

International Future Energy Challenge Information Session

Brian Johnson
General Chair for IFEC 2024

ECCE 2023 in Nashville, TN, on October 30th, 2023

IFEC 2024: University of Texas at Austin

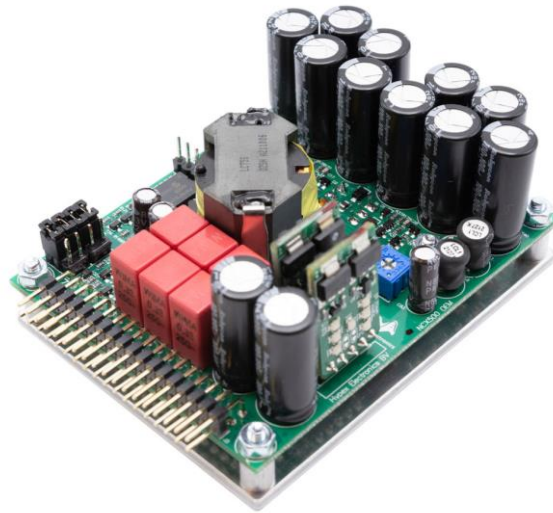
Topic: Stereo Switch-mode Audio Power Amplifier

- Power input: 48 V from dc supply
- Audio output: 135 W per channel @ 6Ω , 3 channels
- Signal Input: Balanced analog stereo

IFEC 2024: Vision Statement for Competition

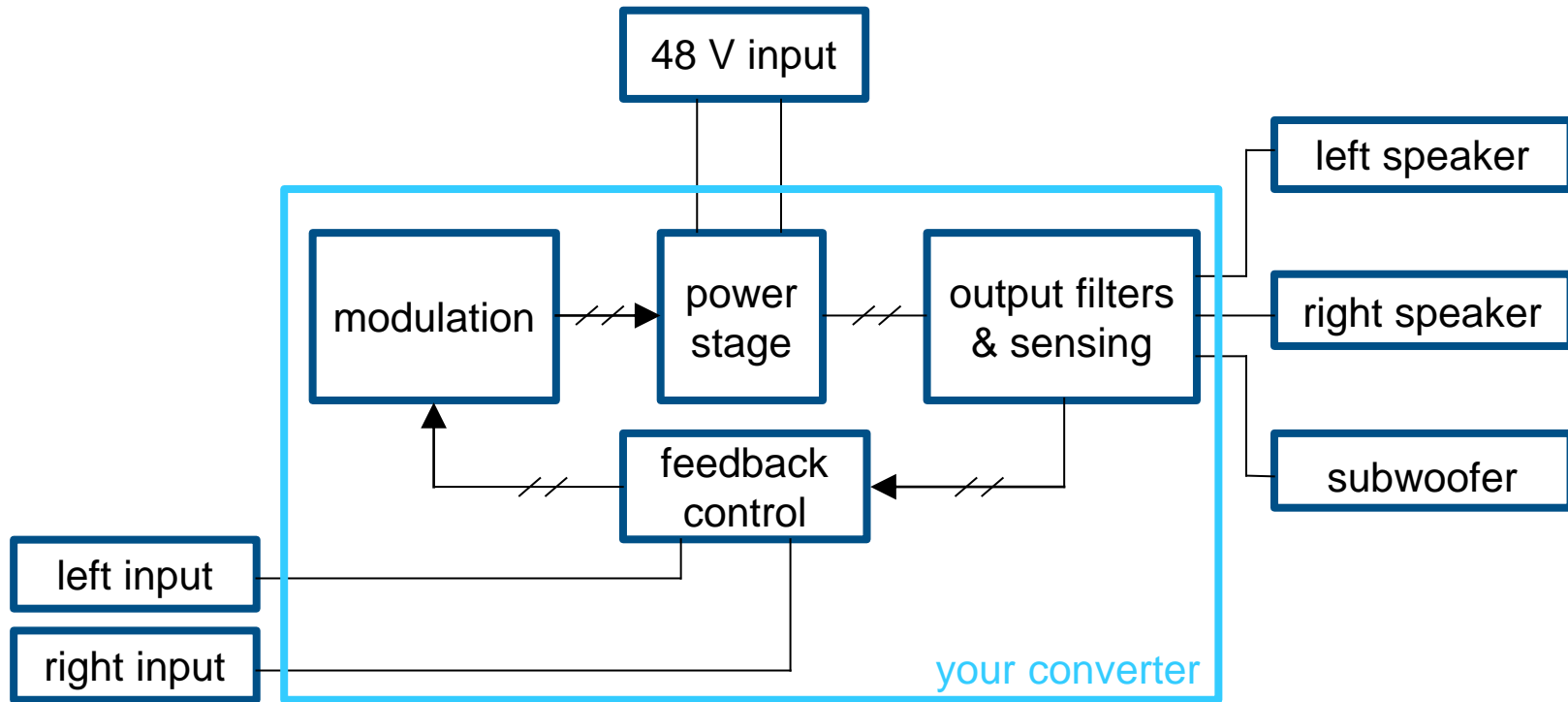
An emphasis on converter and control innovations:

