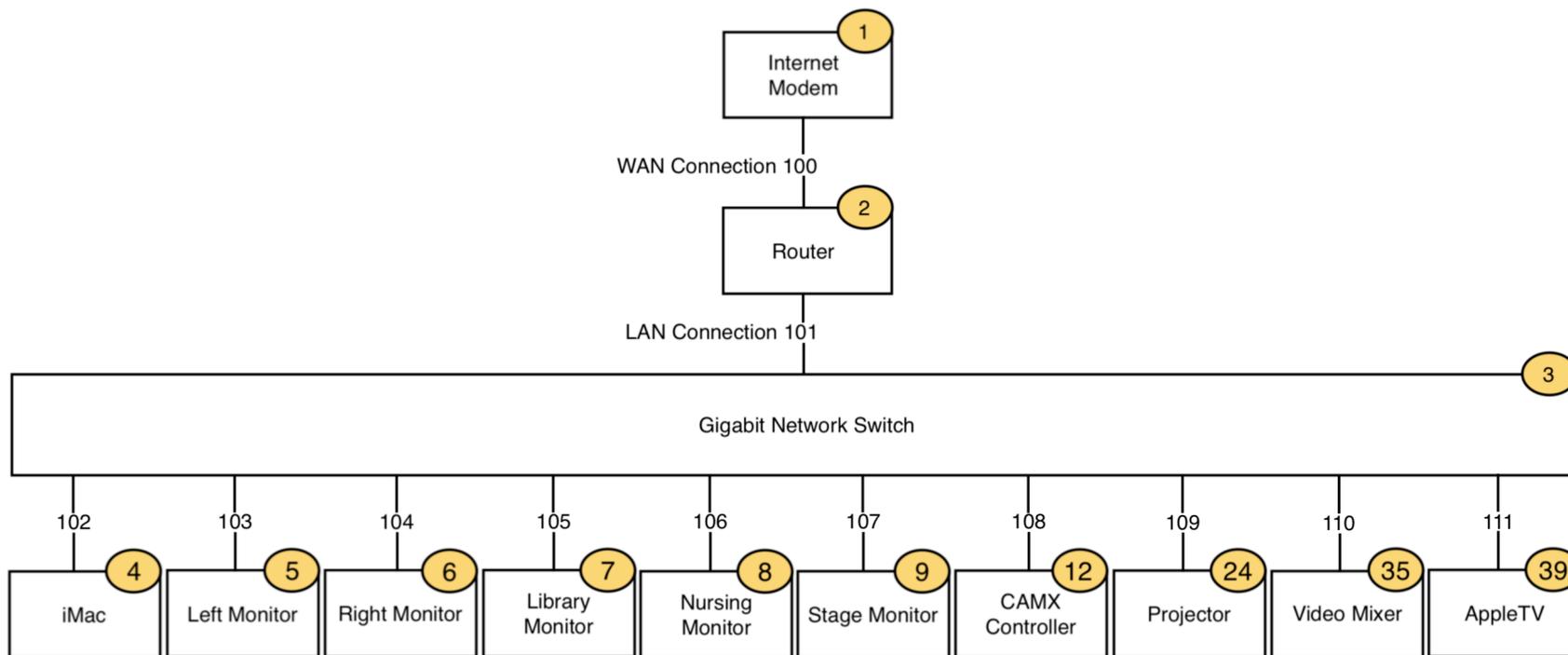
Audio Cabling Infrastructure
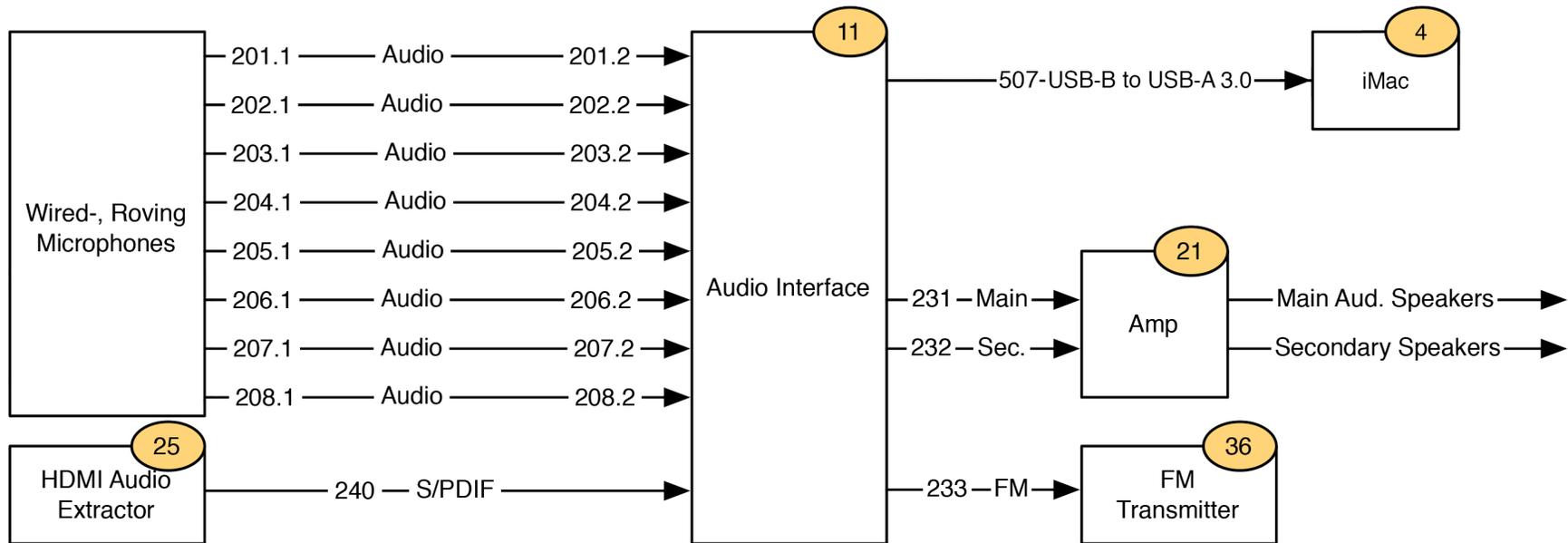
- Conferencing connections to services like KHConf and MetroConf are all established using internet connections. No need for telephone interfaces.

- Recording is handled in software. No need for recording equipment.

- Playback of songs, background music in multiple languages and external tracks is handled in software. No need for playback equipment.

- All mixing, sound processing, filtering, etc is done in software. No need for external mixers or sound processing equipment other than an interface and an amp.

- Very straightforward microphone to interface wiring and interface to amplifier and FM transmitter wiring (virtually the only analog wiring).

- Very simple configuration. Templates can be copied from KH to KH. Backup of a complete KH setup can be saved in seconds.

