IMMERSIVE SOUND FOR THEATRE

Sounds In Space 2017

THE AISLE IS FULL OF NOISES

Immersive Audio in Theatre Sound Design

By
John Leonard

"Be not afeard; the isle is full of noises,
Sounds and sweet airs,
that give delight and hurt not.
Sometimes a thousand
twangling instruments
Will hum about mine ears."

The Tempest - William Shakespeare

“On the foregoing principles, the brazen vases are to be made with mathematical proportions, depending on the size of the theatre.

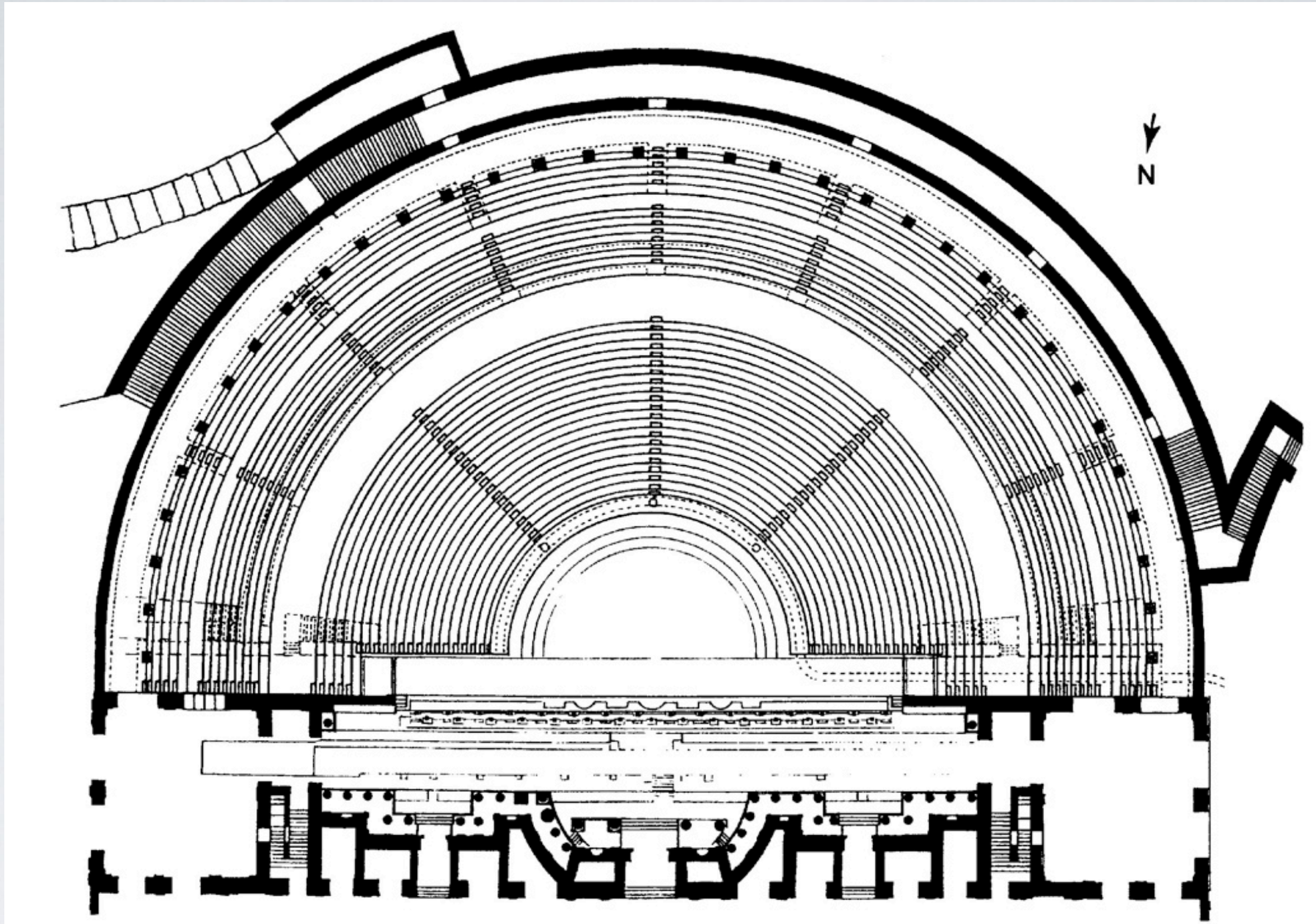
They are formed so, as when struck, to have sounds, whose intervals are a fourth, fifth, and so on, consecutively to a fifteenth. Then, between the seats of the theatre, cavities having been prepared, they are disposed therein in musical order, but so as not to touch the wall in any part, but to have a clear space round them and over their top: they are fixed in an inverted position, and one the side towards the scene are supported by wedges not less than half a foot high: and openings are left towards the cavities on the lower beds of the steps, each two feet long, and half a foot wide.

By the adoption of this plan, the voice which issues from the scene, expanding as from a centre, and striking against the cavity of each vase, will sound with increased clearness and harmony, from its unison with one or other of them.”

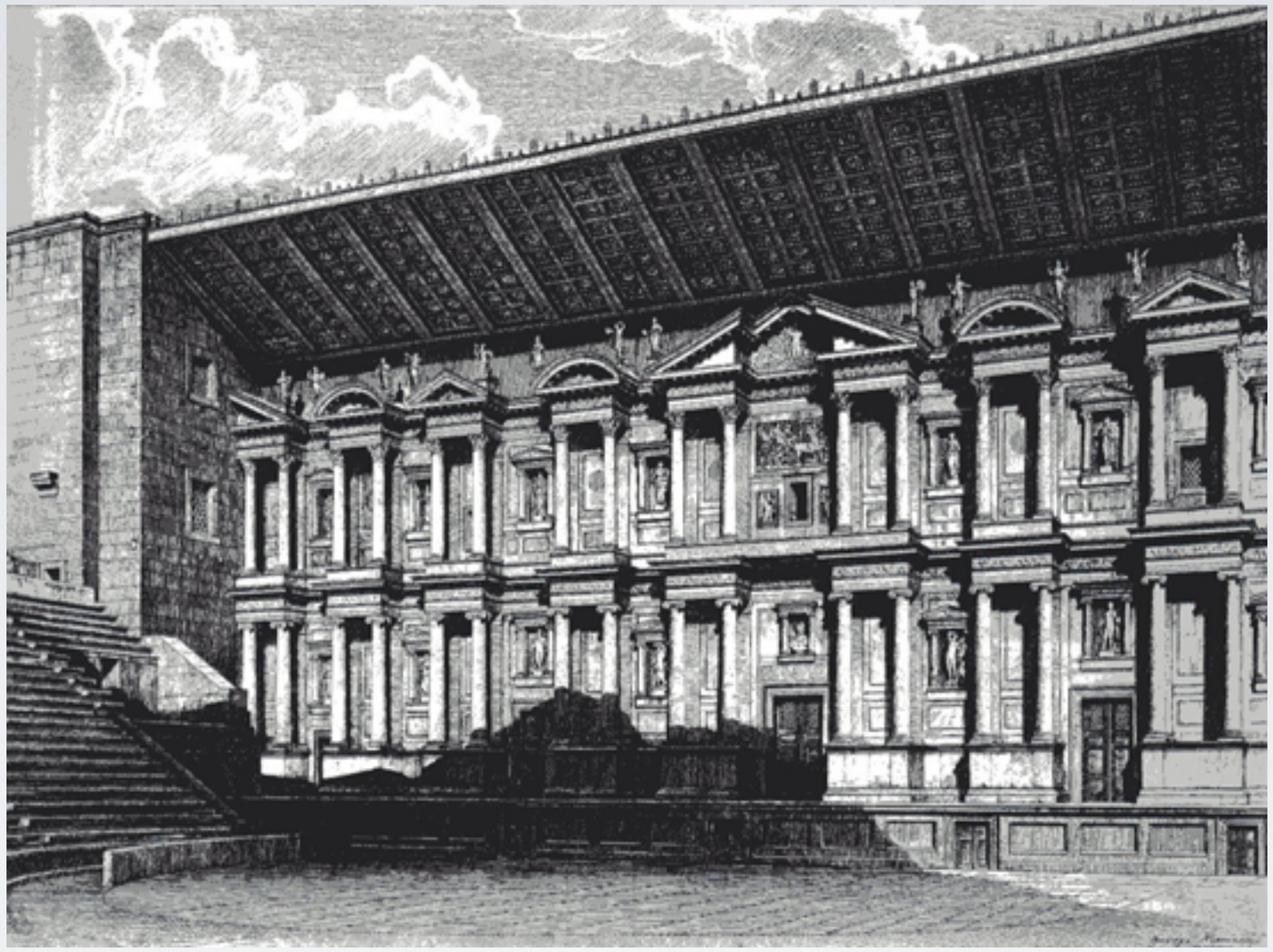
MARCUS VITRUVIUS - 50BC

"Wee have also Sound-houses, where we practise and demonstrate all Sounds, and the Generation. Wee have harmonies which you have not, of Quarter-Sounds, and lesser Slides of Sounds. Diverse Instruments of Musick likewise to you unknowne, some sweeter than any you have; Together with Bells and Rings that are dainty and sweet. Wee represent Small Sounds as well as Great and Deepe; Likewise Great Sounds, Extenuate and Sharpe; Wee make diverse Tremblings and Warblings of Sounds, which in their Originalle are Entire. Wee represent and imitate all Articulate Sounds and Letters, and the Voices and Notes of Beasts and Birds. Wee have certain Helps, which sett to the Eare doe further the Hearing greatly. Wee have also diverse Strange and Artificiall Echos, Reflecting the Voice many times, and as it were Tossing it: And some that give back the Voice lowder than it come, some Shriller, some Deeper; Yea some rendering the Voice, Differing in the letters or Articulate Sound, from that they receyve, Wee have also means to convey Sounds in Trunks and Pipes, in strange Lines, and Distances."