- *An ideal design would have an innovative power stage, high-bandwidth closed-loop performance, a modest-sized output filter, and sound exceptional to an audio professional.*



IFEC 2024: Key Subsystems

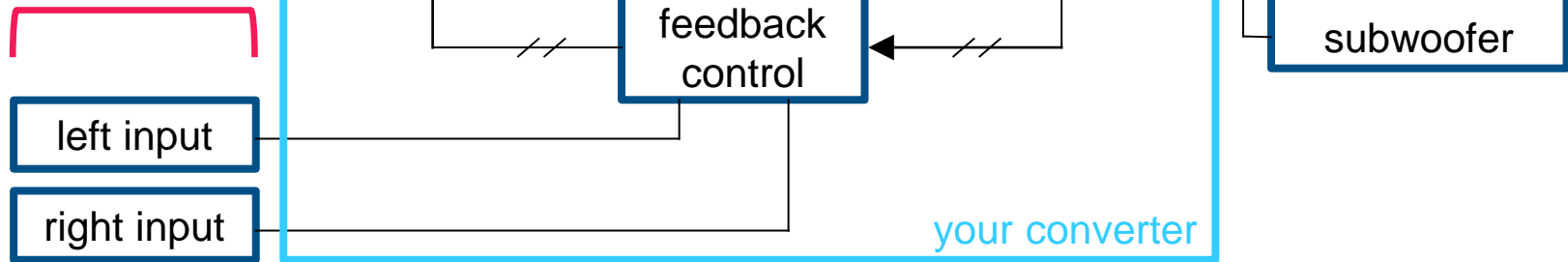
The closed-loop power electronics system:



IFEC 2024: Key Subsystems



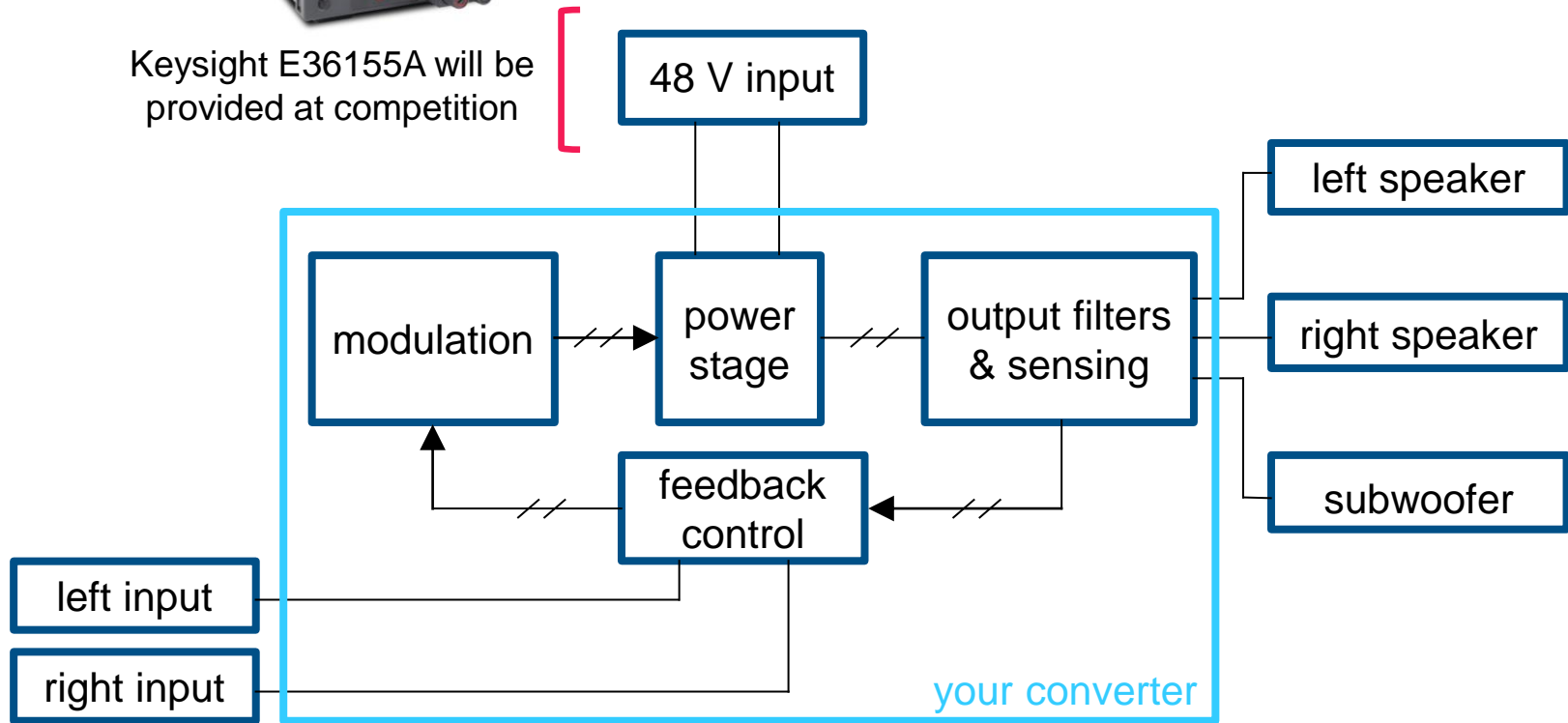
Analog stereo input: differential balanced inputs via 2 XLR plugs