Video Cabling Infrastructure
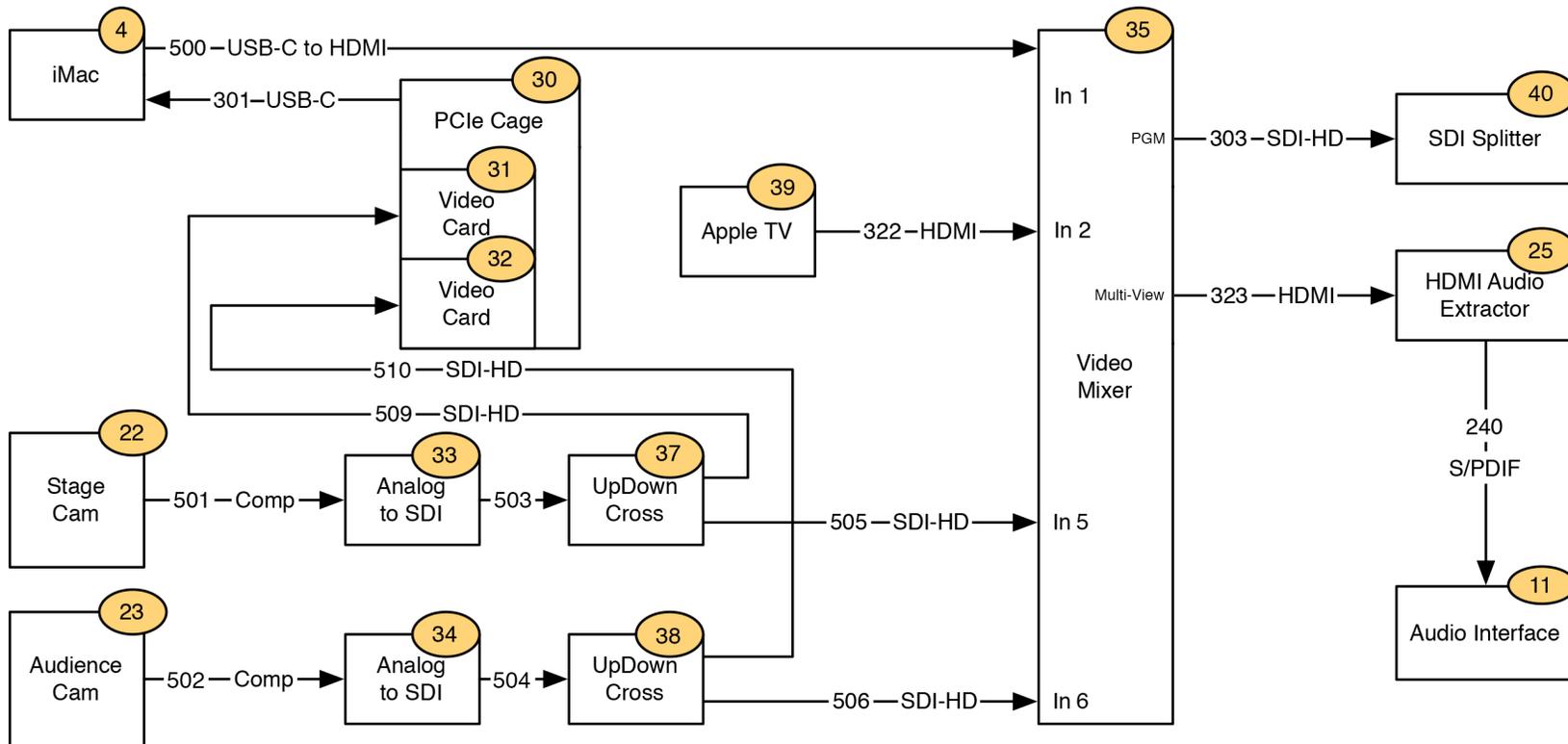
Video System Diagram

- All presentation of video tracks, still pictures, year texts, lyrics, external audio tracks, and streaming content is handled in KHAudio or SL Studio KH HD. No need for other software or equipment.

- See cabling specs in tables below.

  - All HDMI cables facilitate short connections inside the A/V console (so short cables).

  - All projection devices have their own SDI-HD feed reducing the possibility of a single point of failure.

  - Audio embedded in video tracks will be routed from HDMI audio extractor to audio interface input.

Video Distribution Diagram
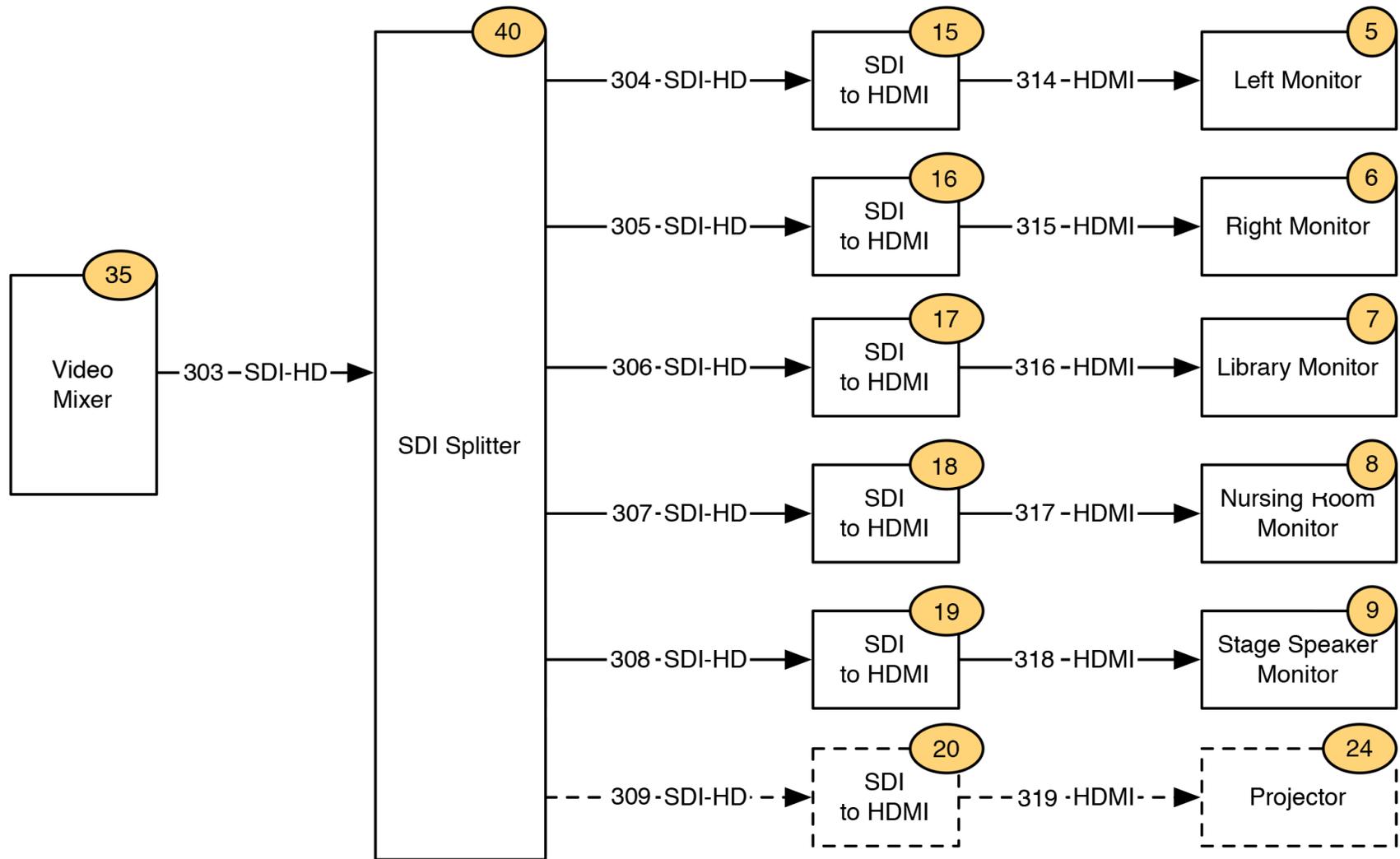
- Splitter at A/V operator console, SDI-HD cabling using spec'd cables to monitor/projector destinations. See cable routing diagrams.
- All HDMI cables facilitate connection from SDI to HDMI converter to projector and/or monitors only (they should be very short).

