

James Turrell's *Twilight Epiphany* Skyspace Audio Specifications

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SYNOPSIS OF THE TURRELL SKYSPACE SOUND SYSTEM

The integrated audio system in *Twilight Epiphany*, the James Turrell Skyspace, consists of twelve [Amina AIW5X](#) in-wall loudspeakers (protected by [Amina APU2](#) limiters) and two [Technomad Soho IP56](#) subwoofers. Product data sheets for these speakers and limiters are included in this packet. Audio signals can be routed into the system using analog or digital inputs (via [CobraNet](#)) and are processed by a [BiAmp Flex](#) digital audio system before routing to the loudspeakers.

Digital and analog audio inputs to the system may be accessed from within the Skyspace or from the control room (see signal flow document). For live concert-length works, REMLABS can provide a [Yamaha LS9](#) mixer to convert digital audio from the Dante Virtual Soundcard (DVS) into Cobranet. For installation works that run over the course of hours or days, the system may be accessed using the [Focusrite RedNet2](#) Audio interface. While this option foregoes the LS9 mixer, it still supports the Dante protocol. The Turrell Skyspace Speaker Setup diagram shows the default speaker number mappings for both the analog and digital systems.

Both the DVS and Dante Controller must be installed to connect a digital audio feed via the LS9 or RedNet2. Both the DVS¹ and Dante Controller are available from Audinate here:

<https://www.audinate.com/products/software/dante-virtual-soundcard>

<https://www.audinate.com/products/software/dante-controller>

REMLABS can provide a laptop with DVS, Dante Controller, and other software. A list of laptop specifications and installed software is included in this packet. Computers and hardware can be secured in the Turrell control room.

¹ A license for the Dante Virtual Soundcard must be purchased in order to use this option. The price varies between \$25-50.

REMLABS LAPTOP SPECIFICATIONS

MacBook Pro (13-inch, Late 2011)

2.8 GHz Intel Core i7

16GB 1333 MHz DDR3

Intel HD Graphics 3000 512 MB

OSX Yosemite 10.10.5

INSTALLED SOFTWARE

Ableton Suite 9

Ableton Live 8

Adobe CS6 (includes Audition)

