I. OVERVIEW

Purpose
The PAC was designed to facilitate easier implementation of phased arrays in live audio. It does so by allowing the user to link multiple DSP parameters to a hardware control, so multiple parameters can change by individual factors when one control is adjusted.

This allows easy control of beam direction from a line array, or directionality of a subwoofer array, with just the turn of a knob.

Background theory
Additionally, the PAC can perform all standard live sound system processor functions such as limiting, compression, equalization, and high/low pass filtering.

Beamforming equation for desired angle(θ), Speaker spacing L:
Delay = (speaker index)*(speaker spacing)*sin(θ)

Example: DSP.output[x].delay = x*L*sin(slider[0]*90)

II. SYSTEM ARCHITECTURE

System Model

Data Flow

III. PROTOTYPE AND FINAL DESIGN

IV. TESTING

The receiver and transmitter circuits were tested for appropriate levels. DSP gain and delay were also tested.

No processing, no directionality
106.5 dB (back)
106 dB (front)

Directional array implemented on PAC
109 dB (back)
102.5 dB (front)

Real-world testing with an end-fire subwoofer array

V. CONCLUSION

Our team successfully created a standalone live sound system controller that allows the user to adjust the beam of a directional speaker array in real time via the onboard controls.

VI. PAC TEAM MEMBERS