CAMX Controller Wiring

22 Stage Camera	— 401 — RS-422 —
23 Audience Camera	— 402 — RS-422 —
5 Left Monitor	— 403 — RS-232 —
6 Right Monitor	— 404 — RS-232 —
24 Projector	- · 405 - RS-232 - - -
7 Library Monitor	— 406 — RS-232 —
8 Nursing Room Monitor	
9 Stage Monitor	

12 CAMX Controller

- - - 408 - - Dry Contacts - - - - **24** Projection Screen
- - - 409 - 24VDC Controls - - - **26** Lighting Relays
- - - 411 - - Dry Contacts - - - - Mic Stand
- - - 410 - 24VDC Controls - - - **27** Manual Override Push Buttons
- - - 407 - - DMX-512 - - - - Stage Lighting

Control System Diagram

- During or before the meeting all equipment can be turned on with a single click of the "Equipment On" button. Monitors/projector will come on with the proper video input, resolution, aspect ratio, etc selected.

- When done, a click of the "Equipment Off" will pull up the screen, turn off the stage lights, turn monitors and projectors off.

- During the meetings, no commercials will appear as KHA/V or SL Studio will keep the monitors/projectors in blackout until actual media is presented. After a video track has ended or the speaker proceeds from a still picture, the screens will fade to black or to the current year text.

- When enabled, the year text in the selected language for the meeting will appear after a configurable time when no media is being shown.

- When enabled, lyrics will show up automatically in the selected language for the meeting in sync with the song being played. As the lyrics file format is lightweight rich text document (RTF) based, it can be easily extended for any language.

- If available in your language, branch supplied .mp4 lyric videos are compatible with KHA/V and with proper configuration will be shown instead of the standard lightweight lyrics.

- Mic stand controls with up/down controls from the main panel of KHA are supported on output 4 (up) and output 5 (down).

- Alternatively equipment and lighting can be controlled directly from push buttons behind the stage wall (optional install). This allows for extra redundancy.

CAMX Control Board (12)
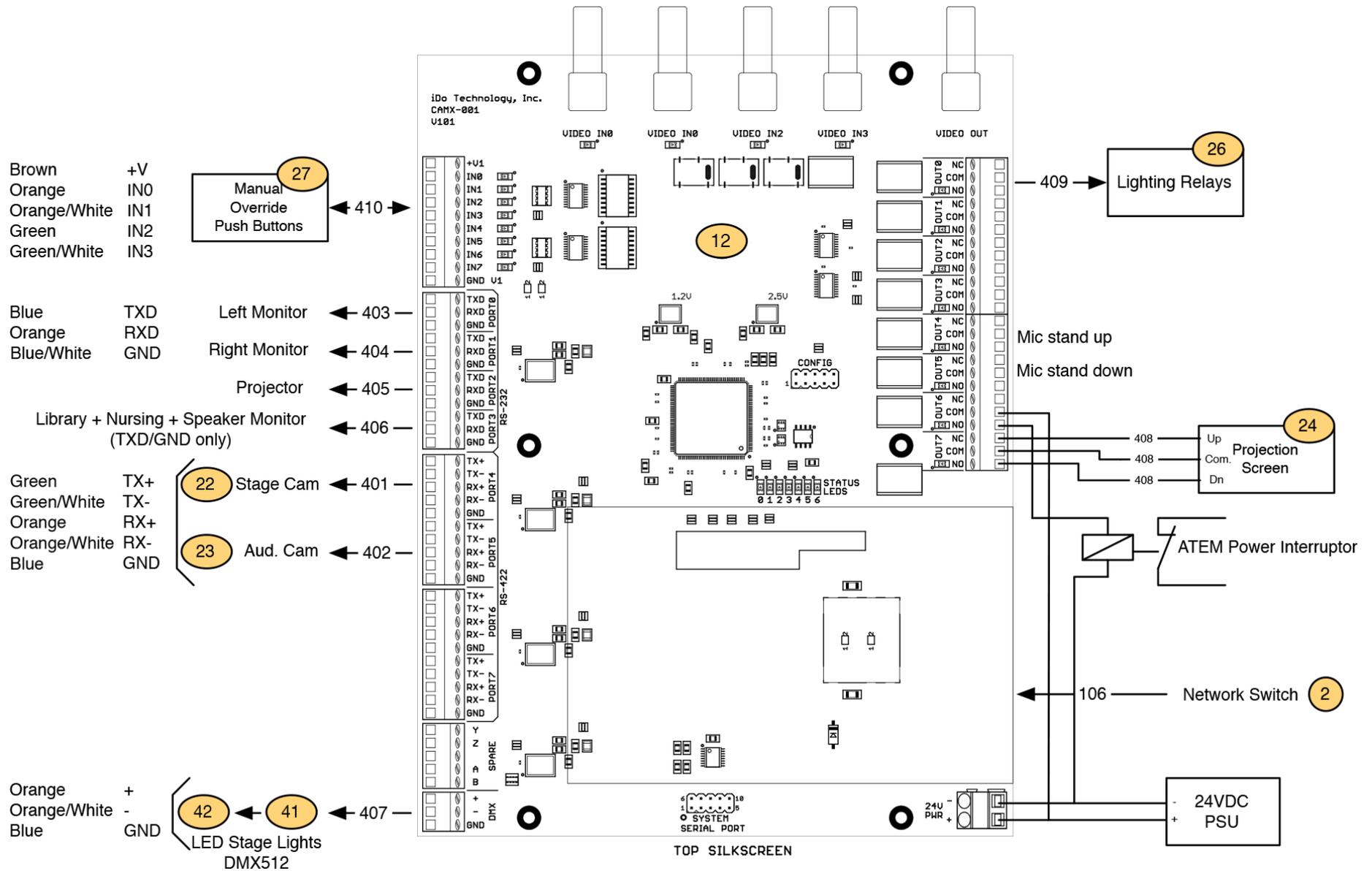
A/V System Locations & Cable Routing

A/V Console

Controller / Network Gear (behind stage)

iMac

Audio Interface

Amp

HDMI Audio Extractor

Video Mixer

SDI Splitter

Apple TV

Cat5e: 102 111

Stage Left

RG6: 304

Left Monitor

Cat5e: 103 403

Stage Right

RG6: 305

Right Monitor

Cat5e: 104 404

Stage Center

RG6: 502

Audience Camera

Cat5e: 104 402 404

Auditorium Ceiling

RG6: 501 309

Stage Camera

Projector

Cat5e: 107 401 405

Internet Modem

Router

Network Switch

CAMX Controller

A/V Console

- iMac
- Audio Interface
- Amp
- HDMI Audio Extractor
- Video Mixer
- Apple TV
- SDI Splitter

Library

RG6: 306 — Library Monitor

Nursing Room

RG6: 307 — Nursing R. Monitor

Stage Overh.

