

MISOUND MISOUND NUSOUND SOUND REINFORCEMEN T WORKSHOP

Optimizing Large-Scale PA Systems



HERE'S THE PLAN



01

BACKGROUND

A Brief History of Sound Reinforcement

02

ANATOMY

Signal Flow
PA System +Theory

03

TOOLS

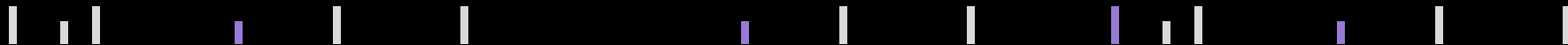
Acoustical tools for Design, Optimization, Control

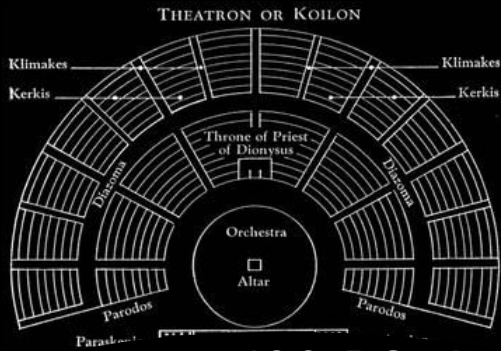
04

PLAYTIME

Patch Your Own Stage
Splay An Array

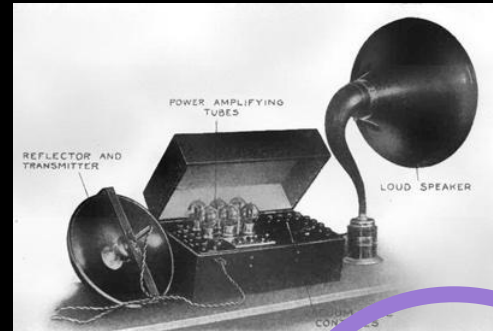
+CAREER PATHS IN LIVE SOUND?





BEGINNINGS

- 100 BC: Architectural Acoustics
- ~1875: The **Microphone**
- 1898: Coil **Loudspeaker**
- 1906: Audion: first tube **Amplifier**

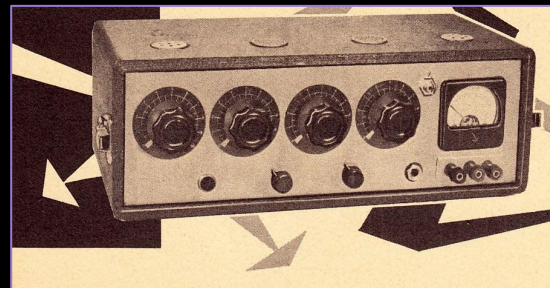


These are the **building blocks** of sound reinforcement.



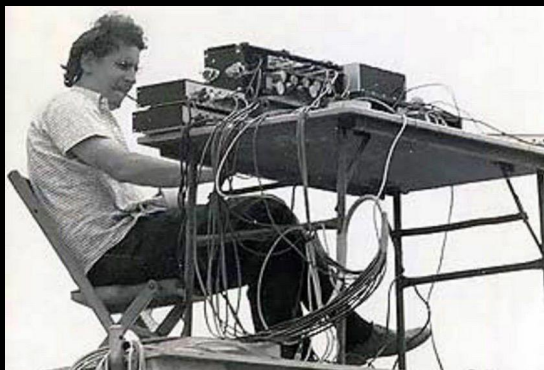
A NEED FOR NOISE

- From one-mic Jazz to Rock 'N Roll
- **1965:** Beatles Stadium Show
- **1966:** Low-impedance mics
- **1967:** Solid State Amplifier
- **1968:** Early Mixer