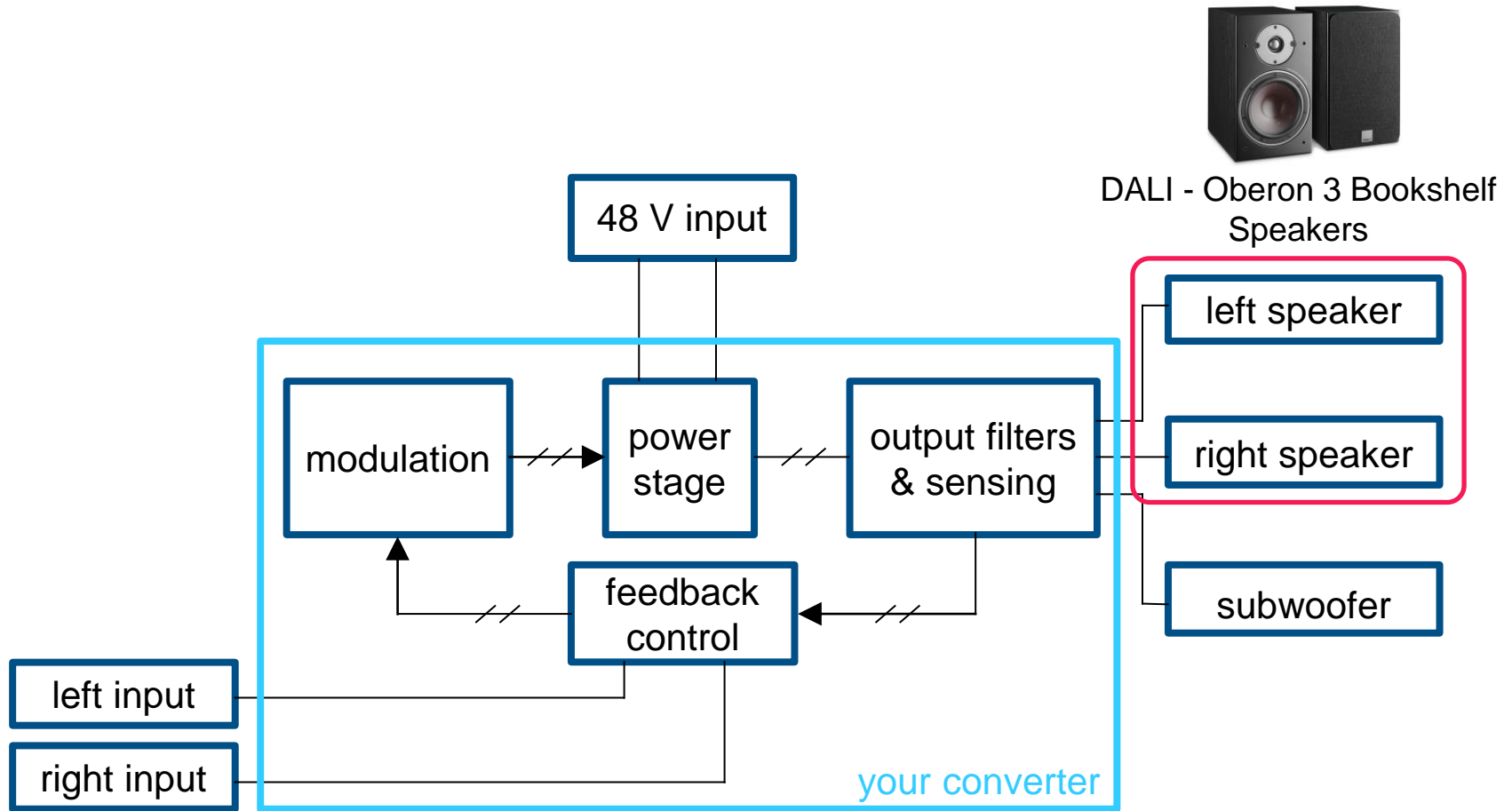
IFEC 2024: Key Subsystems



Keysight E36155A will be provided at competition

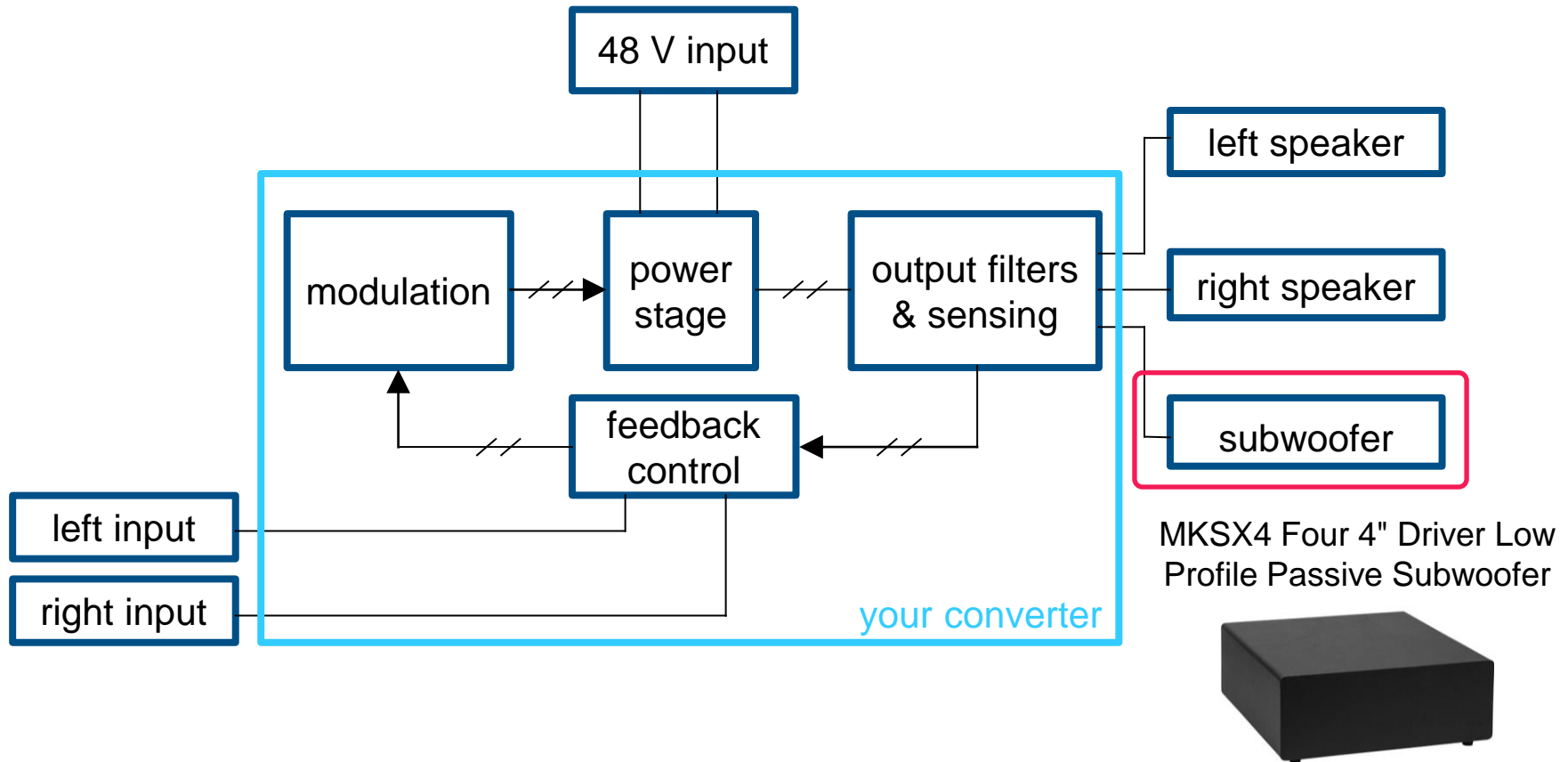