RG6: 308 — Speaker Monitor

Cat5e: 406
Cat5e: 406

Cat5e: 105 406
Cat5e: 106
Cat5e: 107

Controller / Network Gear (behind stage)

- Internet Modem
- Router
- Network Switch
- CAMX Controller

Cat5e: 407 408 409 410

Misc. Controls

- Projection Screen
- Override Buttons
- Lighting Relays
- LED Stage Lighting
- Mic Stand

Components List

A/V System Components

Item Numbers	Description	Manufacturer	Man. Part Nr	Supplier	Min. Amount
	Network components				
1	Internet modem (delivered by provider but might need to be replaced with a real modem. Don't accept routers unless configured to be modems)				
2	Router	Synology	RT1900AC	B&H PhotoVideo	1
3	16 port 1 Gb POE network switch	Linksys	LGS116P	B&H PhotoVideo	1
	Cat5e Cable	Belden	Belden 1213		
	OR: Cat5e Cable	Belden	Belden 1583A		
	RJ45 Connectors - RJ45 CAT-5E				20
	Audio/Video components				
11	Digital Audio Workstation Interface	Zoom	UAC-8	B&H PhotoVideo	1
21	Amplifier				
36	FM Transmitter				
25	HDMI to S/PDIF (RCA Coax) Audio Extractor	Tendak	4K HDMI Audio Extractor	Amazon	1
22,23	Stage + Audience Camera	Sony	EVI-D80		2
30*△	Thunderbolt 3 PCIe Cage	Sonnet	ECHO-EXP-SE3-T3	B&H PhotoVideo	1
31,32*	Decklink Mini Recorder	BlackMagic	BDLKMINIREC	B&H PhotoVideo	2
33,34	Analog to SDI converter	BlackMagic	CONVMAAS2	B&H PhotoVideo	2
37,38	UpDownCross converter	BlackMagic	CONVMUDC	B&H PhotoVideo	2
301□	Thunderbolt 3 (USB-C)	Apple	MQ4H2AM/A	Apple Store	1
500†	USB-C to HDMI	CHOETECH	B01LYS3Q5A (or similar)	Amazon	1
507	USB-B to USB-A Cable 3.0	Cable Matters	B00C7RZPJ0 (or similar)	Amazon	1
35	ATEM Television Studio HD	BlackMagic	SWATEMTVSTU/HD	B&H PhotoVideo	1

Item Numbers	Description	Manufacturer	Man. Part Nr	Supplier	Min. Amount
40	SDI Distribution	BlackMagic	CONVMSDIDA	B&H PhotoVideo	1
15,16,17,18,19, 20	SDI to HDMI converter	BlackMagic	CONVCMIC/SH	B&H PhotoVideo	5
314, 315, 316, 317, 318, 319, 322, 323	HDMI Cable 8 ft (shorter possible if SDI to HDMI converters planned close or behind equipment)				11
5,6	LCD/LED Flatscreen Monitor (65"+), preferably RS232 controllable with published protocols. (Samsung MU7, MU8, or MU9 series TVs.)	Samsung or LG (Not all RS-232 compatible)	UN65MU7000FXZA or similar w/ Ex-Link if Samsung	B&H PhotoVideo	2
9,10	LCD/LED Flatscreen Monitor (65"+), preferably RS232 controllable with published protocols. (Samsung MU7, MU8, or MU9 series TVs.)	Samsung or LG (Not all RS-232 compatible)	UN40MU7000FXZA or similar w/ Ex-Link if Samsung	B&H PhotoVideo	2
29	LCD/LED Flatscreen Monitor (65"+), preferably RS232 controllable with published protocols. (Samsung MU7, MU8, or MU9 series TVs.)	Samsung or LG (Not all RS-232 compatible)	HG22NE690ZFXZA or similar w/ Ex-Link if Samsung	B&H PhotoVideo	1
303,304,305, 306,307,308, 309,501,502, 503,504,505, 506,509,510	RG6 Cable - Belden 1694A (non plenum) or 1695A (plenum)	Belden	1694A/1695A	Belden	as needed
	BNC Connectors	Belden	FSNS6BNCU (1694A) or FSNS6BNCPL (1695A)		30+
	RCA Connectors				5
240	RCA to RCA S/PDIF cable			Amazon	1
	CAMX Controller components				
12	A/V Equipment Controller	iDo Technology	CAMX (Cannot be CAMC)	iDo Technology	1
	Power Supply 24V (for Cam Controller)	Meanwell	DR-60-24		1
	3.5mm Male Jack for Soldering	Timibis	B01AYB3NLC	Amazon	3?
	Stage lighting components				

Item Numbers	Description	Manufacturer	Man. Part Nr	Supplier	Min. Amount
41,42	LED wash light, controllable color and intensity	Chauvet	SLIMPARPROWUSBWHT	B&H PhotoVideo	2
	XLR 3 pin male				2
	XLR 3 pin female				2
	120 Ohm 1/4W Carbon Resistor				2
	Computer components				
4	**KHAudio + SL Studio KH HD:** 27-inch iMac Retina 5K display, 3.4GHz quad-core Intel Core i5 16GB 2400MHz DDR4 1 TB Fusion Drive Magic Mouse 2 Magic Keyboard **with Numeric Keypad** (English)	Apple		Apple Store	1
39	AppleTV	Apple		Apple Store	1

Using a multi-slot PCIe cage and two separate cards for camera previews is by far the best solution. However, if you currently have a single slot Thunderbolt PCIe cage in connection with the original standard-definition version of SLS and NEED to reuse this item, please contact the support team at www.teamkh.org/jwd for a card recommendation in place of the Mini Recorders. This will only reduce cost for systems that already have a Thunderbolt PCIe cage, and will not benefit new installations.

If you have an older style Thunderbolt connector on your iMac that is NOT USB-C, please purchase the following equipment in place of what is listed in the "Components List". (Diagram connections are exactly the same.)
△#30 - Sonnet Echo Express SE II (ECHO-EXP-SE2)
▢#301 - Apple 6.6' Thunderbolt Cable (MD861LL/A)
† #500 - Cable Matters Mini DisplayPort to HDMI Cable (101019-6)

Specifications - Cat5e Cabling

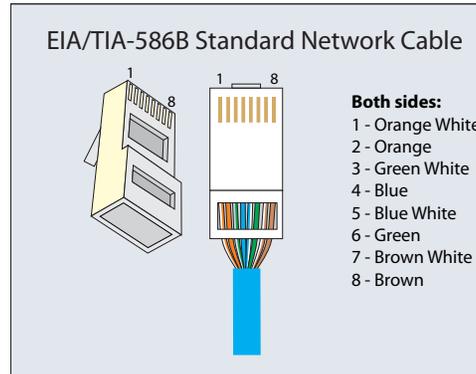| CableID	Type	Signal	.1 Device (From)	.1 Connector	.2 Device (To)	.2 Connector
100	Cat5e	1G Ethernet	Internet Modem (1)	RJ45	Router (2)	RJ45
101	Cat5e	1G Ethernet	Router (2)	RJ45	Gigabit Internet POE Switch (3)	RJ45
102	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	iMac (4)	RJ45
103	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Left Monitor (5)	RJ45
104	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Right Monitor (6)	RJ45
105	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Library Monitor (7)	RJ45
106	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Nursing Monitor (8)	RJ45
107	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Stage Monitor (9)	RJ45
108	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	CAMX Controller (12)	RJ45
109	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Projector (24)	RJ45
110	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ45	Video Mixer (35)	RJ45
111	Cat5e	1G Ethernet	Gigabit Internet POE Switch (3)	RJ46	Apple TV (39)	RJ46
401	Cat5e	RS422	CAMX Controller		Stage Camera (22)	Phoenix 9 pin
402	Cat5e	RS422	CAMX Controller		Audience Camera (23)	Phoenix 9 pin
403	Cat5e	RS232	CAMX Controller		Left Monitor (5)	
404	Cat5e	RS232	CAMX Controller		Right Monitor (6)	
405	Cat5e	RS232	CAMX Controller		Projector (24)	
406	Cat5e	RS232	CAMX Controller		Library + Nursing + Speaker (daisy chained)	
407	Cat5e	DMX512	CAMX Controller		First LED Stage Light	Female XLR
408	Cat5e	Controls	CAMX Controller		Projection Screen (24)	
409	Cat5e	Controls	CAMX Controller		Lighting Relays (26)	
410	Cat5e	Controls	CAMX Controller		Manual Override Push Buttons (27)	
411	4x18 AWG	Controls	CAMX Controller		Mic Stand Up/Down	