INDUSTRY PIONEERS

Bill Hanley, Hanley Sound



Charlie Watkins, WEM

Roy+Gene Clair, Clair Brothers



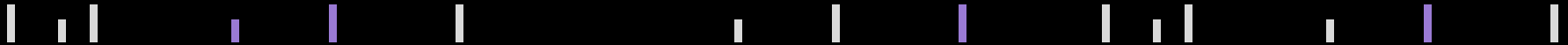


02

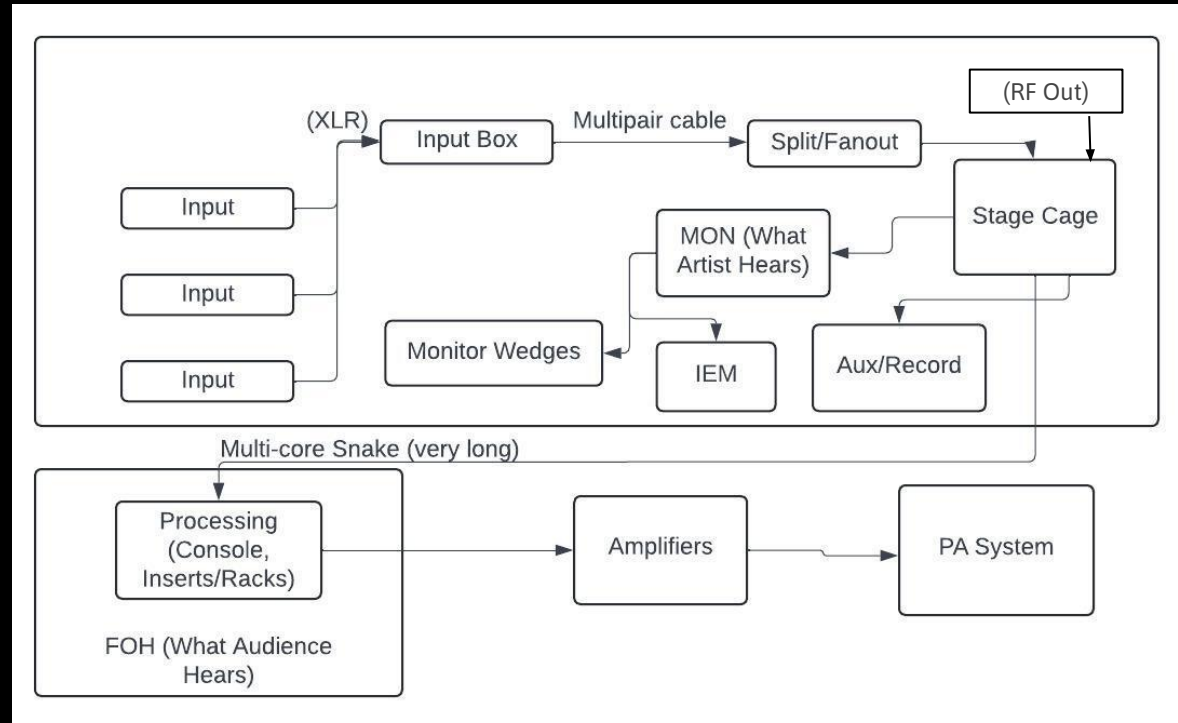
BIG SOUND BIG SOUND BIG SOUND

Building Today's Largest Audio Systems

fred again.. LA Coliseum 2024

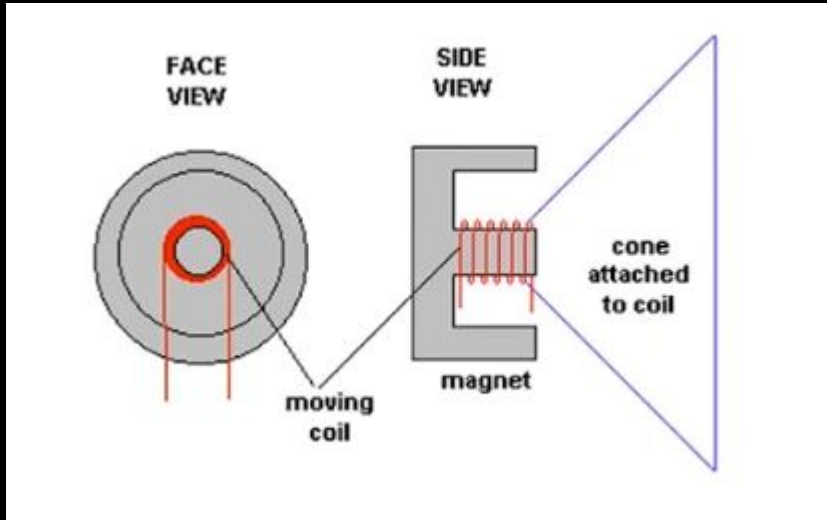


SAMPLE SIGNAL FLOW





COIL SPEAKERS



Amplified Electrical Signal



Magnetic Field



Moves Coil



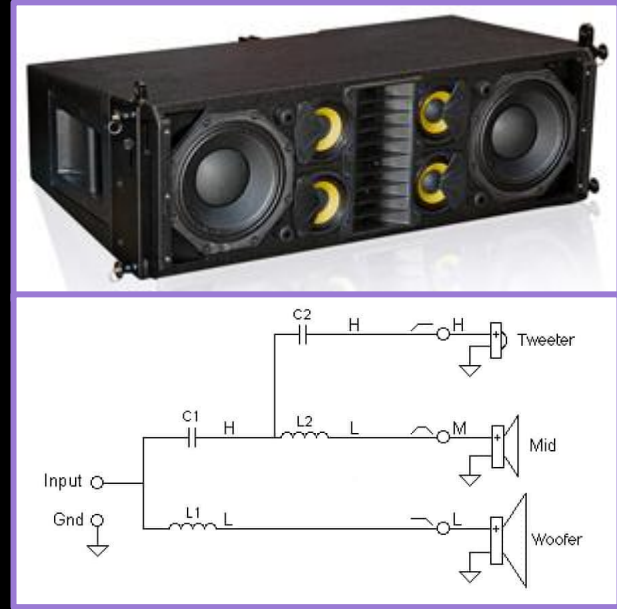