IFEC 2024: Key Subsystems



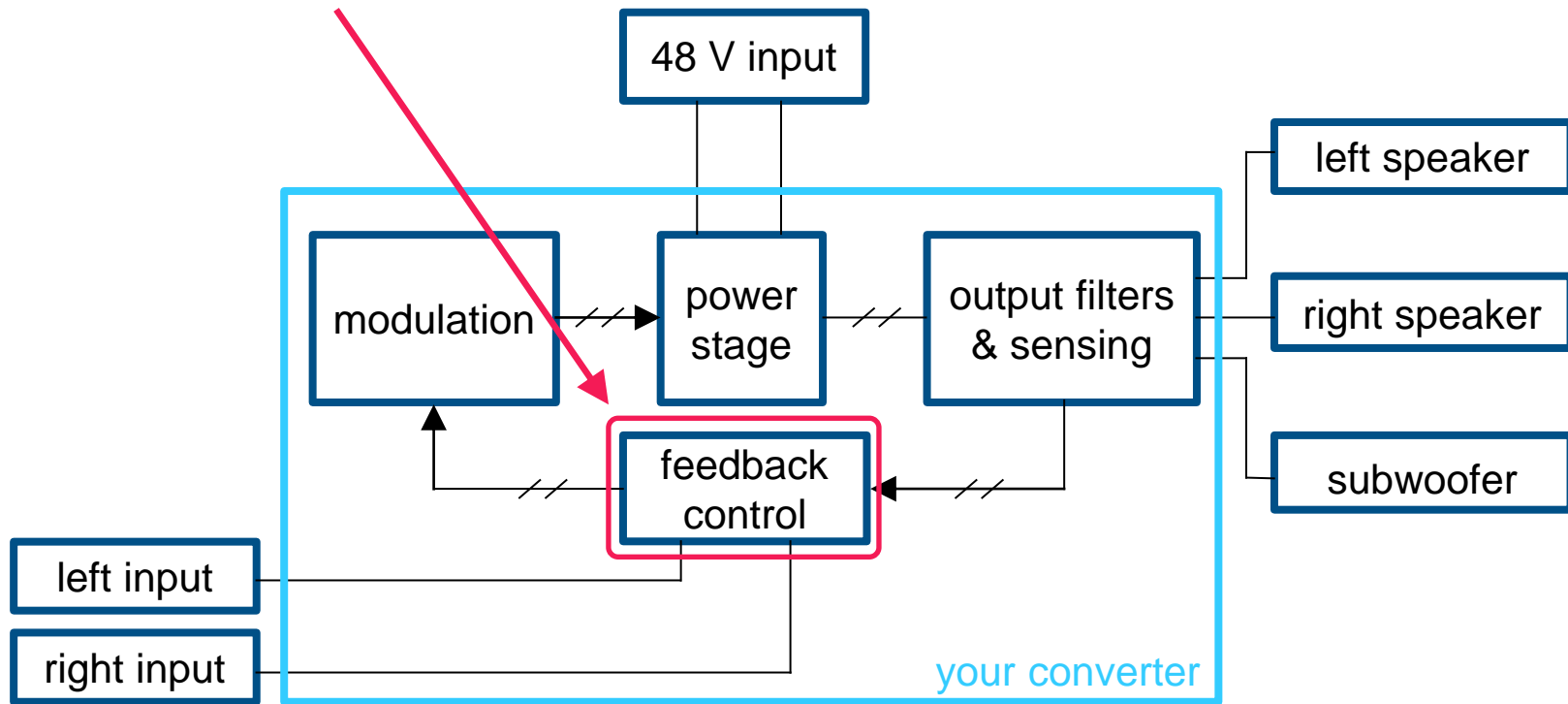
DALI - Oberon 3 Bookshelf Speakers

IFEC 2024: Key Subsystems