Francis Bacon 1640

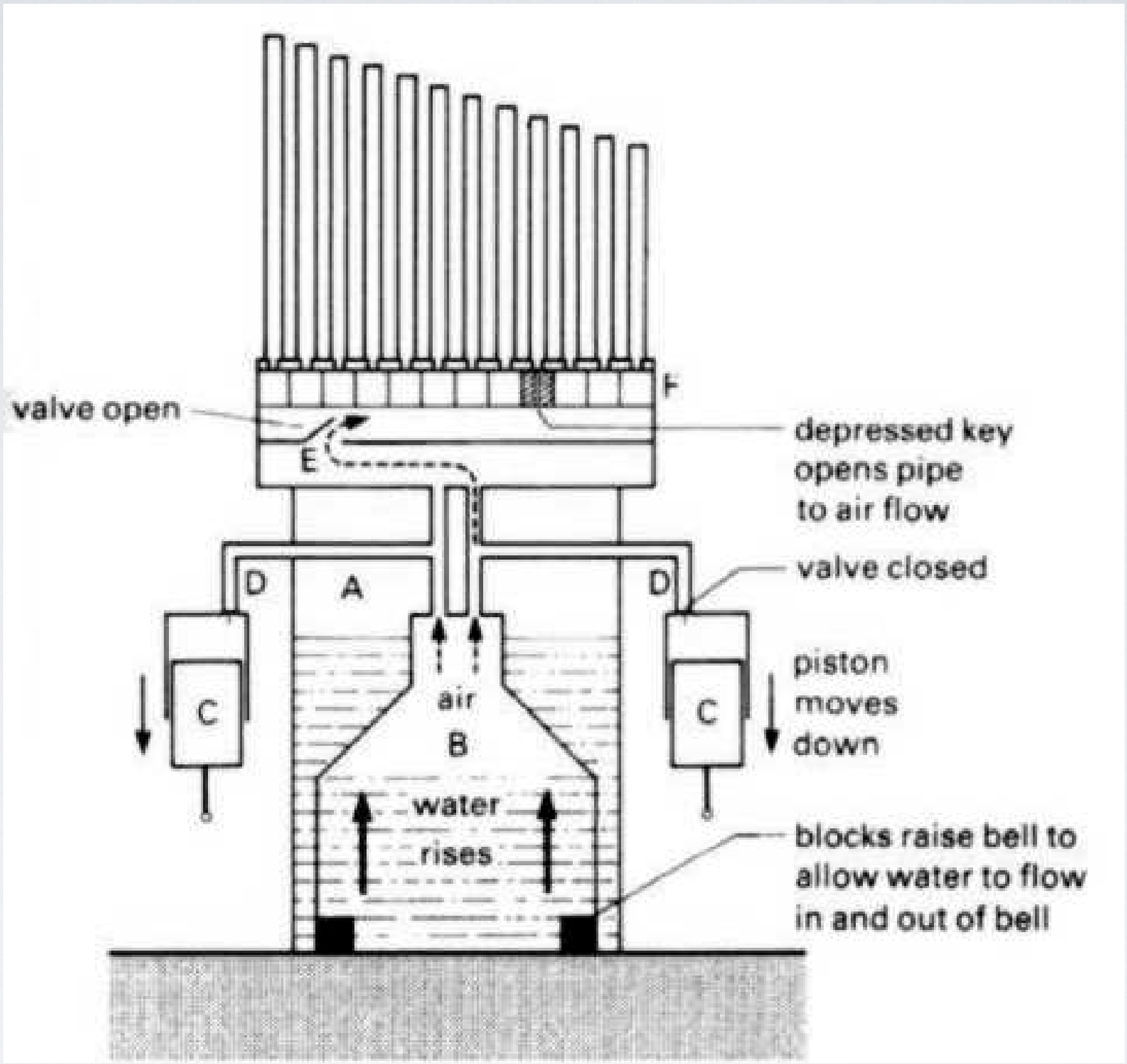


Plan of a typical Greek or Roman theatre

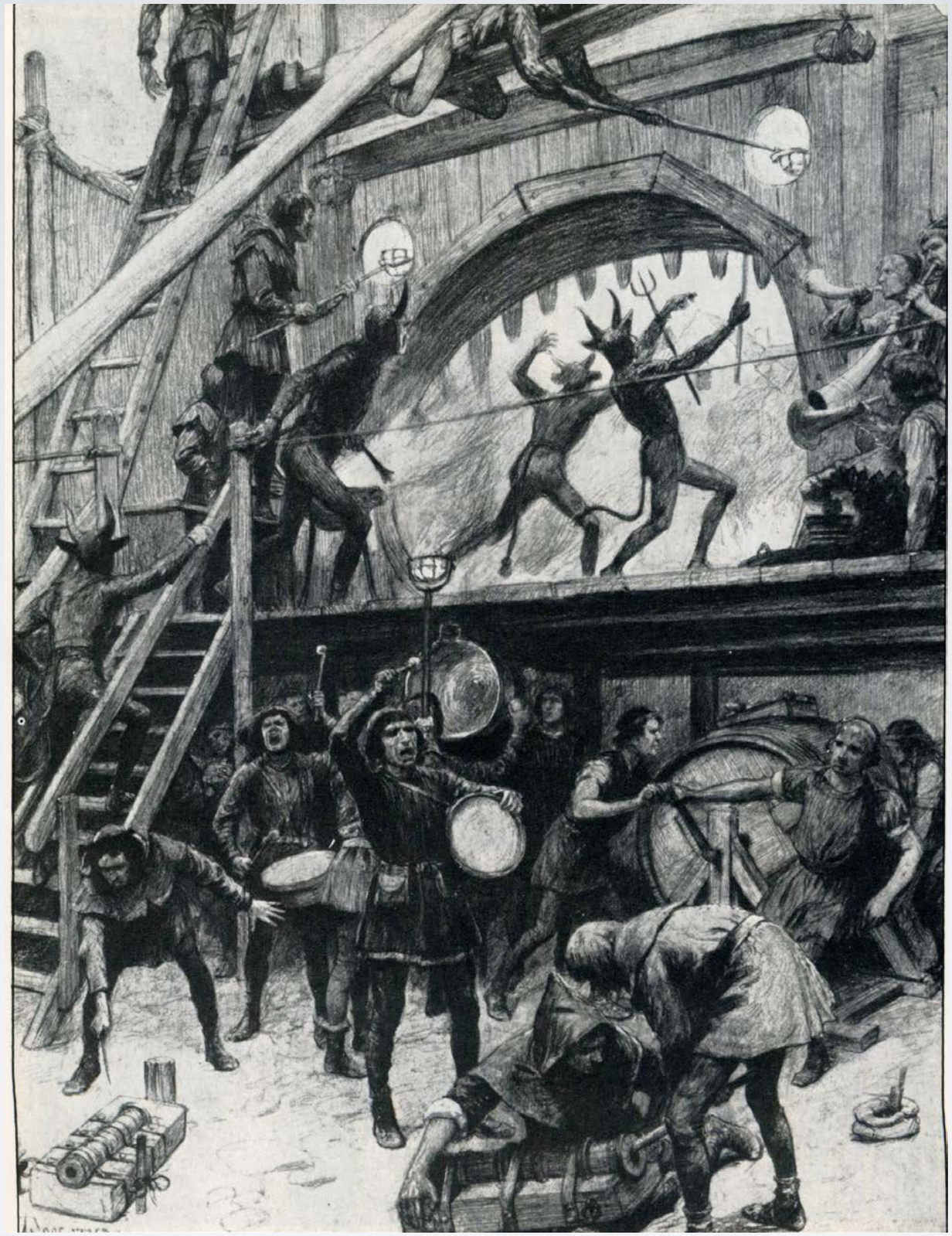


Scaena of a Roman theatre

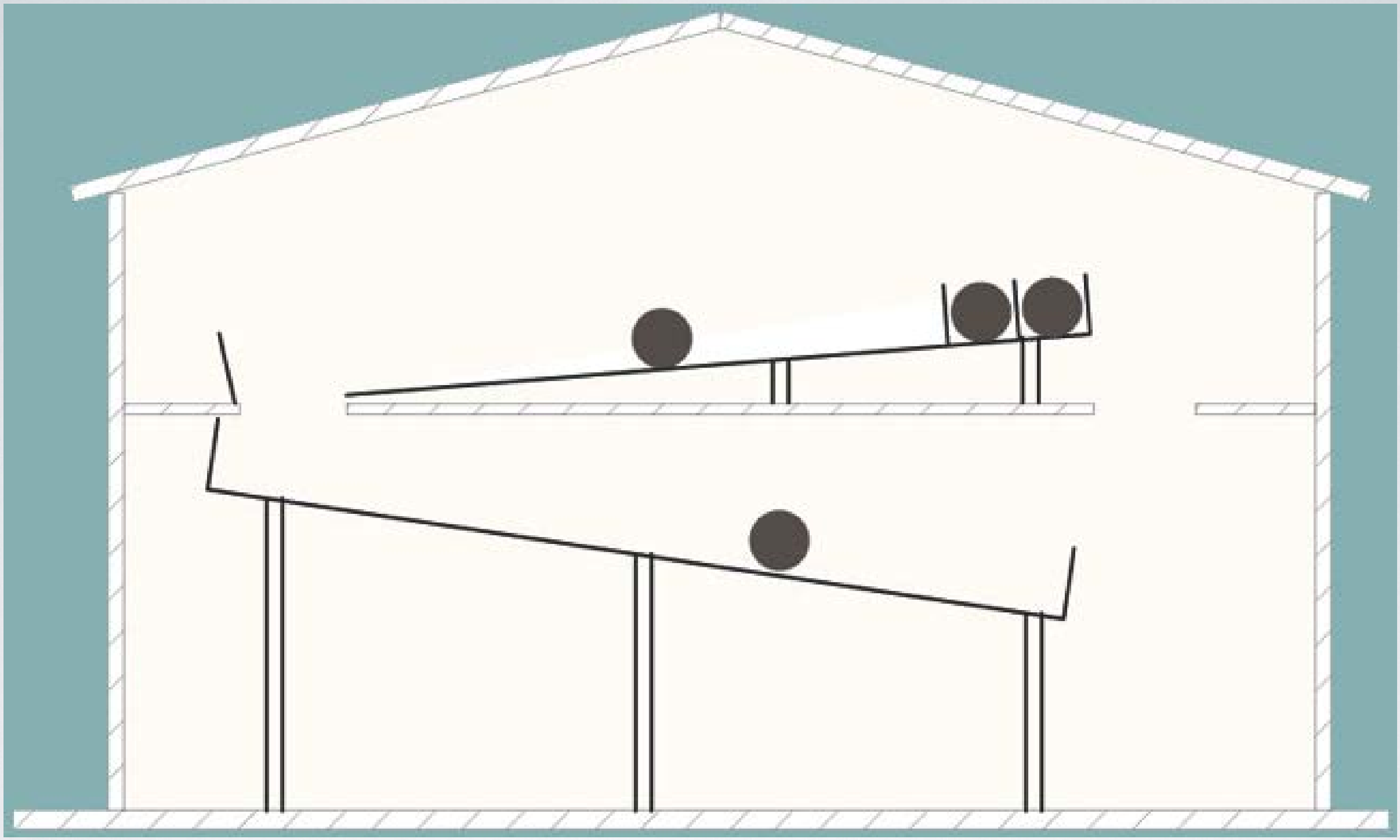
Sound Effects Circa AD 450



The Hydraulikon - Circa 450 AD