Audacity

Dante Controller and Dante Virtual Soundcard

Fireface USB Drivers

Leap Motion Drivers

Logic Pro, Logic Pro X

Max 7, 6.1, 6

MOTU Drivers

Native Instruments KOMplete 10

HARDWARE LINKS

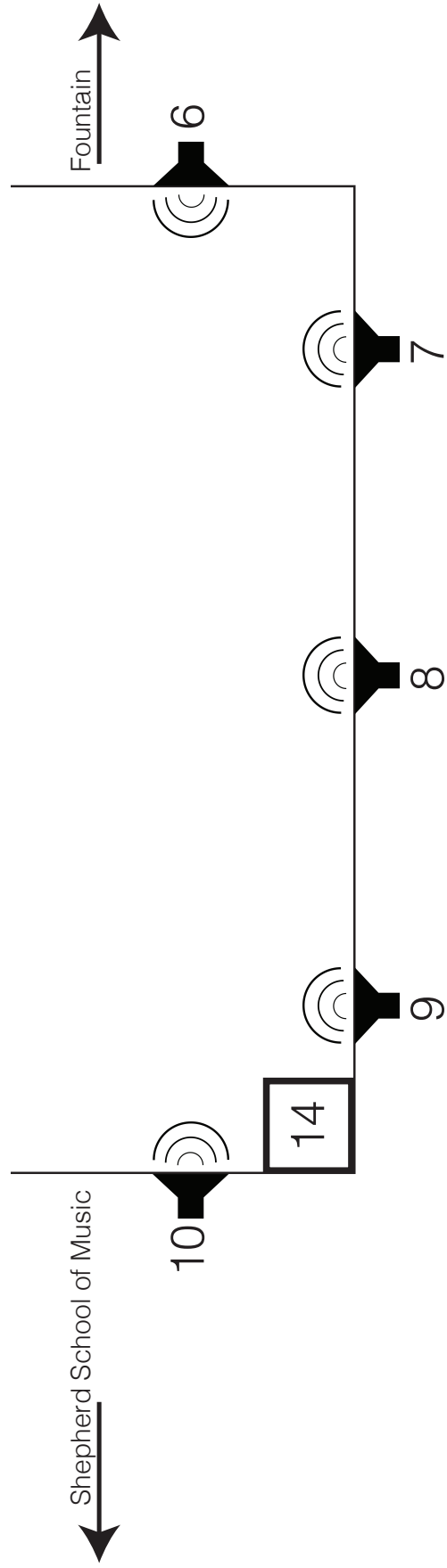
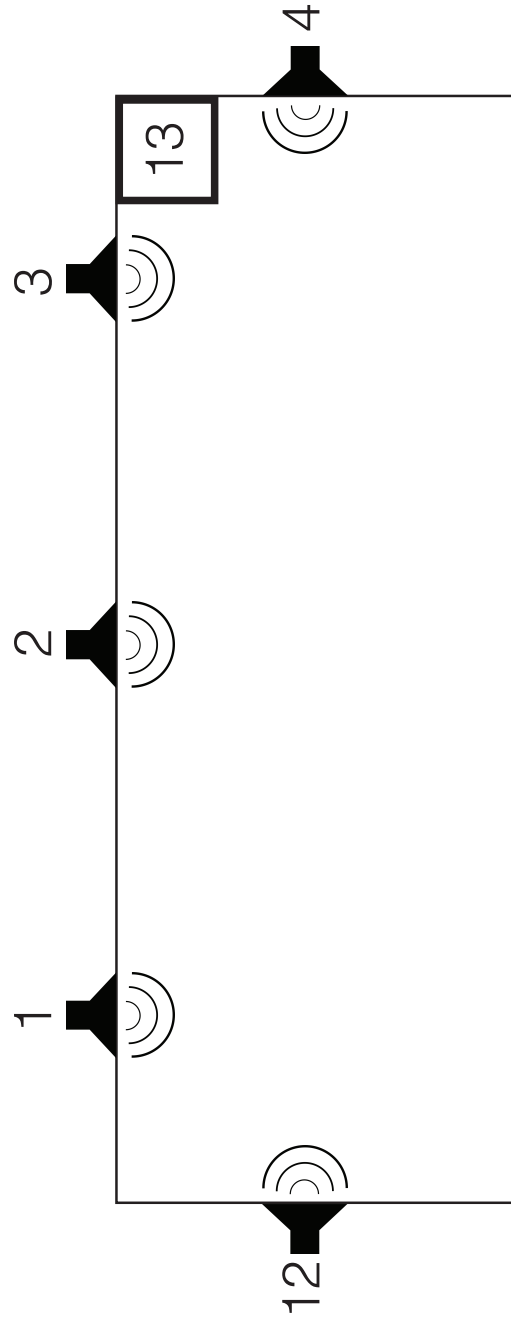
REDNET2

<https://us.focusrite.com/sites/default/files/focusrite/downloads/8291/rednet-2-user-guide.pdf>

LS9

http://download.yamaha.com/api/asset/file?language=en&site=countrysite-master.prod.wsys.yamaha.com&asset_id=8548

Turrell Skyspace Speaker Setup



Product Data Sheet

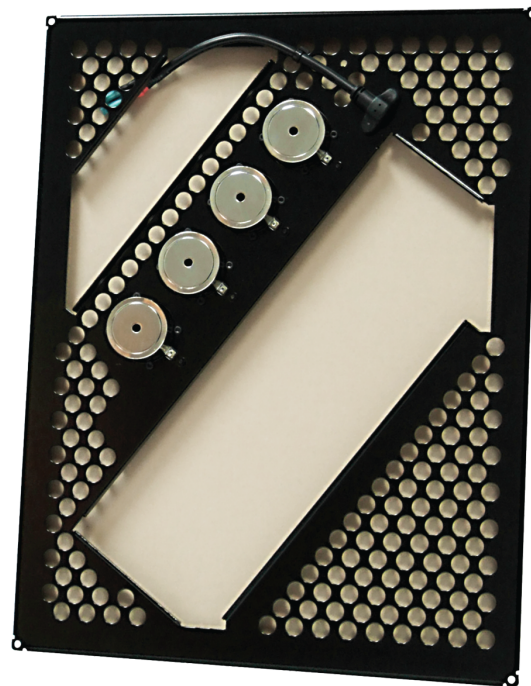
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AIW5X

Invisible Loudspeaker

- Completely Invisible, high fidelity loudspeaker
- Easy to install into walls or ceilings
- Simply skim over with a finishing coat of plaster or mud
- Fits within 400mm (16") on centre wood or metal stud-work commonly used today in walls and ceilings
- Suitable for high level music/surround sound in all rooms.
- 100/70V version available for commercial applications

The Amina® AIWX Series of Plaster-In Loudspeakers are the world's first high performance loudspeakers designed to be skimmed over with 2mm of normal finishing plaster, providing a completely concealed audio solution whilst giving designers and builders a high quality wall finish ready to accept a decoration of choice (paint, paper, etc). By using the principle of distributed mode vibrations, the AIWX Series Loudspeakers produce a sound that has exceptional clarity and room filling properties and have much in common with the way an acoustic musical instrument works.