Specifications - Audio/Video Cabling

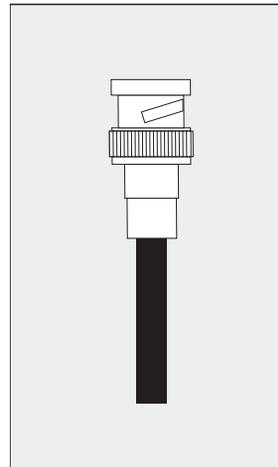| CableID	Type	Signal	Part Number	Approx Length (ft)	.1 Device (From)	.1 Connector	.2 Device (To)	.2 Connector	Notes
501	RG6	Composite	Belden 1694A	??	Stage Cam (22)	RCA	Analog to SDI Converter (32)	BNC	
503	RG6	SDI-SD	Belden 1694A	??	Analog to SDI Converter (33)	BNC	UpDownCross (37)	BNC	
505	RG6	SDI-HD	Belden 1694A	3	UpDownCross (37)	BNC	Video Mixer (35)	BNC	
509	RG6	SDI-HD	Belden 1694A	3	UpDownCross (37)	BNC	DeckLink Mini Recorder (31)	BNC	
502	RG6	Composite	Belden 1694A	??	Audience Cam (23)	RCA	Analog to SDI Converter (34)	BNC	
504	RG6	SDI-SD	Belden 1694A	3	Analog to SDI Converter (34)	BNC	UpDownCross (38)	BNC	
506	RG6	SDI-HD	Belden 1694A	3	UpDownCross (38)	BNC	Video Mixer (35)	BNC	
510	RG6	SDI-HD	Belden 1694A	3	UpDownCross (38)	BNC	DeckLink Mini Recorder (32)	BNC	
303	RG6	SDI-HD	Belden 1694A	??	Video Mixer (35)	BNC	SDI Distribution (40)	BNC	
304	RG6	SDI-HD	Belden 1694A	??	SDI Distribution (40)	BNC	SDI to HDMI Converter (15)	BNC	
305	RG6	SDI-HD	Belden 1694A	??	SDI Distribution (40)	BNC	SDI to HDMI Converter (16)	BNC	
306	RG6	SDI-HD	Belden 1694A	??	SDI Distribution (40)	BNC	SDI to HDMI Converter (17)	BNC	
307	RG6	SDI-HD	Belden 1694A	??	SDI Distribution (40)	BNC	SDI to HDMI Converter (18)	BNC	
308	RG6	SDI-HD	Belden 1694A	??	SDI Distribution (40)	BNC	SDI to HDMI Converter (19)	BNC	
309	RG6	SDI-HD	Belden 1694A	??	SDI Distribution (40)	BNC	SDI to HDMI Converter (20)	BNC	
500	USB	HDMI	B01LYS3Q5A	6	iMac (4)	USB-C	Video Mixer (35)	HDMI	
507	USB 3.0	AUDIO	B00UXKTJE0	3	Zoom UAC 8 (11)	USB-B	iMac (4)	USB-A	
301	USB-C	VIDEO	MQ4H2AM/A	3	PCIe Cage (30)	USB-C	iMac (4)	USB-C	
322	HDMI	HDMI		3	Apple TV (39)	HDMI	Video Mixer (35)	HDMI	
323	HDMI	HDMI		3	Video Mixer (35)	HDMI	Audio Extractor (25)	HDMI	
314	HDMI	HDMI		3	SDI to HDMI Converter (15)	HDMI	Left Monitor (5)	HDMI	
315	HDMI	HDMI		3	SDI to HDMI Converter (16)	HDMI	Right Monitor (6)	HDMI	
316	HDMI	HDMI		3	SDI to HDMI Converter (17)	HDMI	Library Monitor (7)	HDMI	
317	HDMI	HDMI		3	SDI to HDMI Converter (18)	HDMI	Nursing Monitory (8)	HDMI	
318	HDMI	HDMI		3	SDI to HDMI Converter (19)	HDMI	Stage Monitor (9)	HDMI	
319	HDMI	HDMI		3	SDI to HDMI Converter (20)	HDMI	Projector (24)	HDMI	
240	S/PDIF	S/PDIF		3	HDMI Audio Extractor (25)	RCA	Audio Interface (11)	RCA	

Cable Termination

Cat5e Cable Terminations
Each end an RJ45 connector except connections 403,404, and 406 if using RS-232 to control TVs.

EIA/TIA-586B Standard Network Cable

Both sides:
1 - Orange White
2 - Orange
3 - Green White
4 - Blue
5 - Blue White
6 - Green
7 - Brown White
8 - Brown

RG6 Video Cable Terminations
Each end a BNC connector:

DMX512 Terminations

One male and one female connector, except connection to CAMX Controller(12) 407.

FEMALE END
REAR VIEW OF
XLR CONNECTOR

1 - GROUND
2 - NEGATIVE
3 - POSITIVE

MALE END
REAR VIEW OF
XLR CONNECTOR

"DMX IN" CONNECTION

"DMX OUT CONNECTION"

CAT5e CABLE

RS232 Connections Using 3.5MM Jack For LG Monitors

SOLDER CONNECTIONS TO 3.5MM JACK

403/404/406

1.RXD
2.TXD
3.GND
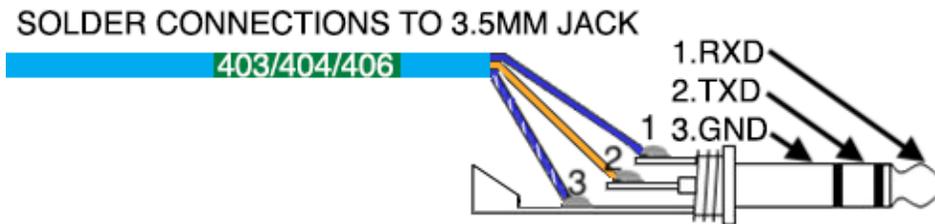
RS232 Connections Using 3.5MM Jack For Samsung Monitors