Mystery Plays - Sound Effects 15th Century



The Thunder Run - 18th Century

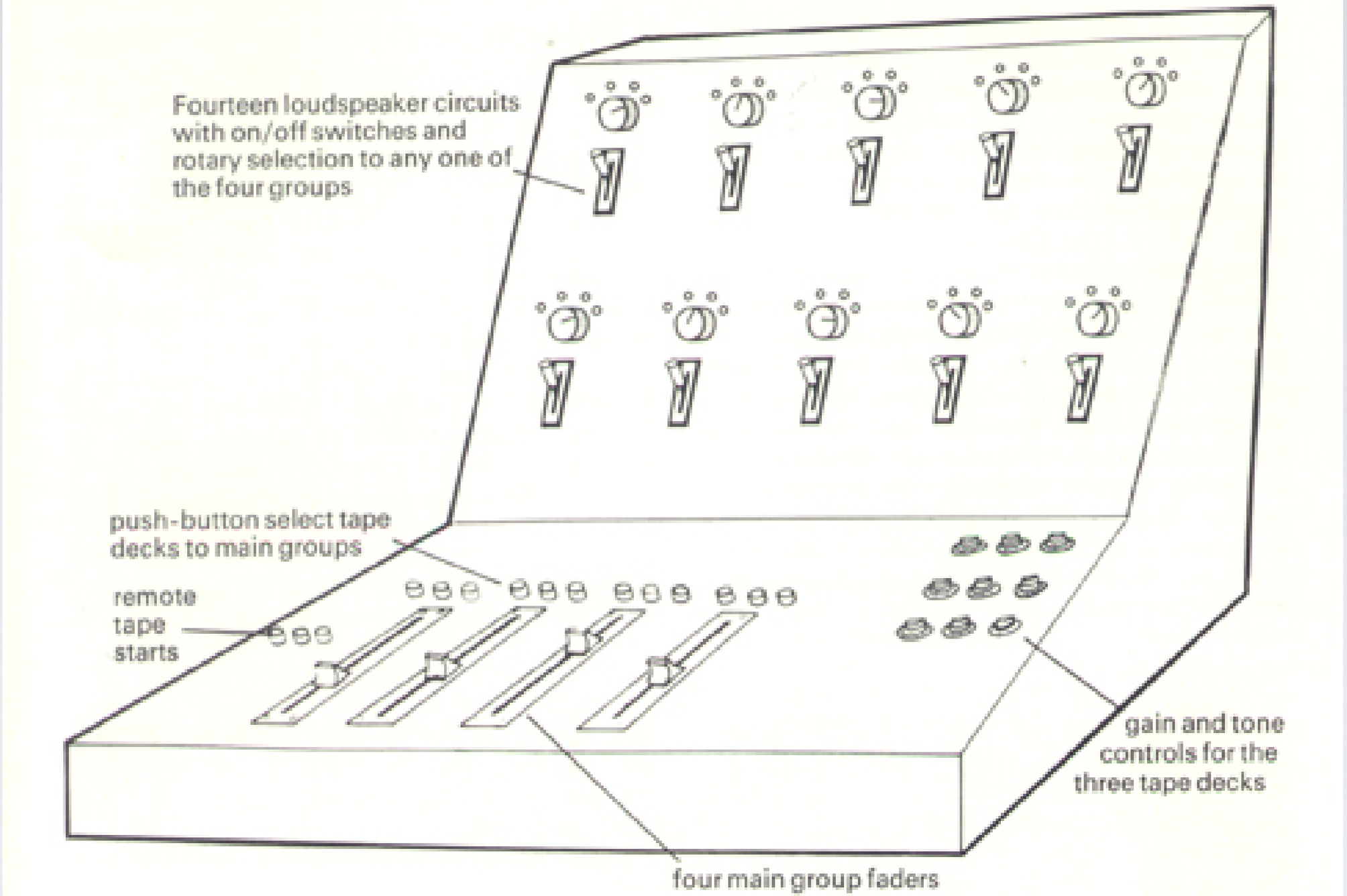
Pre-setting board slots

Pre-setting boards in place

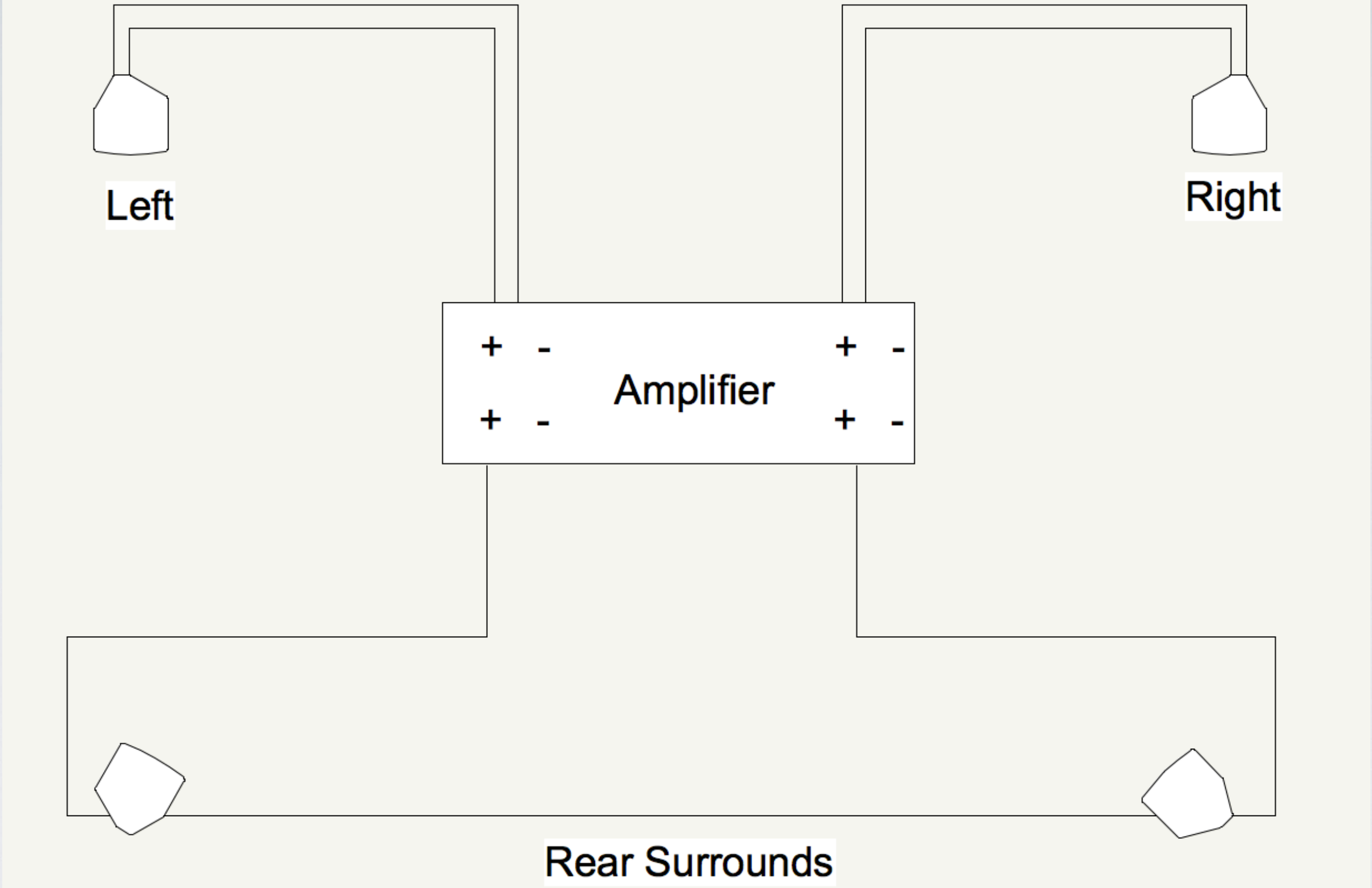
The lower channel