Drives Cone -> Moves Air



CABINETS



1 frequency band/cabinet



Full-range w/crossovers

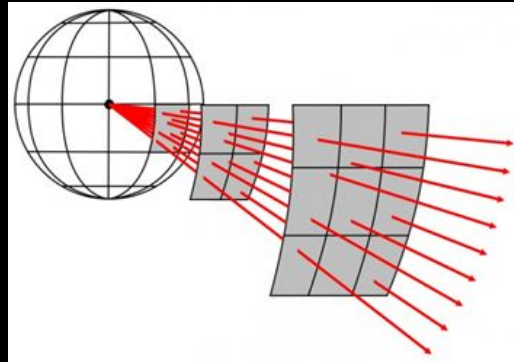


PA SYSTEMS



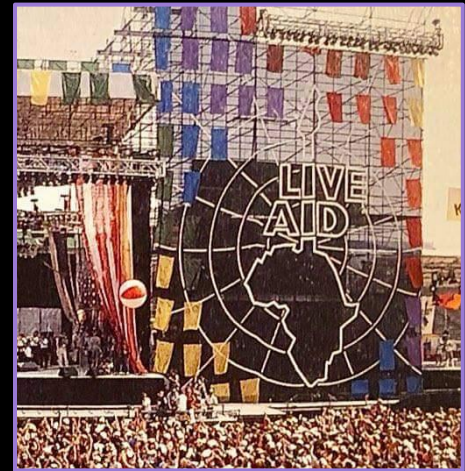
Point-Source Clusters

Trapezoidal shape to help w/
destructive interference



Inverse Square Law

$$\text{SPL} \propto 1/r$$



Festival Speaker Wall

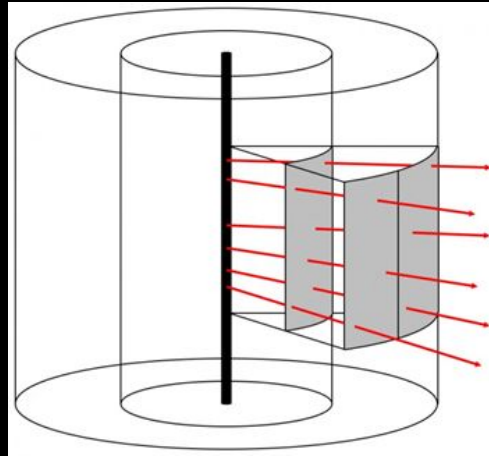
Clair Bros!



PA SYSTEMS



Line Array



Ideal Line Source Behavior
 $SPL \propto 1/r$

WE HAVE TO TALK ABOUT THIS.