SOLDER CONNECTIONS TO 3.5MM JACK

403/404/406

1.TXD
2.RXD
3.GND
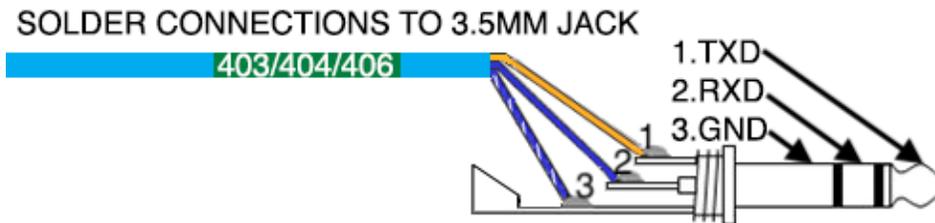
Main Component Connections
iMac (4)
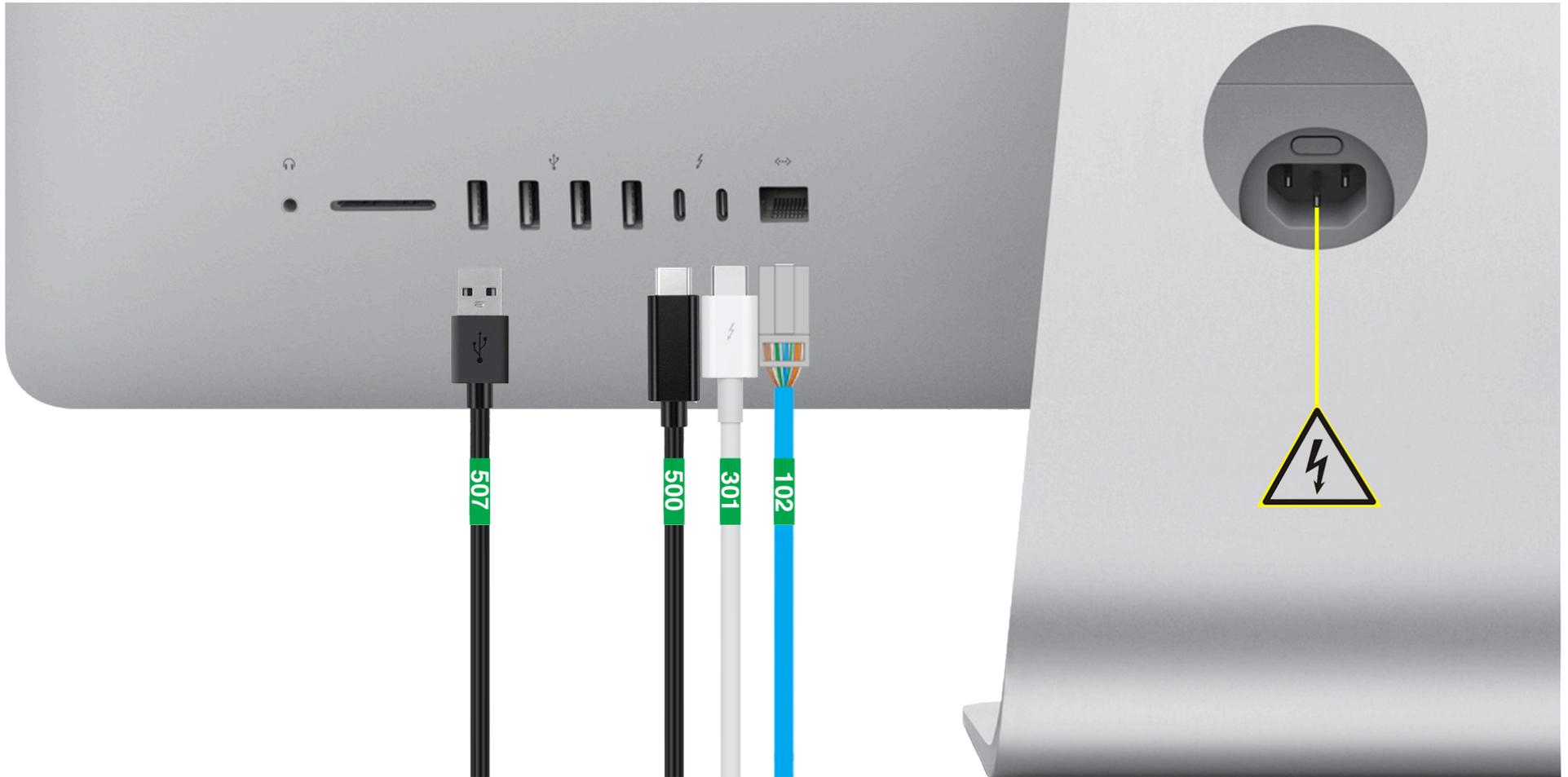
Zoom UAC-8 (11)

Sony EVI-D80 Camera (22,23)