CUSTOM SYSTEM DESIGN FOR THEATRE SOUND

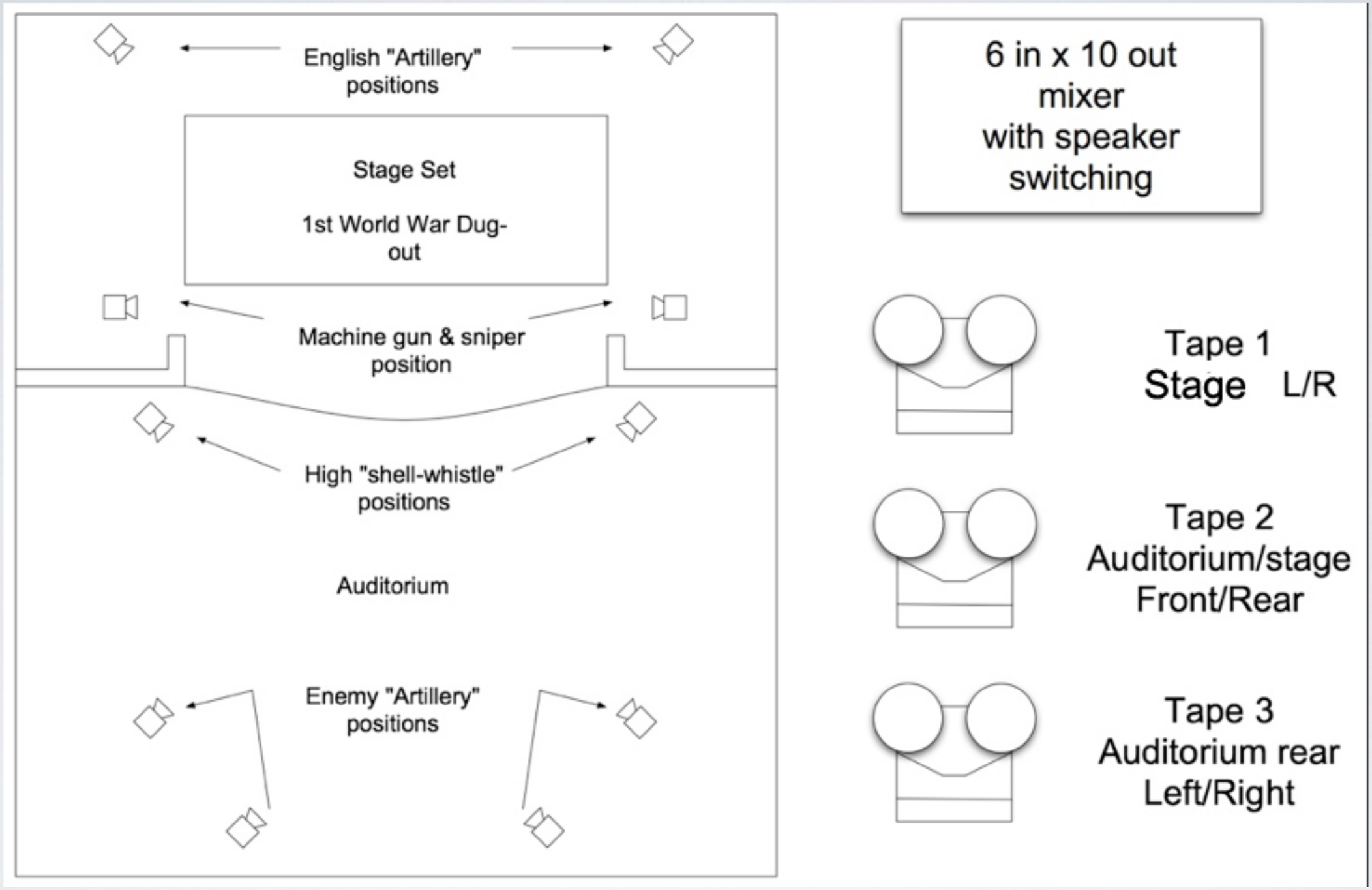
The Panatrope



David Collison's Custom Built Mixing Desk for "Blitz"



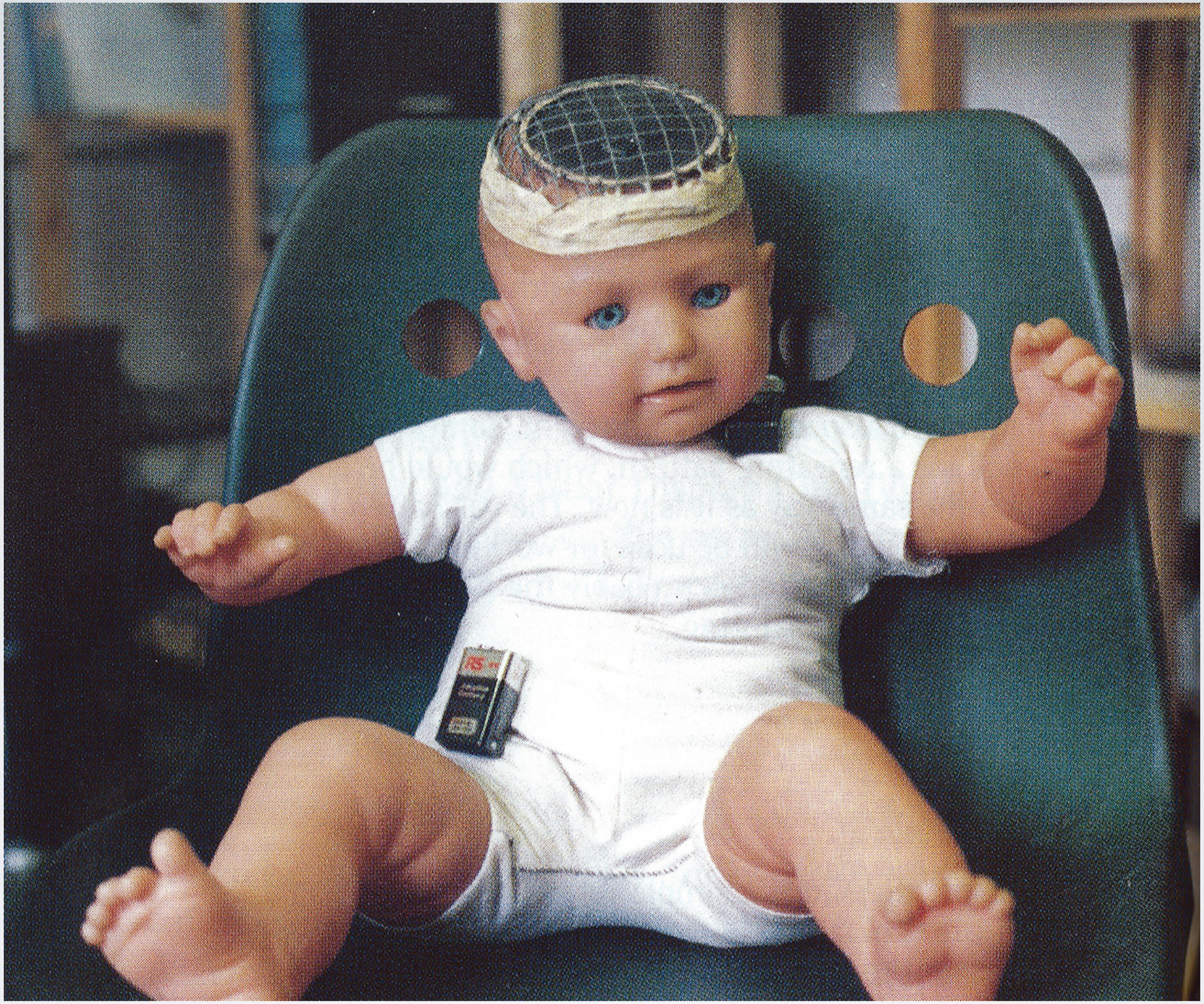
Hafler Set-up



Early surround system design for R.C Sheriff's 'Journey's End'