VOCALS

PIANO

BAS
S

BASS

DRUM
/VOX

PNO/
LGTR/
DRUM

L. GTR

VOX
LF

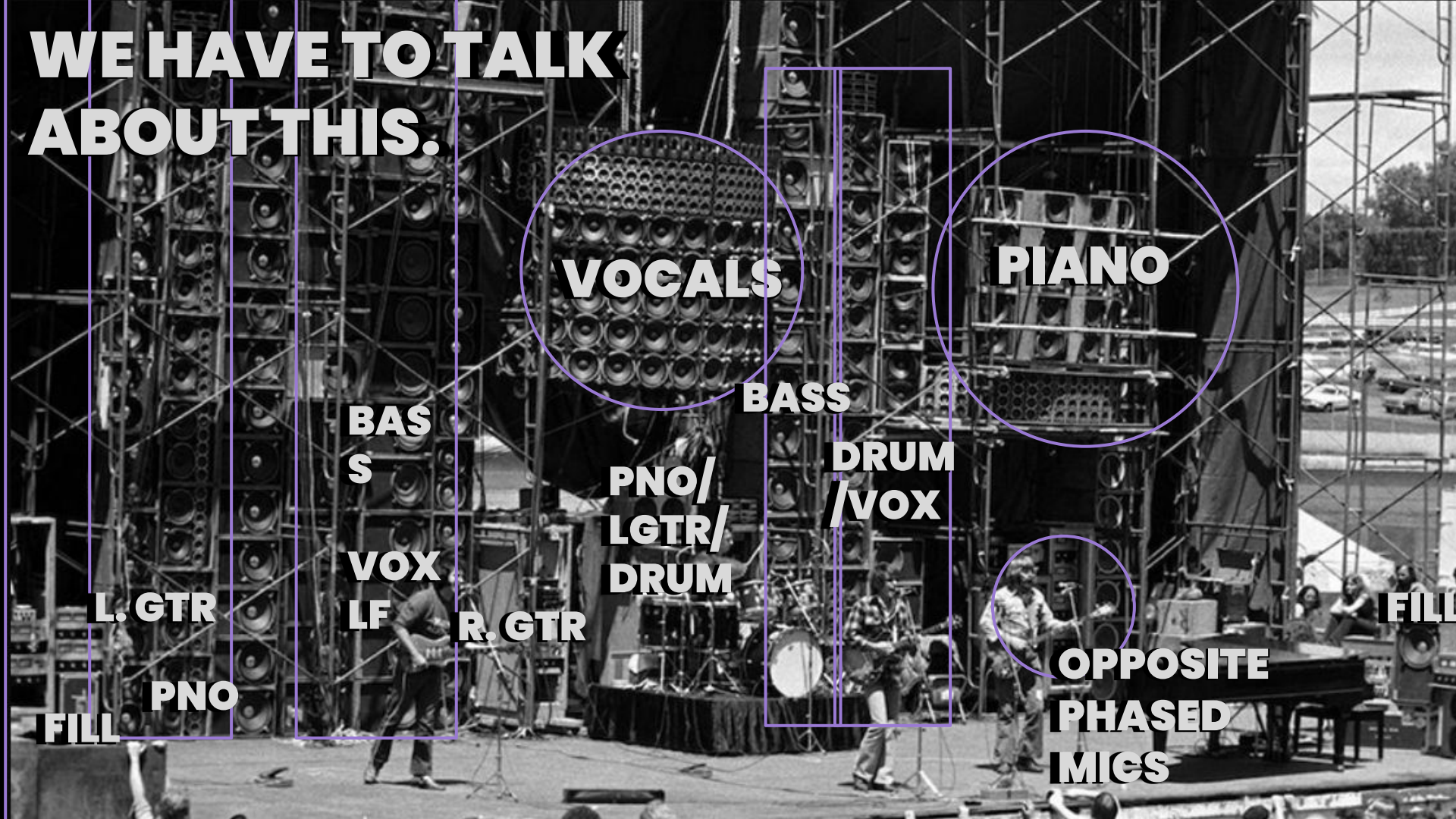
R. GTR

FILL

FILL

PNO

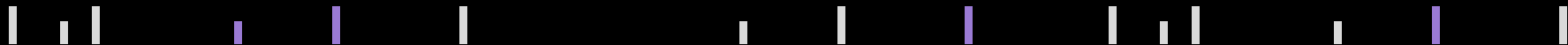
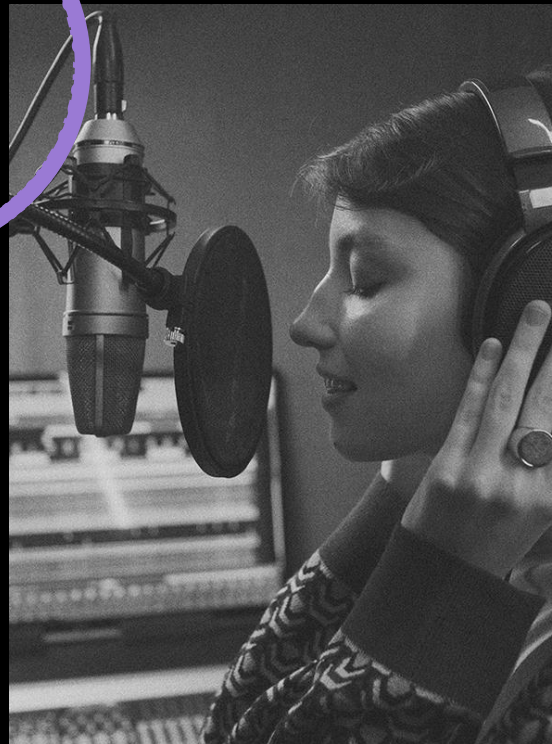
OPPOSITE
PHASED
MICS



0
3

TOOLBOX TOOLBOX TOOLBOX

Software for Audio Optimization



SOFTWARE FOR:



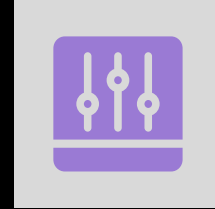
DESIGN

Build and simulate systems before deployment



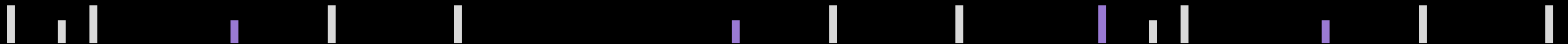
ANALYSIS

Asynchronous and real-time audio analysis



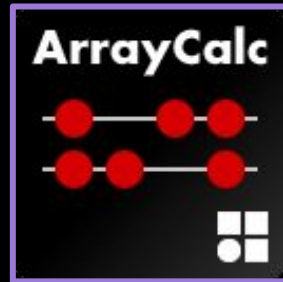