12 VDC

401/402

501/502

D30 MODE	IR OUT	RS 422	36400 bps
OFF	OFF	RS 232C	9600 bps
1	2	3	4

1 2 3 4

Sony EVI-D70
Phoenix Connector

9 8 7 6 5 4 3 2 1

Sony EVI-D70
Phoenix Connector

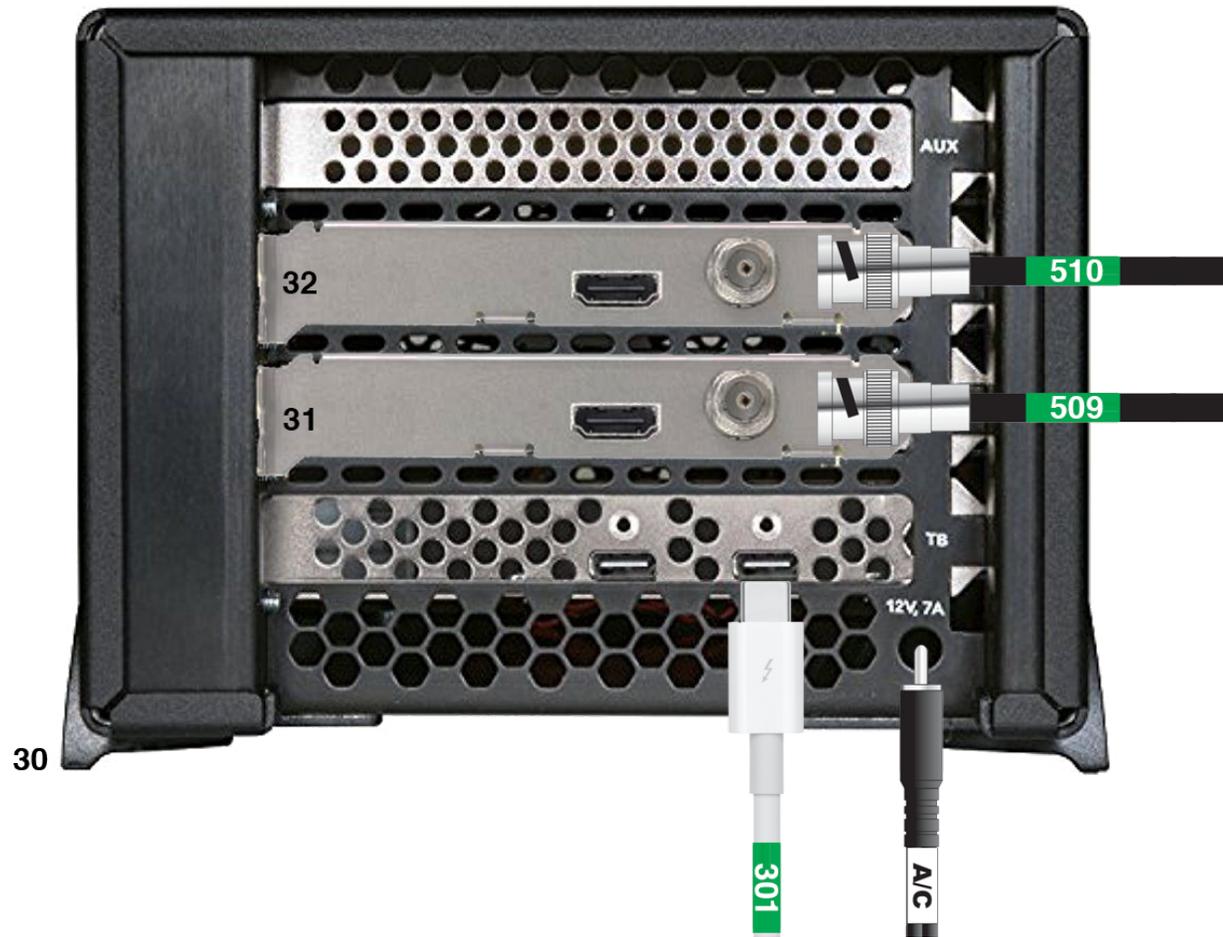|	Signal	Pin
OR-WH	TX IN-	1
ORANGE	TX IN+	2
GRN-WH	RX IN-	3
GREEN	RX IN+	4
BLUE	GND	5
	TX OUT-	6
	TX OUT+	7
	RX OUT-	8
	RX OUT+	9
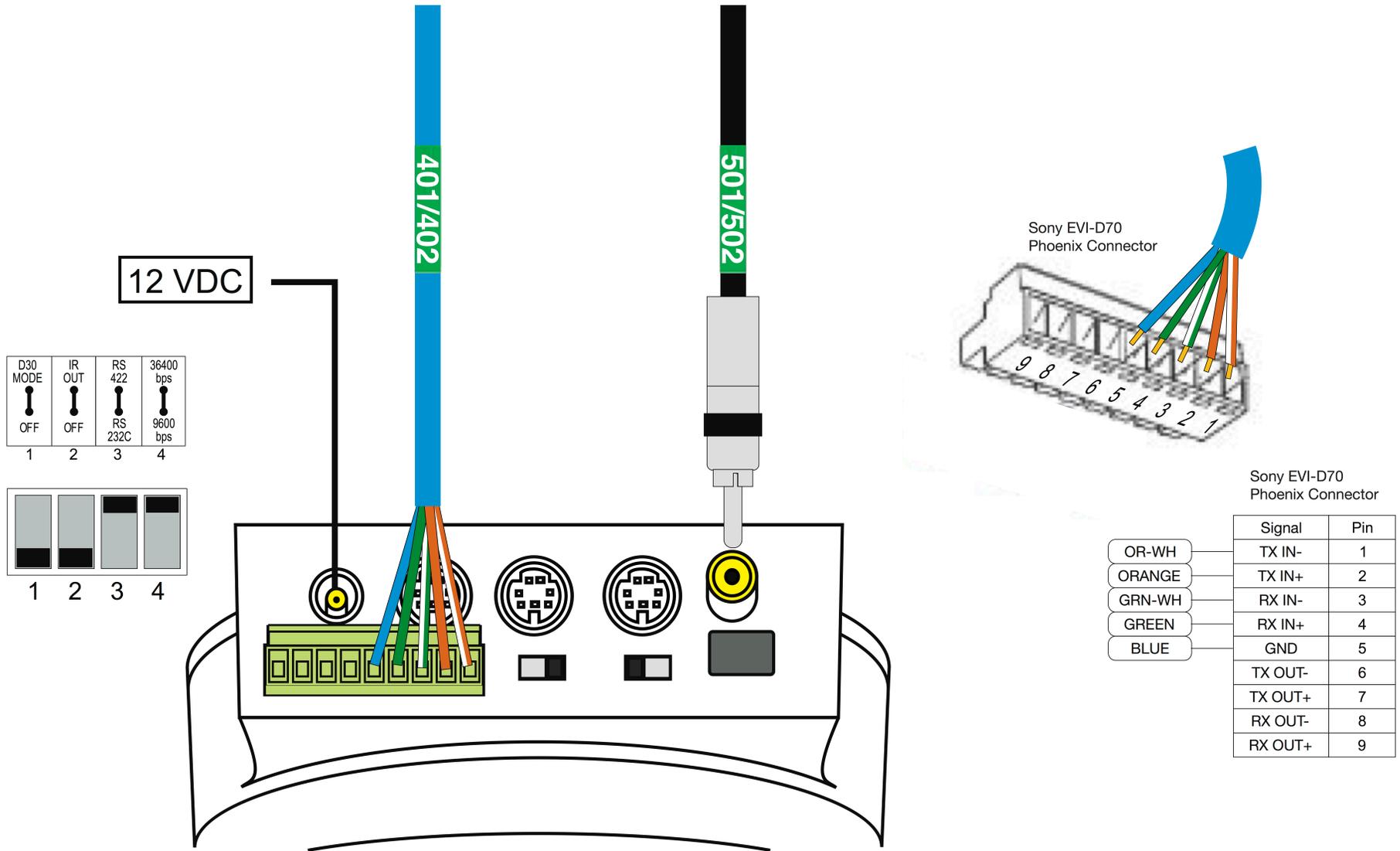
HDMI Audio Extractor (25)

Sonnet Echo Express SEIII (30)
Decklink Mini Recorders (31,32)
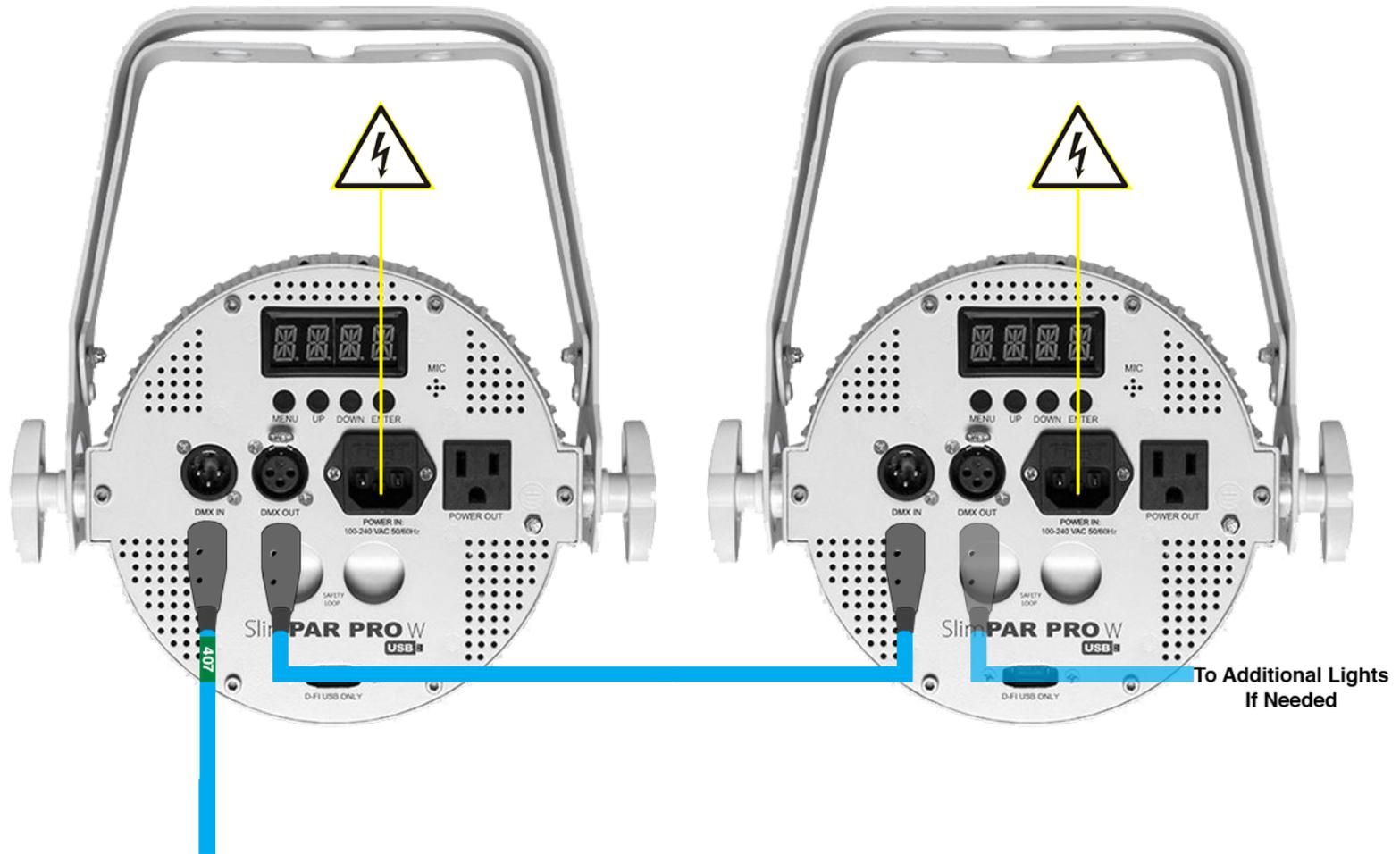
ATEM Television Studio HD (35)