The AIW5X model is suitable for systems where high sound pressure levels and sound quality is required. It can be combined with a high quality active subwoofer to create a high-end stereo or surround sound system.

Specifications	AIW5X
Nominal impedance	8 Ohms (APU2 connected)
Power handling	80 W
Sensitivity (2mm plaster/mud skim)	88dB 1m/ 2.83Vrms (APU2 connected)
Frequency response	125Hz - 20kHz (-6dB) (APU2 connected)
Electrical connection	Blue butt splice crimp terminals
Dimensions	17 ^{3/4} " x 13 ^{5/8} " x 1 ^{1/2} " (450mm x 345mm x 38mm)
Product weight	3.9lbs (1.76kg)
Fixing requirement	Amina BackboxFS / BackboxSW / Basic fixing kit
In-line protection unit	Supplied APU2 or optional APU-RS8
High impedance option (100V/70V)	5W, 10W, 20W, 40W (use model AIW5Xn)
Efficiency with high impedance option	87dB 1m/W
High Impedance Minimum Filter Requirement	High-pass at 120Hz, 24dB/octave
Manufacturer warranty	10 years

Product Data Sheet

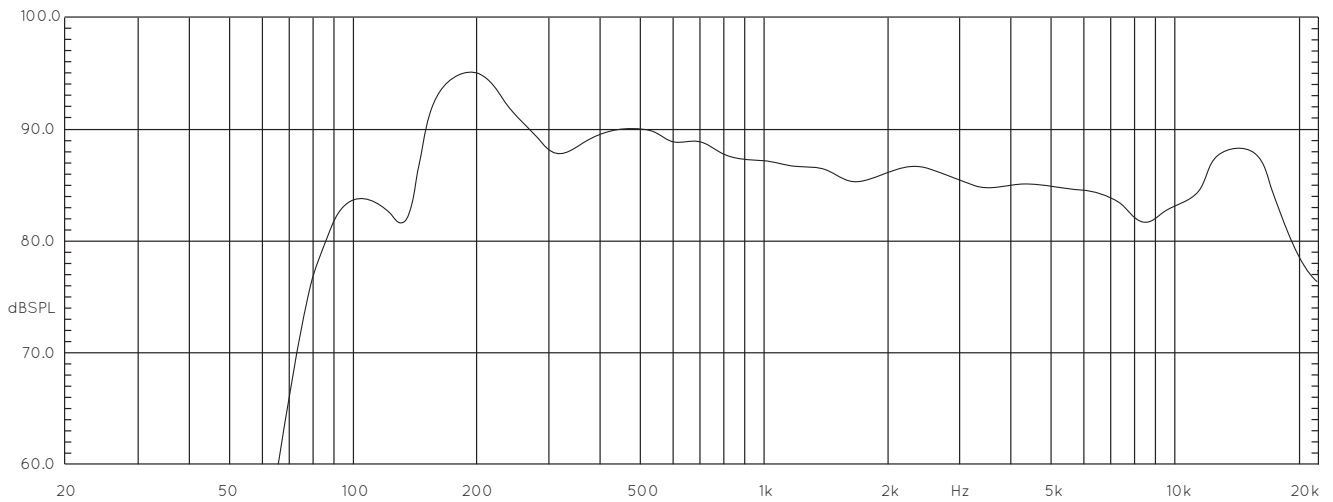
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AIW5X

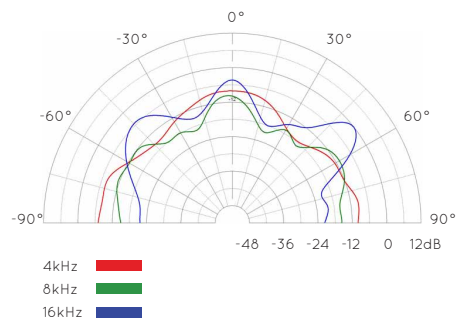
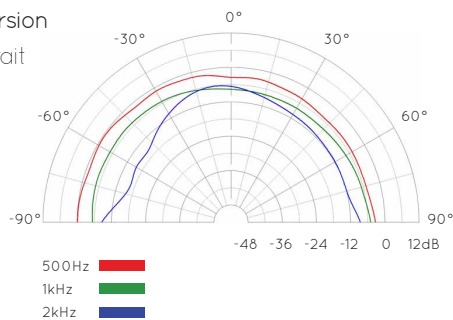
Invisible Loudspeaker