Libra Theatre Sound Mixer Prototype
1976

Libra Desk Commercial version



Reverse Radio Baby

Ambisonic Pan-Rotate unit & Auditorium Decoder

Mobile Recording - First Attempt

Mobile Recording - First Attempt

Sound Field & TetraMic Recording - Spitfire Mk IX

Digital Replay Systems

By considering the front, left, and "up" lobes of the bidirectional patterns X, Y, and Z to be "+" (IN phase with W), and the rear, right, and "down" lobes to be "-" (OUT OF phase with W), the proper channel assignments and phase relationships can easily be made. For example, the left, front, upper channel will be assigned W, X, Y, and Z IN phase. The left, front, lower channel will be assigned W, X, and Y IN phase, with Z OUT OF phase. Here are the channel and phase assignments:

LEFT FRONT UPPER
W+ X+ Y+ Z+

RIGHT FRONT UPPER
W+ X+ Y- Z+

LEFT FRONT LOWER
W+ X+ Y+ Z-

RIGHT FRONT LOWER
W+ X+ Y- Z-

LEFT REAR UPPER
W+ X- Y+ Z+

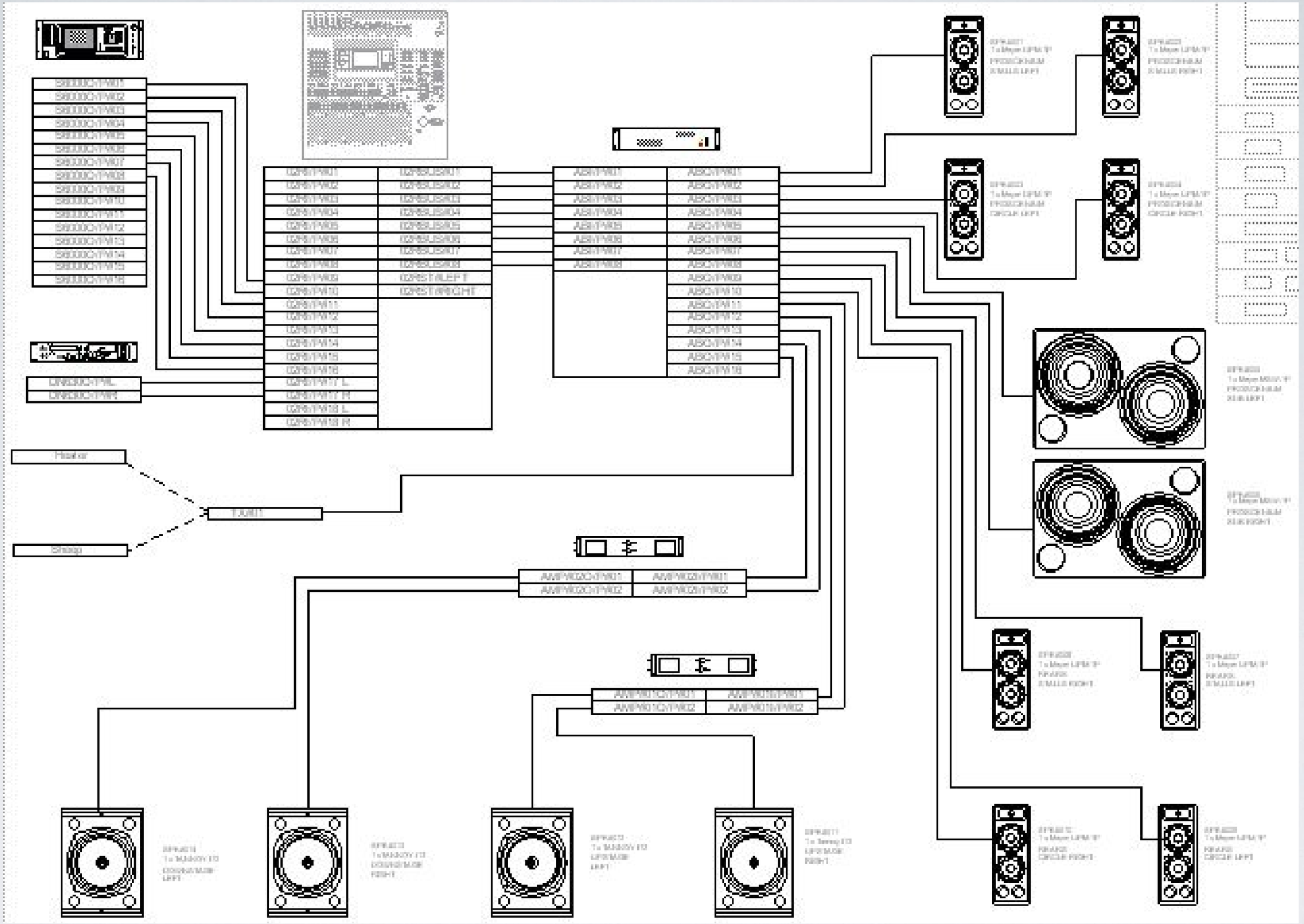
RIGHT REAR UPPER
W+ X- Y- Z+

LEFT REAR LOWER
W+ X- Y+ Z-

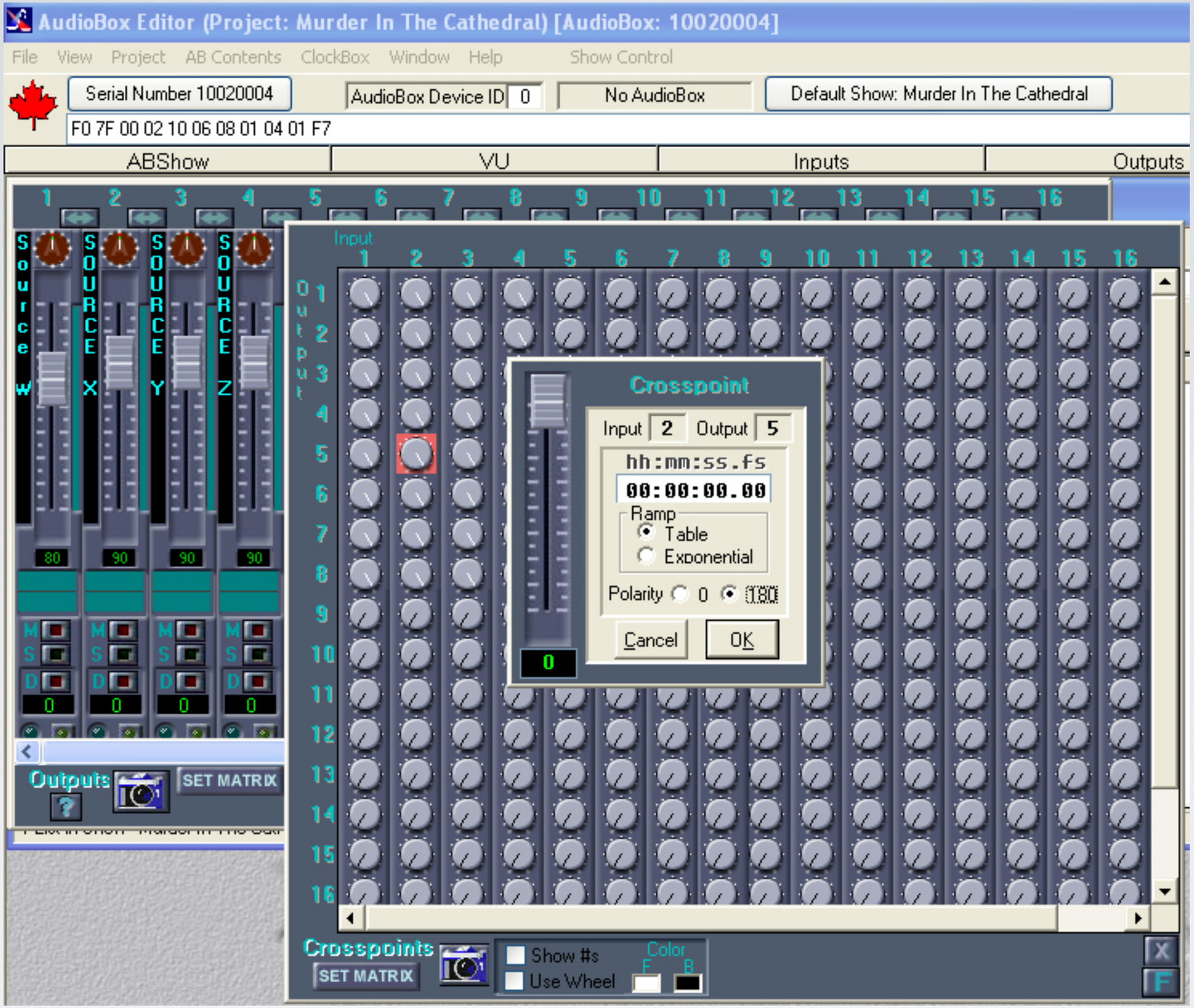
RIGHT REAR LOWER
W+ X- Y- Z-

W is "in phase" to all assignments. All front channels are driven by X in phase; all rear channels are driven by X out of phase. All left channels are driven by Y in phase; all right channels are driven by Y out of phase. All upper channels are driven by Z in phase; all lower channels are driven by Z out of phase.