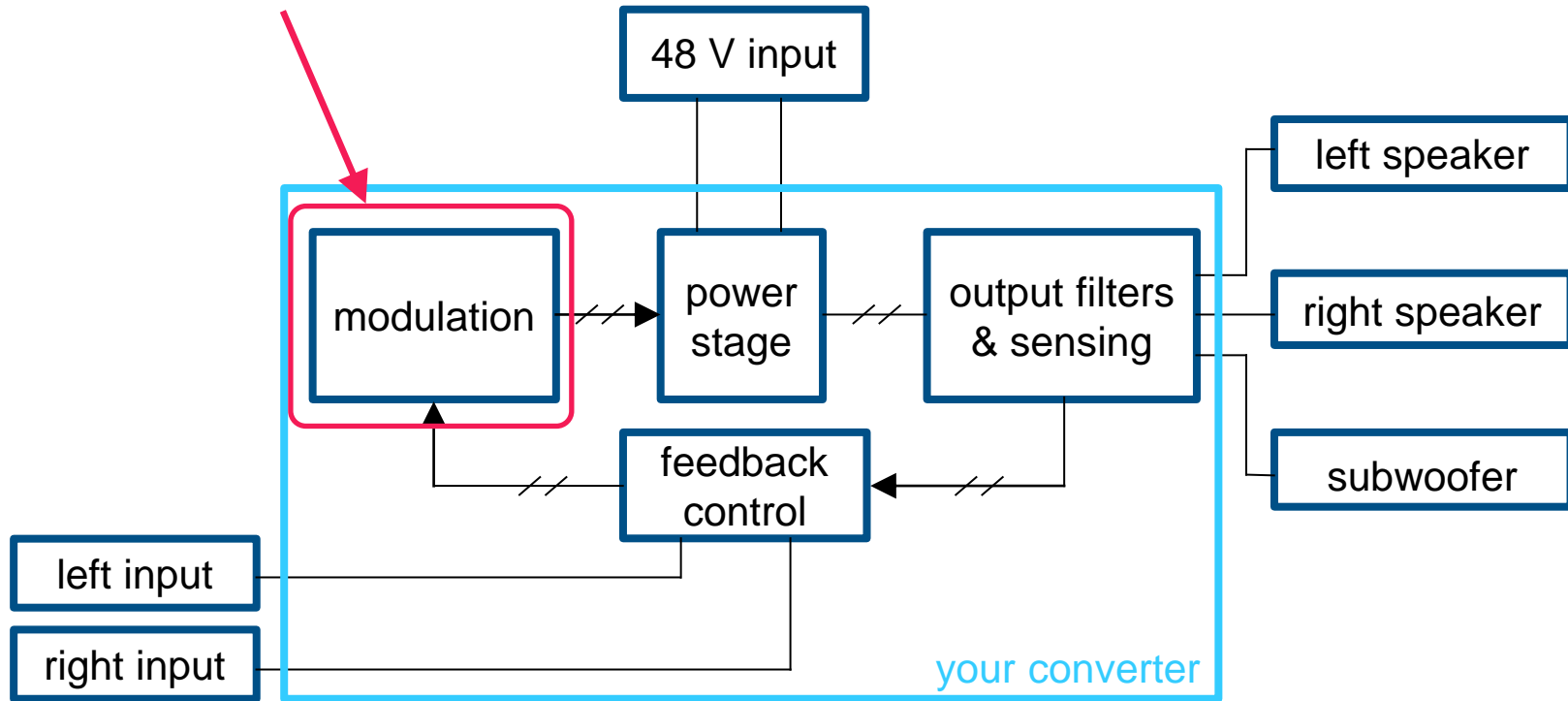
IFEC 2024: Key Subsystems

Goal is for output waveforms to track analog input signals. Analog and/or digital controls may be used.