On Axis Frequency Response (2.83Vrms/1m)

(product installed using Amina BackboxFS in 1/2" drywall sheet with 2mm thick plaster skim coat + 3 coats of vinly paint)



Horizontal Dispersion
(speaker in portrait orientation)

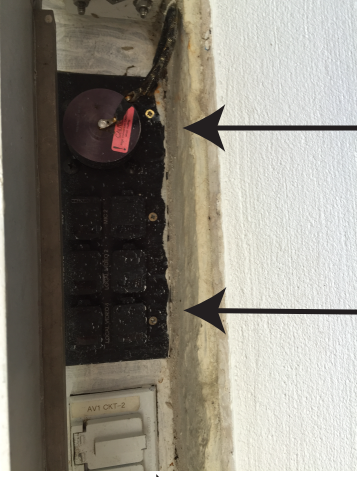


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TECHNOMAD SOHO IP56 SUBWOOFER SPECIFICATIONS

Size:	20.8" x 15.5" x10.1"
Weight:	43 lbs
Freq. Response:	40 Hz – 200 Hz (+/- 2 dB)
Sensitivity:	96 dB SPL (1W/1M, swept sine)
Continuous Power:	430 Watts (based on EIA test 426B)
Sensitivity :	96 db SBL (1W/1M, swept sine)
Dispersion:	Omni directional
Impedance:	8 Ohms (nominal)
Connector:	2 x Speak-On
LF Driver:	12" custom cone driver (coaxial)
	Passive Low-Pass Internal Crossover

TURRELL PATCH PANEL (LOCATED ON SOUTHERN INTERIOR WALL)



Dante Digital (Ethernet) Input (16X) Whirlwind MASS Analog Input (14X)



16 x output. A more detailed IO is included
in the packet.

START PAGE
Event Start Up

On	M101	M102	M103	M104	M105	M106	M107	M108	M109	M110	M111	M112	M113	M114	M115	M116	M117	M118	M119	M120	M121	M122	M123	M124	M125	M126	M127	M128	M129	M130	M131	M132	M133	M134	M135	M136	M137	M138	M139	M140	M141	M142	M143	M144	M145	M146	M147	M148	M149	M150	M151	M152	M153	M154	M155	M156	M157	M158	M159	M160	M161	M162	M163	M164	M165	M166	M167	M168	M169	M170	M171	M172	M173	M174	M175	M176	M177	M178	M179	M180	M181	M182	M183	M184	M185	M186	M187	M188	M189	M190	M191	M192	M193	M194	M195	M196	M197	M198	M199	M200
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Advanced Routing

The 14 Channels may be routed
in a number of configurations, but
correspond by default to the Turrell
Skyspace Speaker Setup.

A larger version of the Routing Matrix is included in the packet. Hi-Resolution versions may also be downloaded here:
<http://remblabs.blogs.rice.edu/files/2015/05/turrellpics-2-wq7ifd.zip>

Biamp Routing Matrix

START PAGE
Event Start Up
 Presets
Downstairs Controls
 Mixer to Speakers via Cobranet
 Mixer to Speakers via Analog
 To Speaker via Analog Only (no mixer)
Upstairs Controls
 Mixer to Upstairs Speakers via Cobranet
 Mixer to Upstairs Speakers via Analog
 To Upstairs Speakers Via Analog Only (no mixer)
Mic Controls
 Control North/South Mics
 Aux Input
Master Controls
 Advanced Level Controls
 Advanced Routing

Advanced Routing

CH	Spr1	Spr2	Spr3	Spr4	Spr5	Spr6	Spr7	Spr8	Spr9	Spr10	Spr11	Spr12	return	Up1	Up2	Up3	Up4	Up5	Up6	Up7	Up8	Up9	Up10	Up11	Up12		
MicB1																											
MicB2																											
MicB3																											
MicB4																											
MicB5																											
MicB6																											
MicB7																											
MicB8																											
MicB9																											
MicB10																											
MicB11																											
MicB12																											
MicB13																											
MicB14																											
Spare																											
Spare2																											
Mic1																											
Mic2																											
Mic3																											
Mic4																											
Mic5																											
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Mic12																											
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Mic14																											
Spare3																											
Spare4																											
Mic1c																											
Mic1c2																											
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Mic1c10																											
Mic1c11																											
Mic1c12																											
Mic1c13																											
Mic1c14																											
Aux Input																											
Security																											
Tone																											
Pink Noi																											