CONTROL

Processing, calibration, configuration, and more

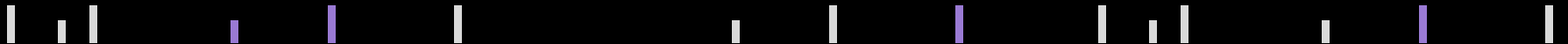




DESIGN (AND MORE)



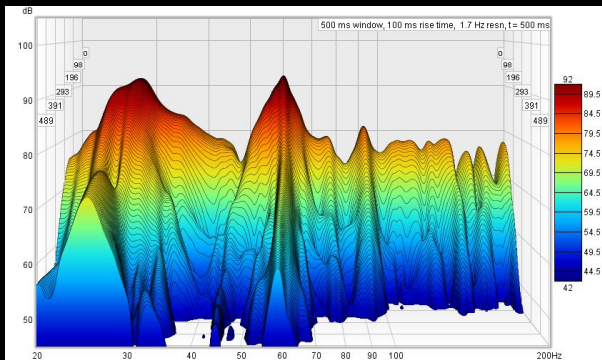
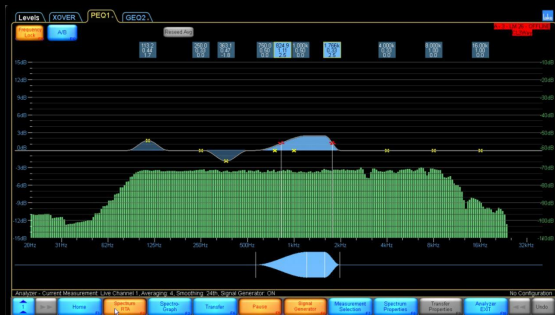
- Brand-Specific CAD programs
- Venue and Speaker system simulations
 - SPL calculation
 - Delay times
 - Rigging, amps, models, splay
 - verification





ANALYSIS

- Evaluate room acoustics
 - Ensure consistent sound across diff. venues
- Comparative software
- Spectrum, Phase, TF
- Ears > lines on a screen.