The notes that got me started



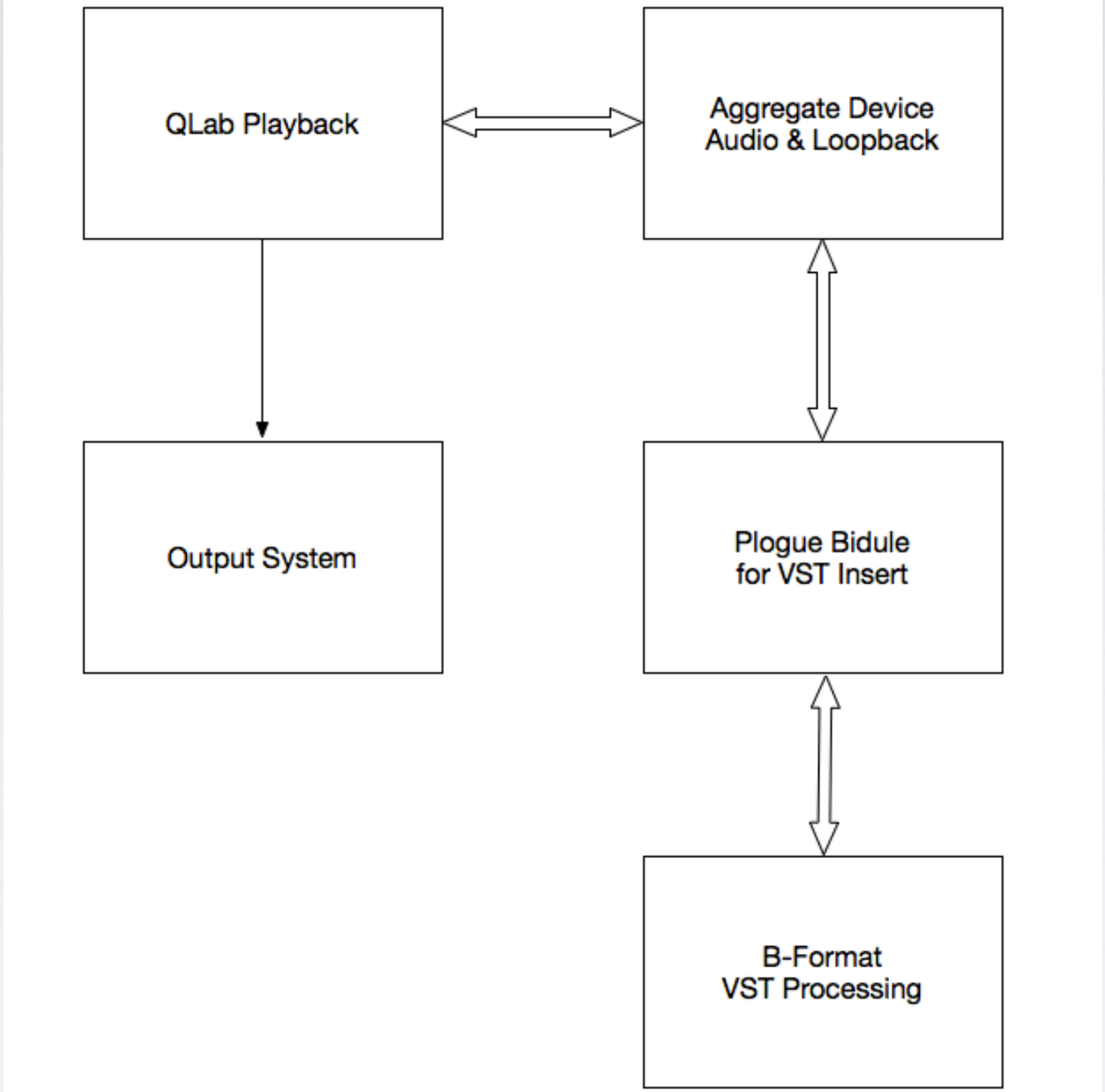
Basic system design for Ambisonic playback at Hampstead Theatre