ATEM Inputs
1. iMac Media HDMI feed (cable 500)
2. Apple TV / External HDMI feed (cable 322)
3. Empty
4. Empty
5. Stage Camera SDI-HD feed (cable 505)
6. Audience Camera SDI-HD feed (cable 506)
7. Empty
8. Empty

SDI Output PGM to be connected to SDI Distribution (40) device using cable 303.
Multi-View HDMI output to be connected to HDMI Audio Extractor (25) using cable 323.

LED Stage Lights (41,42)

For lighting setup within SL Studio please see the article found at http://www.teamkh.org/jwd/kb/faq.php?id=85.

To Additional Lights If Needed

BlackMagic SDI Converters
Blackmagic Mini Converter:Analog to SDI (33,34)

501/502

Y or NTSC/PAL

B-Y or S-VIDEO Y

R-Y or S-VIDEO C

L - ANALOG or AES/EBU

R - ANALOG

Blackmagicdesign

Mini Converter
Analog to SDI

SDI OUT

503/504

SDI OUT

POWER
+12V

A/C

↓1 2 3 4 5 6 7 8

BlackMagic Mini Converter:UpDownCross (37,38)

- Select either 4:3 for the camera aspect ratio.
  - 4:3 is the native resolution and will have black bars on either side of the image.
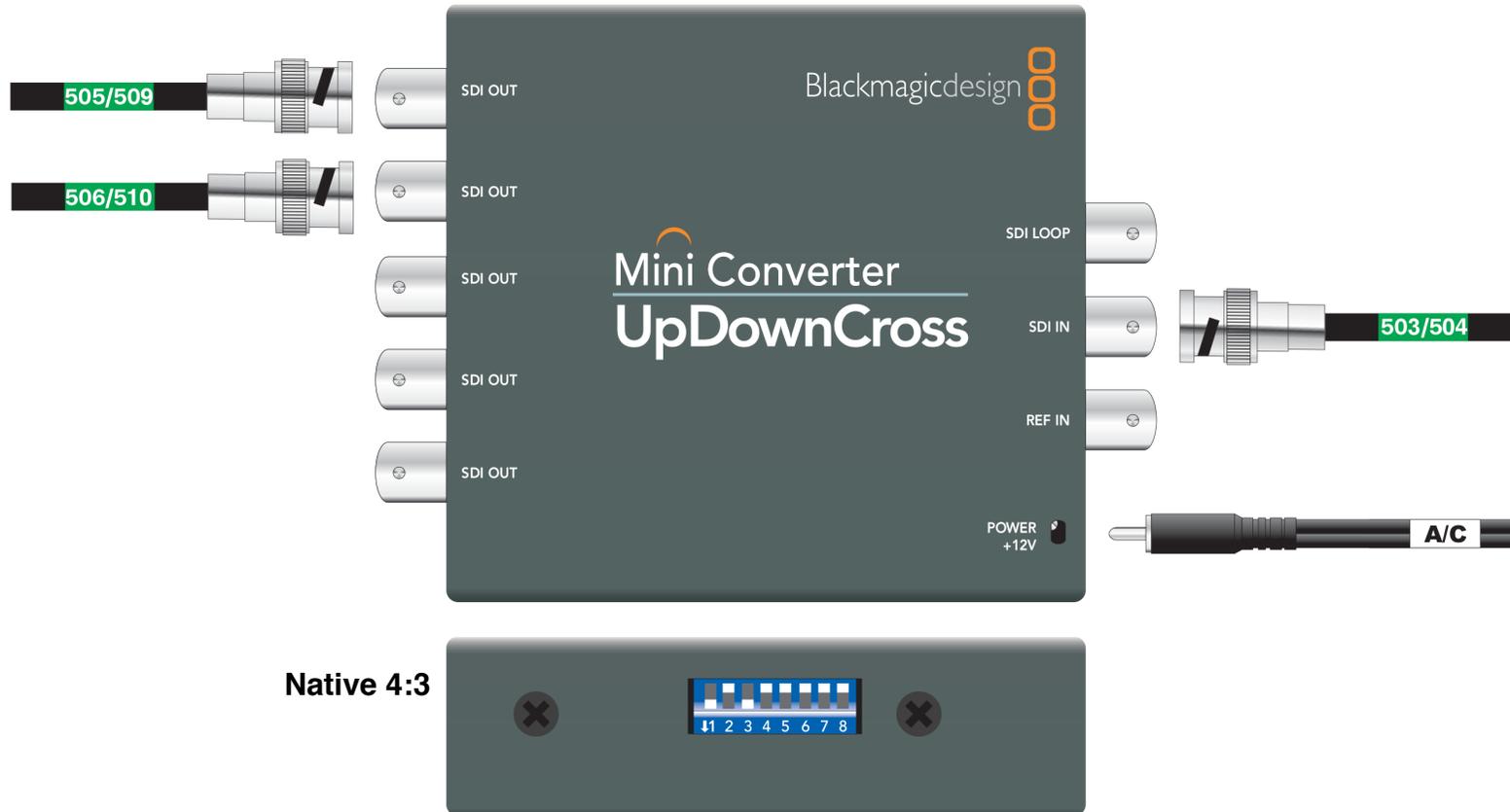
BlackMagic Mini Converter:SDI Distribution (40)
The SDI Distribution (40) device can potentially be eliminated from your installation. There are two possible alternatives:
  1. The ATEM HD (35) has 5 SDI outputs. Each output could be directly connected to the SDI to HDMI converters.

2. The SDI to HDMI converters have a "Loop-Out" function. The converters can be daisy-chained to one another in a series.
   - If one device in the chain ever looses signal or connectivity, it will affect all monitors downstream from that device.
3. A combination of the first two options could also be employed. The most important monitors could receive their own feed with less critical feeds, such as the library monitor, receiving a "Loop-out" from one of the primary monitors.

**BlackMagic Micro
Converter:SDI to HDMI**

(15,16,17,18,19,20)

304-309

LOOP OUT
OPTIONAL OUTPUT
TO ADDITIONAL MONITOR

Blackmagicdesign

MicroConverter
SDI to HDMI

SDI IN

SDI LOOP OUT

HDMI OUT

A/C

314-319