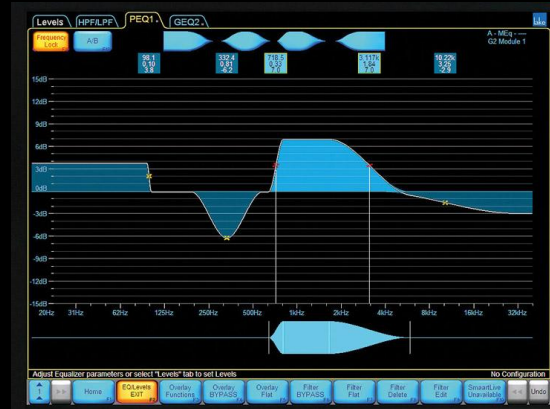
SysTune, REW (Bottom)



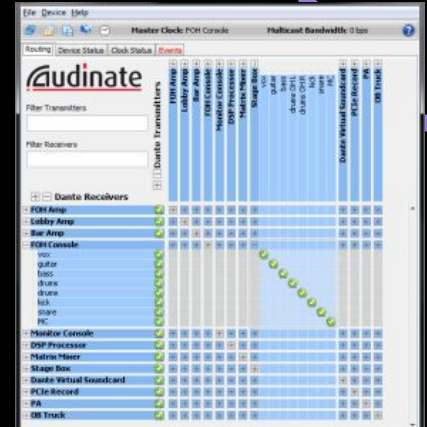


CONTROL

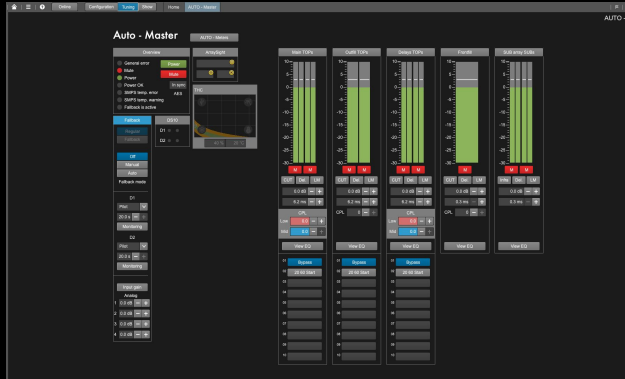
- Network/Config
- Zoning
- Processing

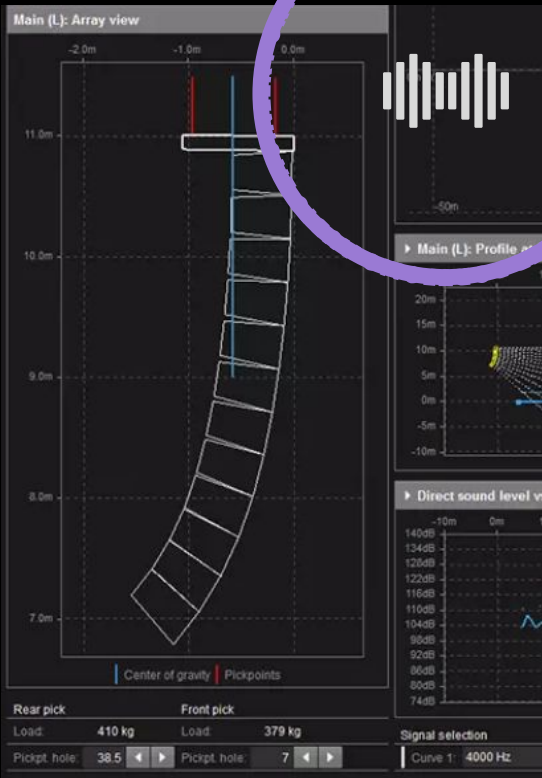


Lake



Dante Controller





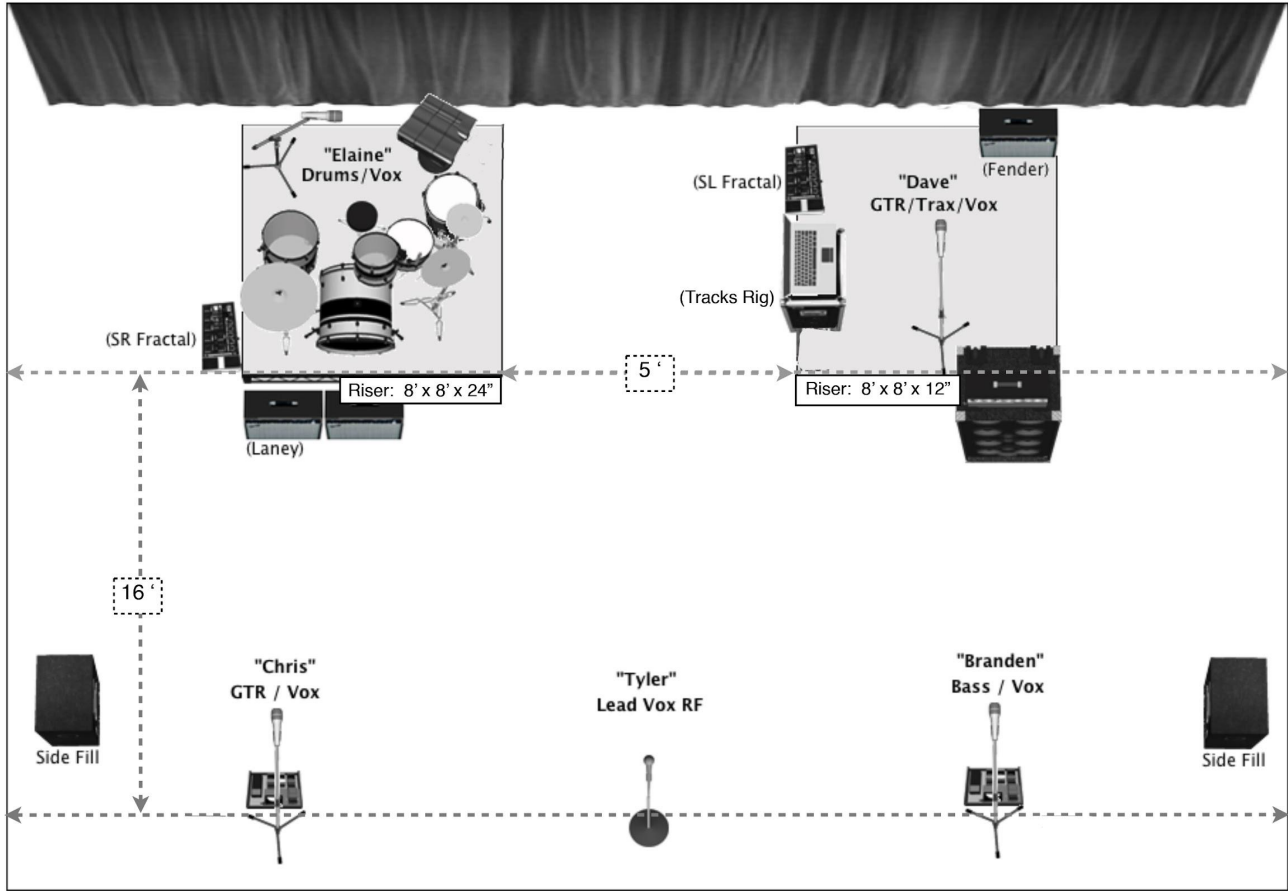
DO IT!

ACTIVITY 1: SIGNAL PATCH

- Input List + Stage Plot
- Position input boxes and power drops
- Fill out Input List

ACTIVITY 2: PA OPTIMIZATION

- Download/launch d&b ArrayCalc
- Import example file
- Angle PA hangs for optimal coverage





THANKS!

Does anyone have any questions?

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ALTERNATIVE RESOURCES

Here's an assortment of alternative resources whose style fits the one of this template

PHOTOS

- Close up man making music
- Close up smiley woman with headphones
- Close up man making music
- Close up smiley woman singing
- Man woman making music medium shot
- Medium shot smiley woman playing guitar
- Medium shot man with headphones
- Close up artist making music
- Close up microphone pop filter
- Close up artist playing guitar
- Front view smiley female musician playing piano keyboard indoors





RESOURCES

Did you like the resources on this template? Get them for free at our other websites:

PHOTOS

- Close up woman singing
- Side view female musician recording song home while playing acoustic guitar
- Close up man making music
- Medium shot man wearing headphones
- Medium shot man making music
- Close up young man making music
- Medium shot man making music
- Close up woman recording song
- Medium shot man making music with computer
- Close up man making music
- Close up man wearing headphones
- High angle music making studio

BACKGROUND

- Music landing page template with photo