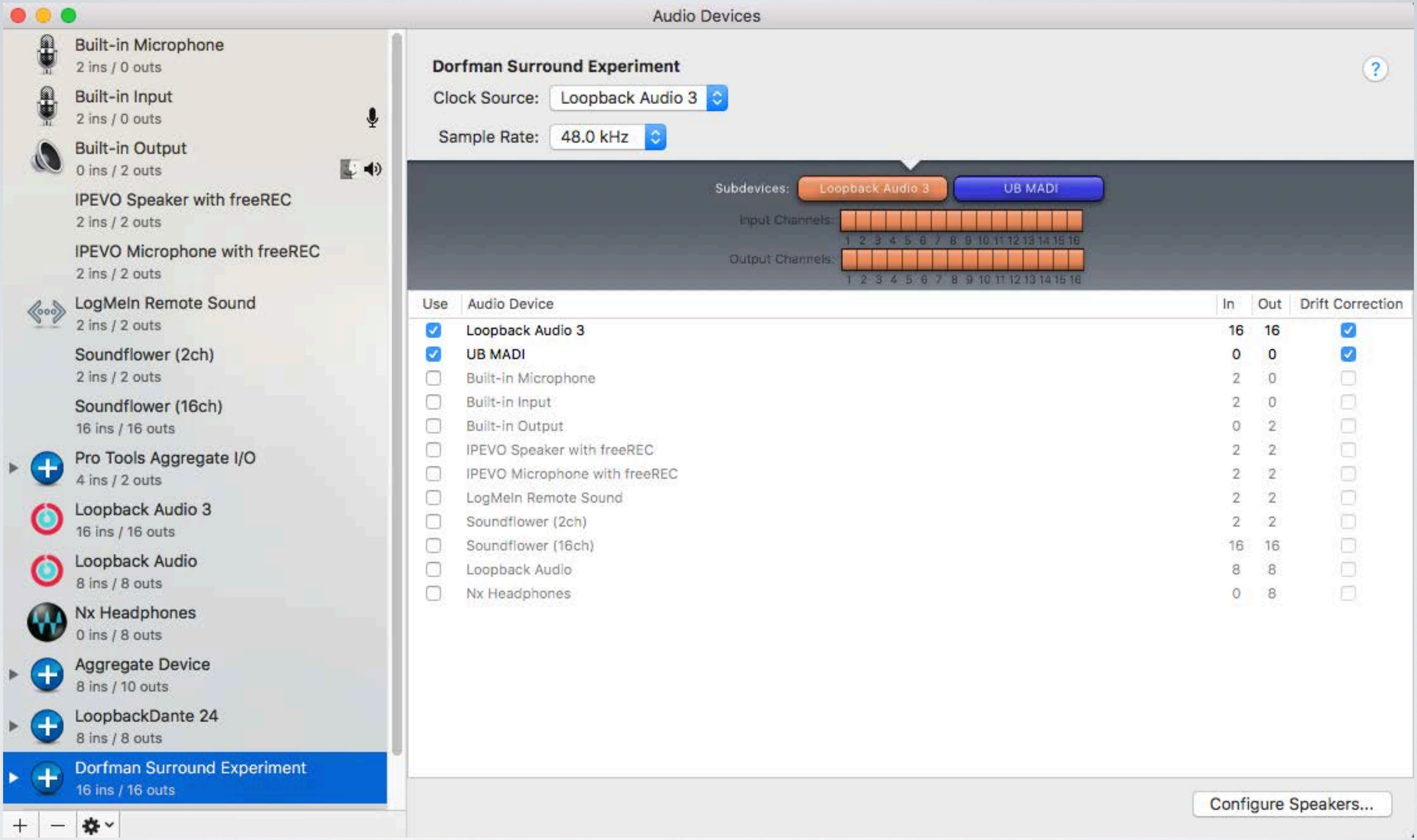
AudioBox Matrix with Polarity Inversion

CURRENT SYSTEM FOR THEATRE

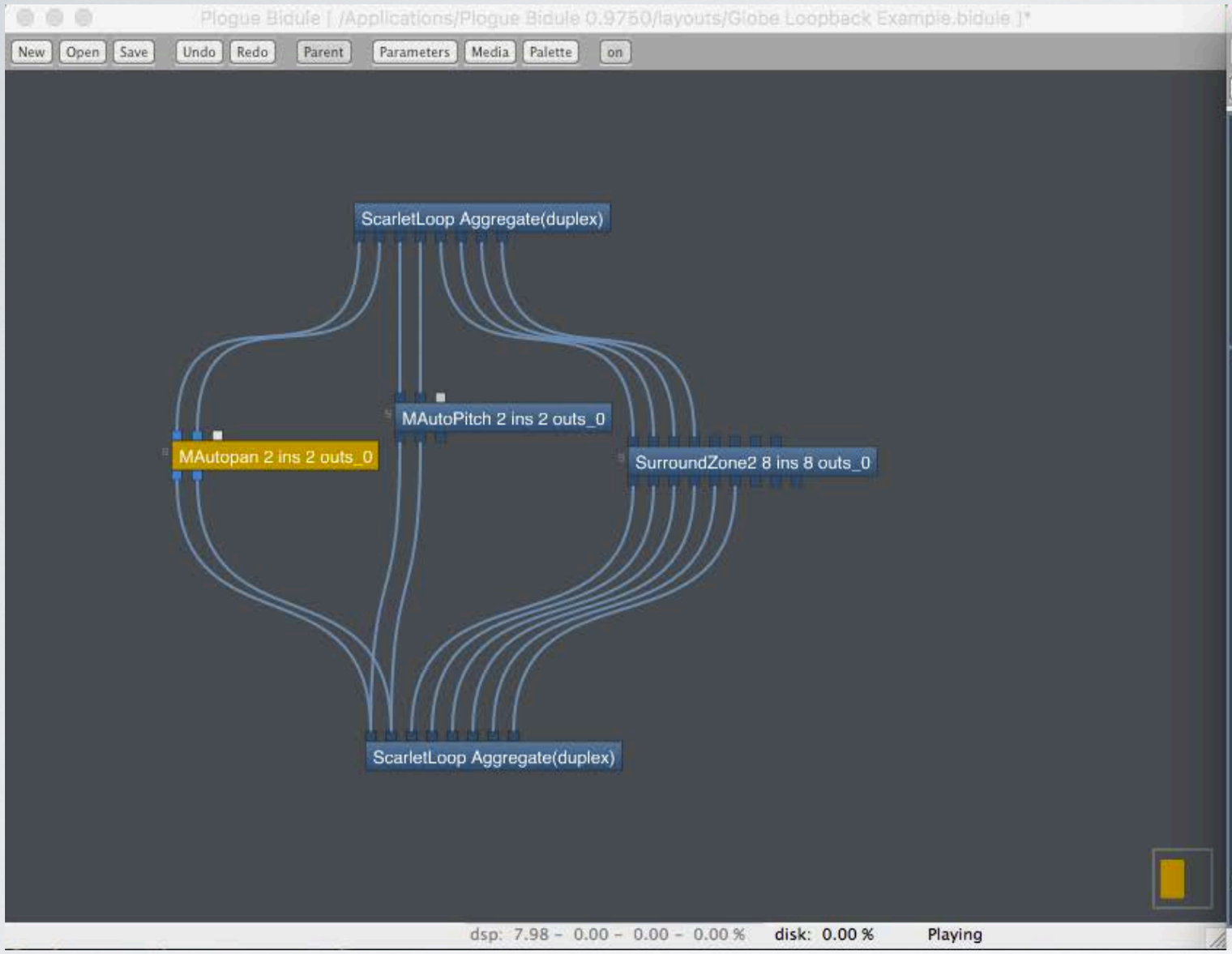
Figure 53’s QLab System

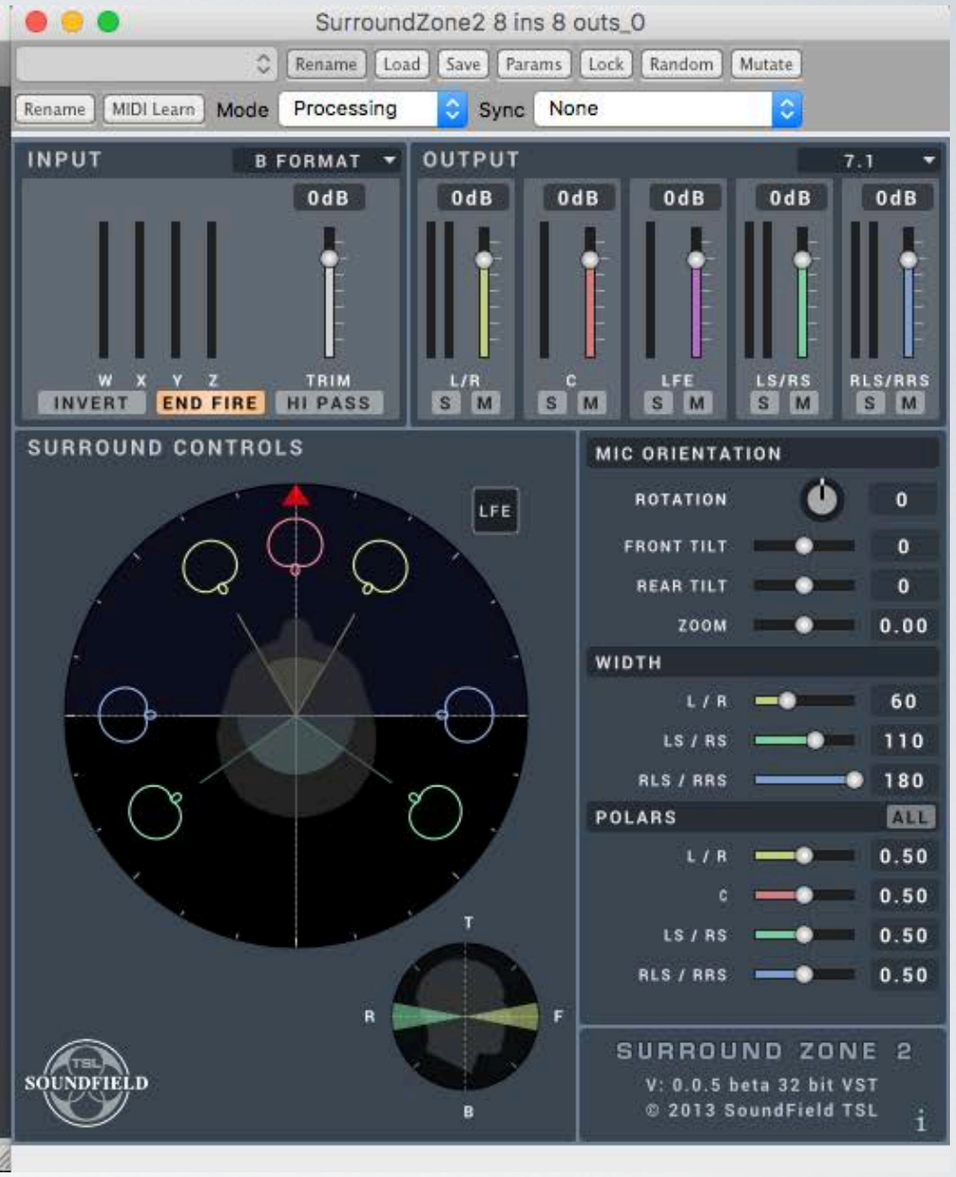


QLab Loopback System for VST Plug-ins



MacOs Audio-MIDI Aggregate Device Set-up



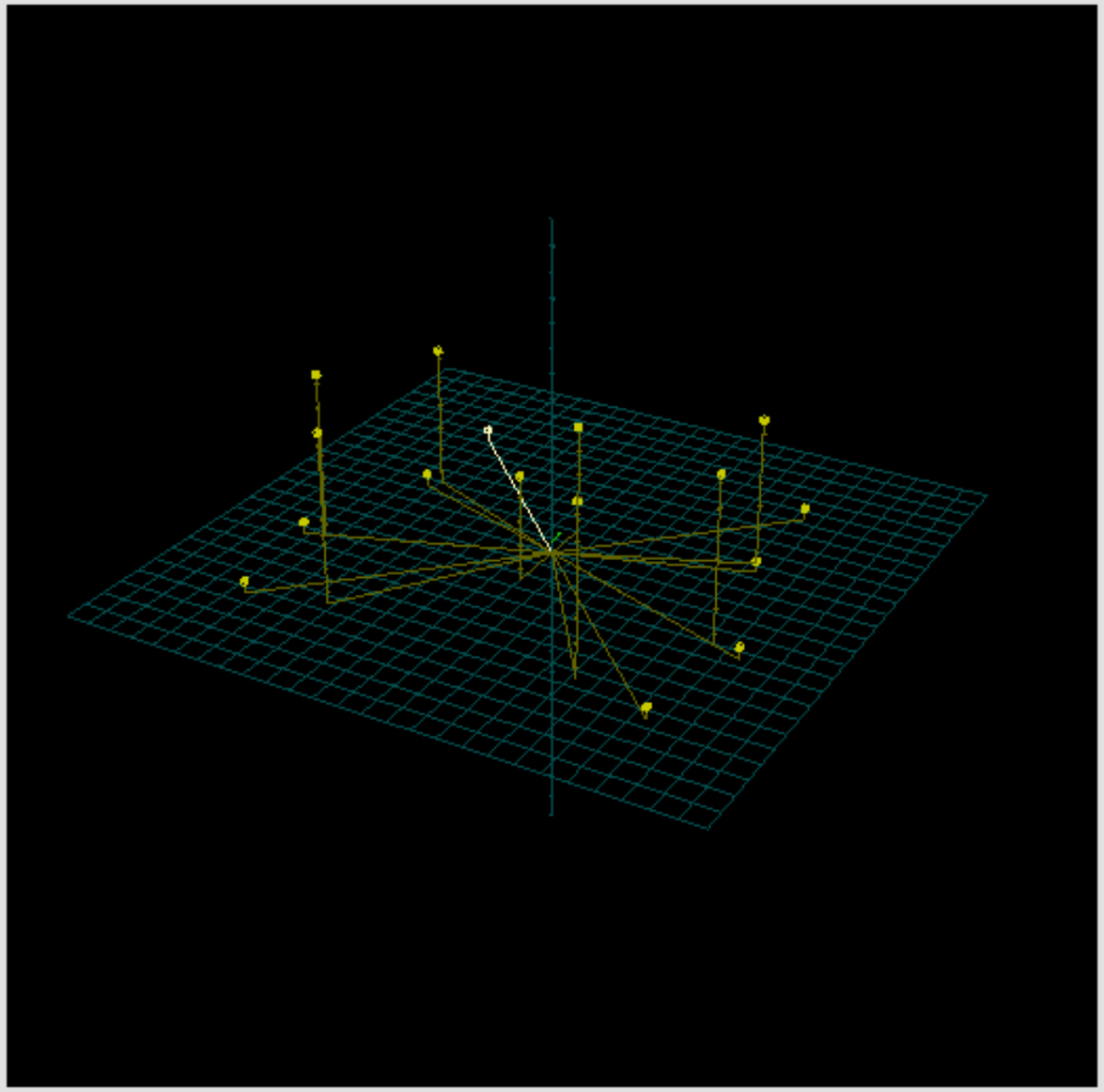


Plogue Bidule Set-up for Shakespeare’s Globe Rehearsa

Rapture3D - Advanced Speaker Layout

Layout | Decoder | Rapture3D Games | Ambisonic Playback | Logs | Licenses | About