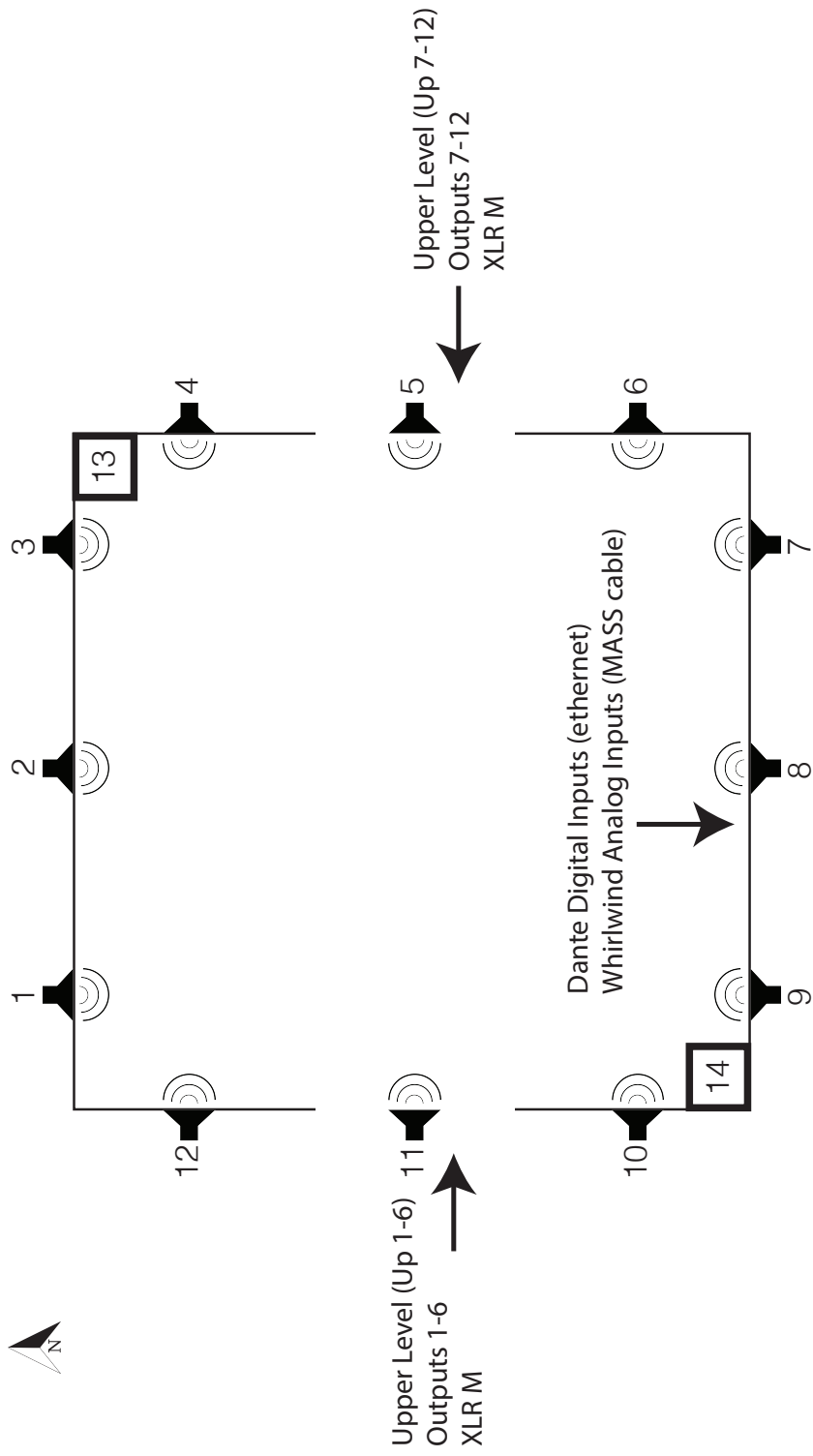
Inputs (Mic) 1-14 may also be routed to the 12 outputs on the upper level of the Skyspace. These outputs require additional speakers and amplifiers.