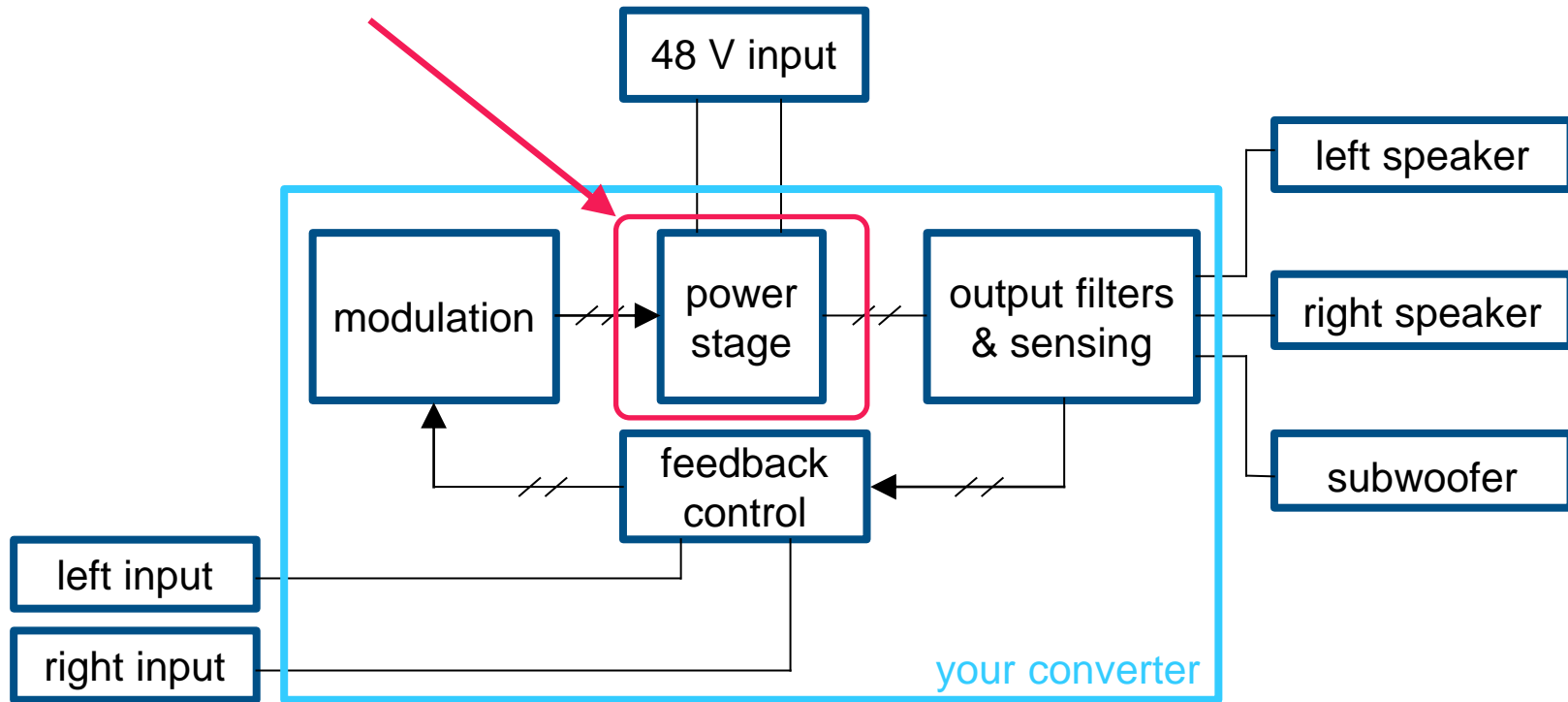
IFEC 2024: Key Subsystems

Converts control signals into switch-level waveforms for gate drivers.