Layout: Dorfman Set Up



Customise... | Import Speakers... | Export Speakers... | Delete Layout

Audio Device: Core Audio — Dorfman Surround Experiment

Overall Volume: 0.00

Distance Mode: Only use location directions

Audience Face: Upright

Bass Crossover:

Channel:
- Lower Front Left
- Lower Front Right
- Lower Left Surround Front
- Lower Right Surrount Front
- Lower Left Surround Rear
- Lower Right Surround Rear
- Lower Back Left
- Lower Back Right

Channel Settings

Name: Lower Front Left

Location (m): X 7.32 Y 7.32 Z 0 A 45 E 0 R 10.352

Speaker Type: Normal

Speaker Role: General

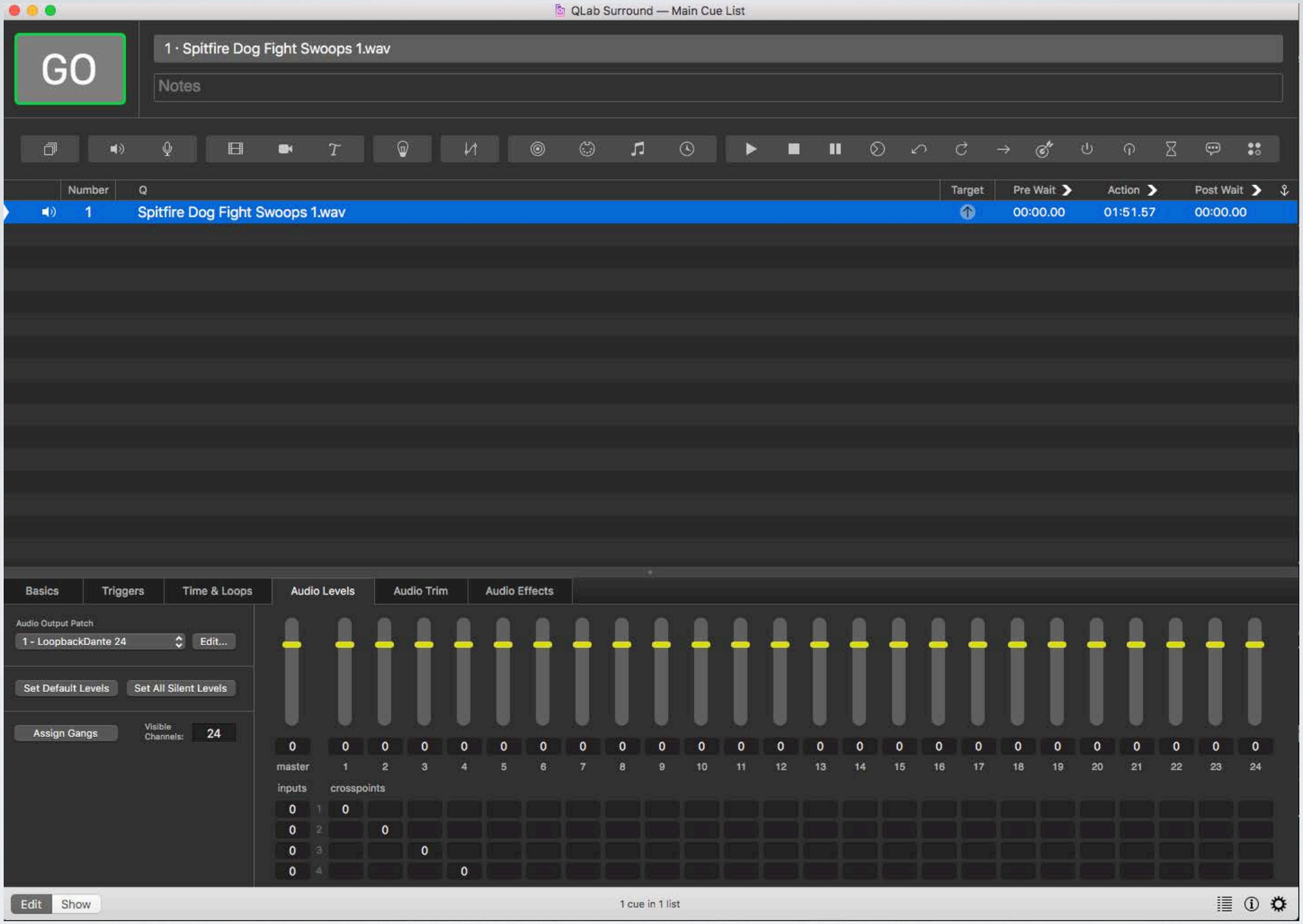
Audio Output: Output 1

Volume Modifier: 0.00

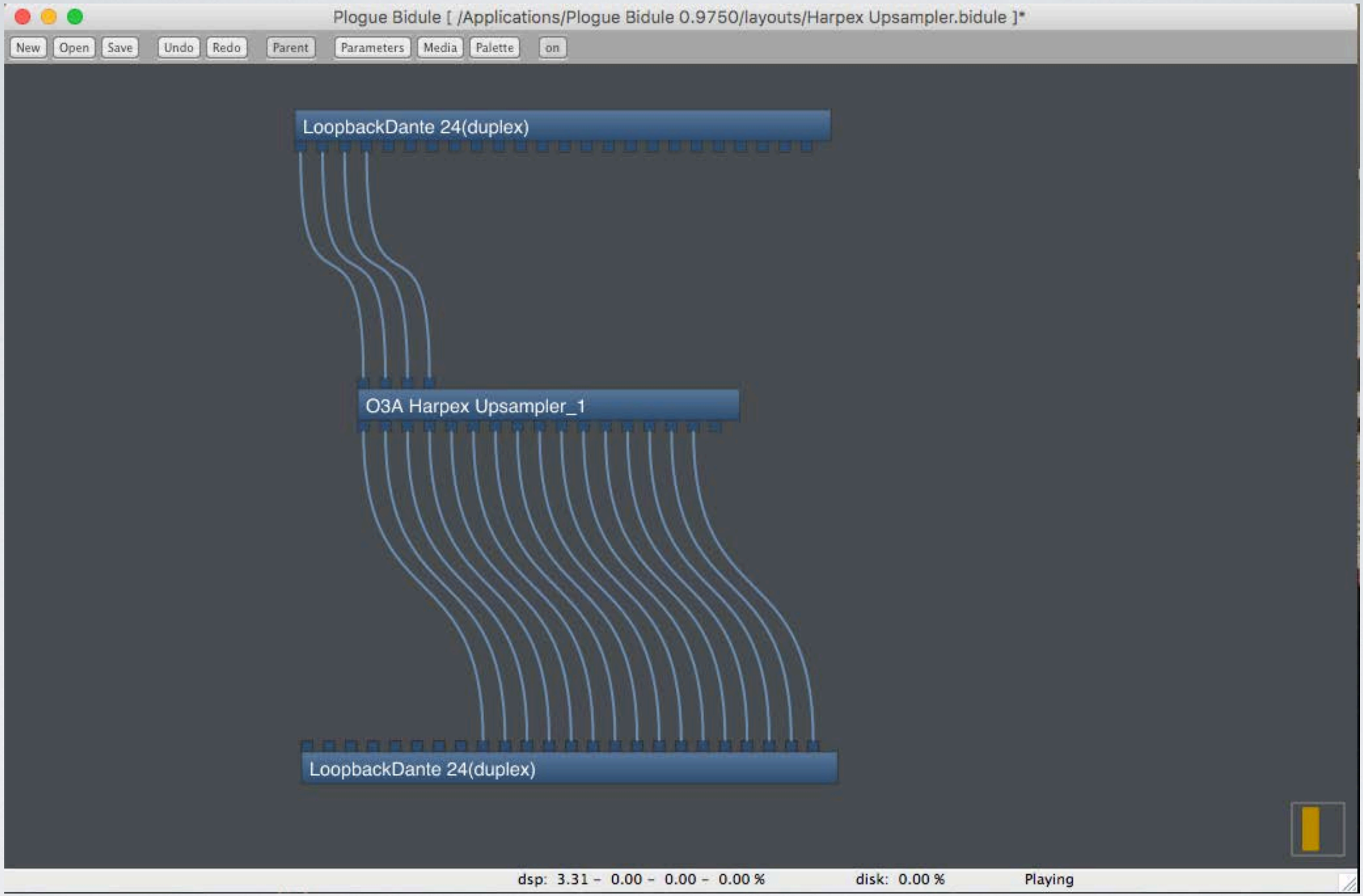
Decoders are not set up for this format.

OK | Cancel | Apply

Blue Ripple Sound Rapture 3D Advanced Layout



QLab B-Format Playback



Plogue Bidule Set-up for Harpex Upsampler

- A multi-dimensional sound environment
- Articulates concepts to an audience
- Reinforces the design concepts
- Emotionally engaging
- Has integrity and is believable
- Is ‘living’ and ‘realtime’
- Interacts with other sensory and visual technologies