Inputs (Mic) 1-14: correspond to Skyspace Speaker Setup outputs by default.

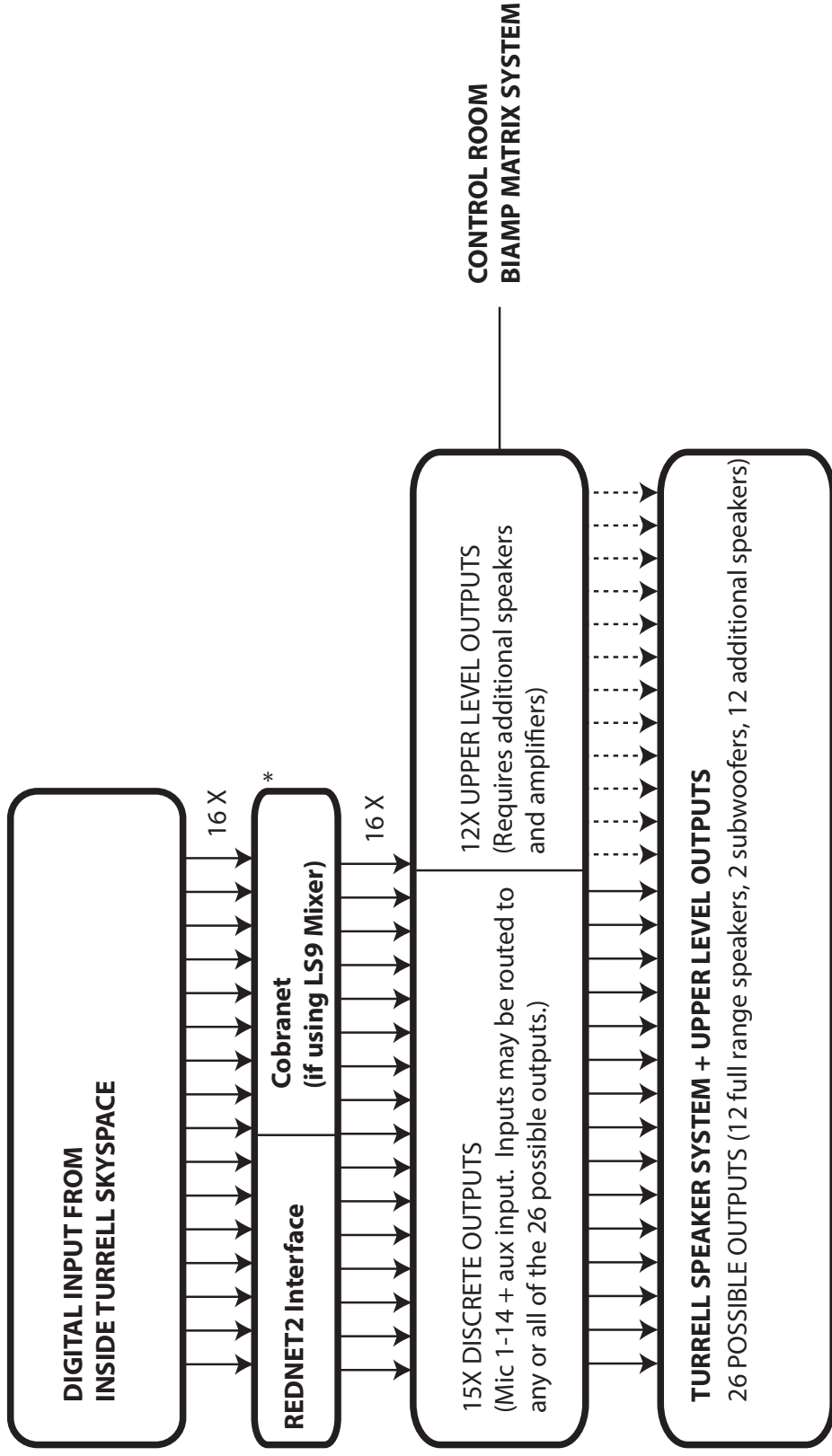
Aux input may be routed upstairs for a 15th discrete output. Requires an additional speaker and amplifier.

Aux input may be routed upstairs for a 15th discrete output. Requires an additional speaker and amplifier.

LOCATION OF TURRELL PHYSICAL INPUTS AND OUTPUTS



TURRELL SKYSPACE SIGNAL FLOW



*Both digital systems cannot be used at the same time.