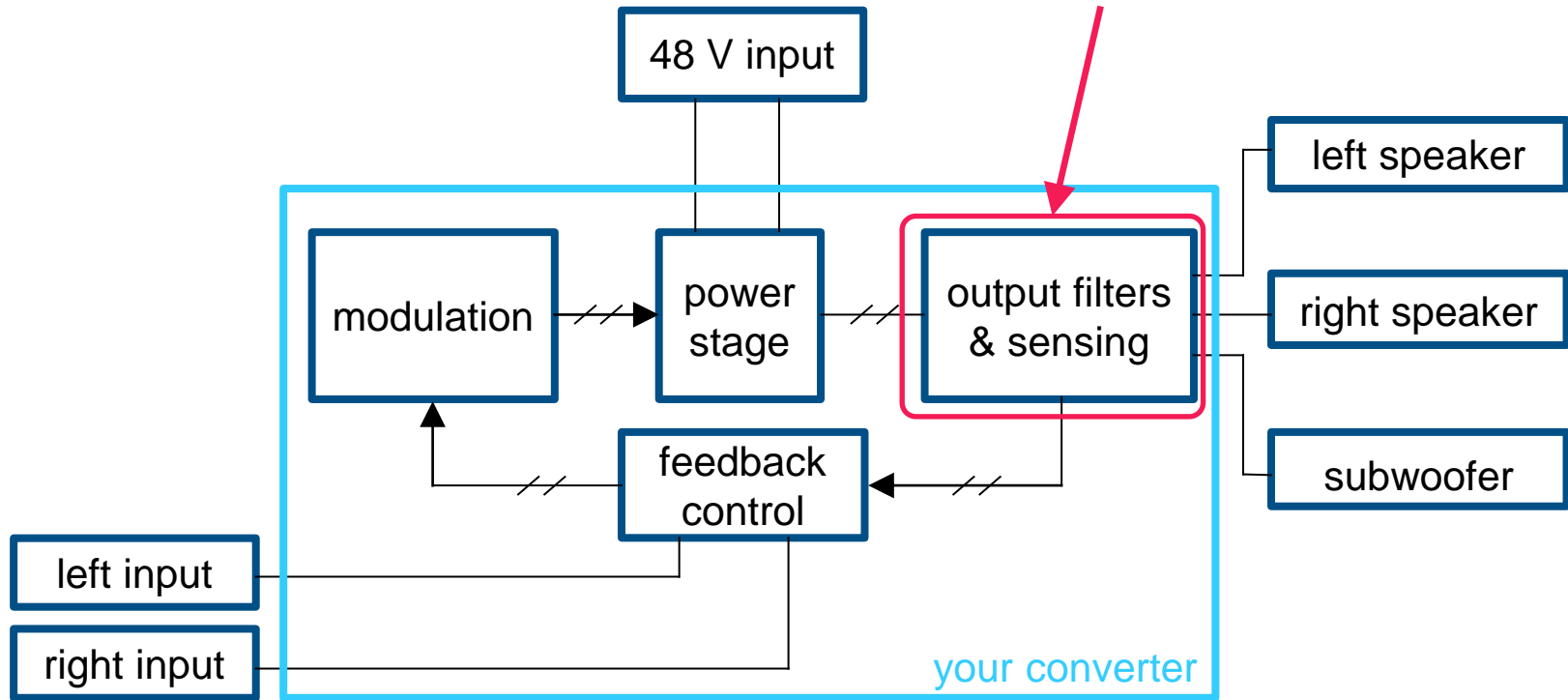
IFEC 2024: Key Subsystems

Power devices that process power and shape output waveforms reside here.



IFEC 2024: Key Subsystems

Filtering components reside here so that a high-quality output waveform is provided to the speakers.



IFEC 2024: Test Equipment

Audio Precision brand, APX5xx B Series

- One unit will be procured for evaluating performance during final competition.*



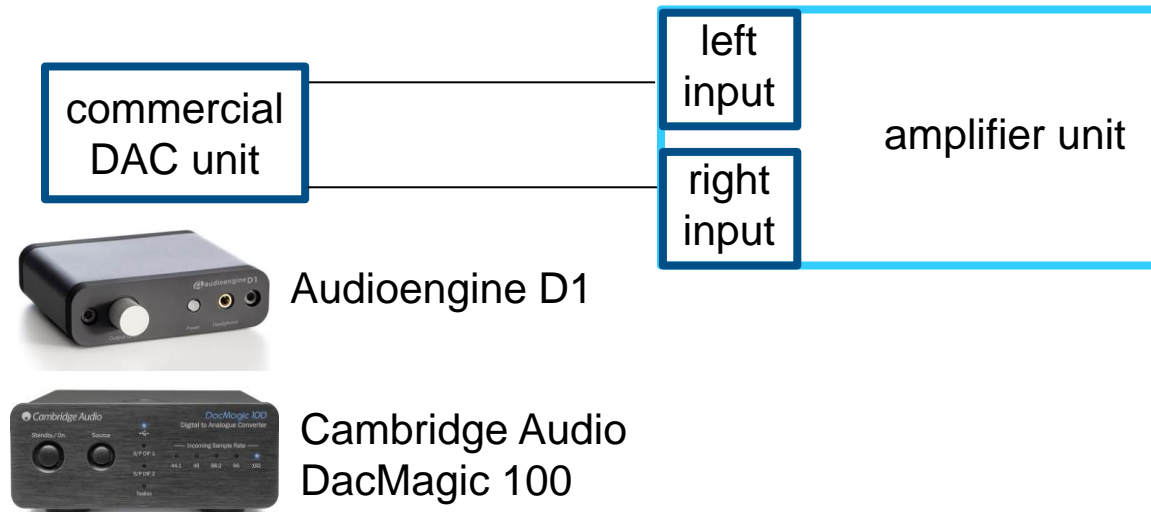
IFEC 2024: Metrics

Metrics will include but not be limited to:

- *Subjective listening experience*
- *Input-output audio frequency response*
- *THD and distortion metrics in general*
- *Signal-to-noise ratio*
- *Converter efficiency*
- *Converter weight*
- *Converter volume*

IFEC 2024: Guidance on Input Audio Files

- Off-the-shelf commercial products may perform digital to analog conversion external to unit as shown below.



IFEC 2024: Next Steps

- Reference WAV format audio files will be posted in the near future.
- Keep up to date by checking the website regularly.
- Relevant Dates:
 - Proposal Deadline Dec. 10, 2023
 - Acceptance Notification Nov. 17, 2023
 - Workshop at APEC 2024 Feb. 25, 2024
 - Notification of Finalists March 08, 2024
 - Final Competition at UT Austin July xx, 2024