
## General Description

The AC 24 stereo 4-way Crossover combines conventional analog controls and DSP signal processing. The AC 24 is ideal for those who want the features and accuracy of DSP, but prefer not to use a PC for control. One knob = one function — no confusion. This approach allows a full-featured, high performance product that doesn't break the bank. The AC 24 is a truly affordable crossover that features the very best technology, with exactly the right features.

The AC 24 combines Rane's exclusive phase compensated, 4-way *Linkwitz-Riley-Plus* crossover filters with independent time delay and limiting for each output. Once settings are made, an included security cover guards all controls. With these tools, it is possible to realize a well-protected sound system that exhibits unsurpassed clarity and accuracy.

See the RaneNote *Linkwitz-Riley Crossovers* at the Rane website for background information.

## Why *Linkwitz-Riley-Plus*?

- Absolutely flat amplitude response through out the passband.
- Steep 24 dB per octave roll-off rate after the crossover point.
- All outputs are everywhere in phase.
- Excellent transient response.

## Special AC 24 Features

- Exclusive Automatic Phase Compensation
- Independent Alignment Delays
- Independent Limiters
- CD Horn EQ on the Hi-Mid and High Outputs
- Stereo Link Switch
- Summed Output Use for Band-Split Limiting and Tone Controls
- Internal Universal Power Supply
- Included Security Cover

## Applications:

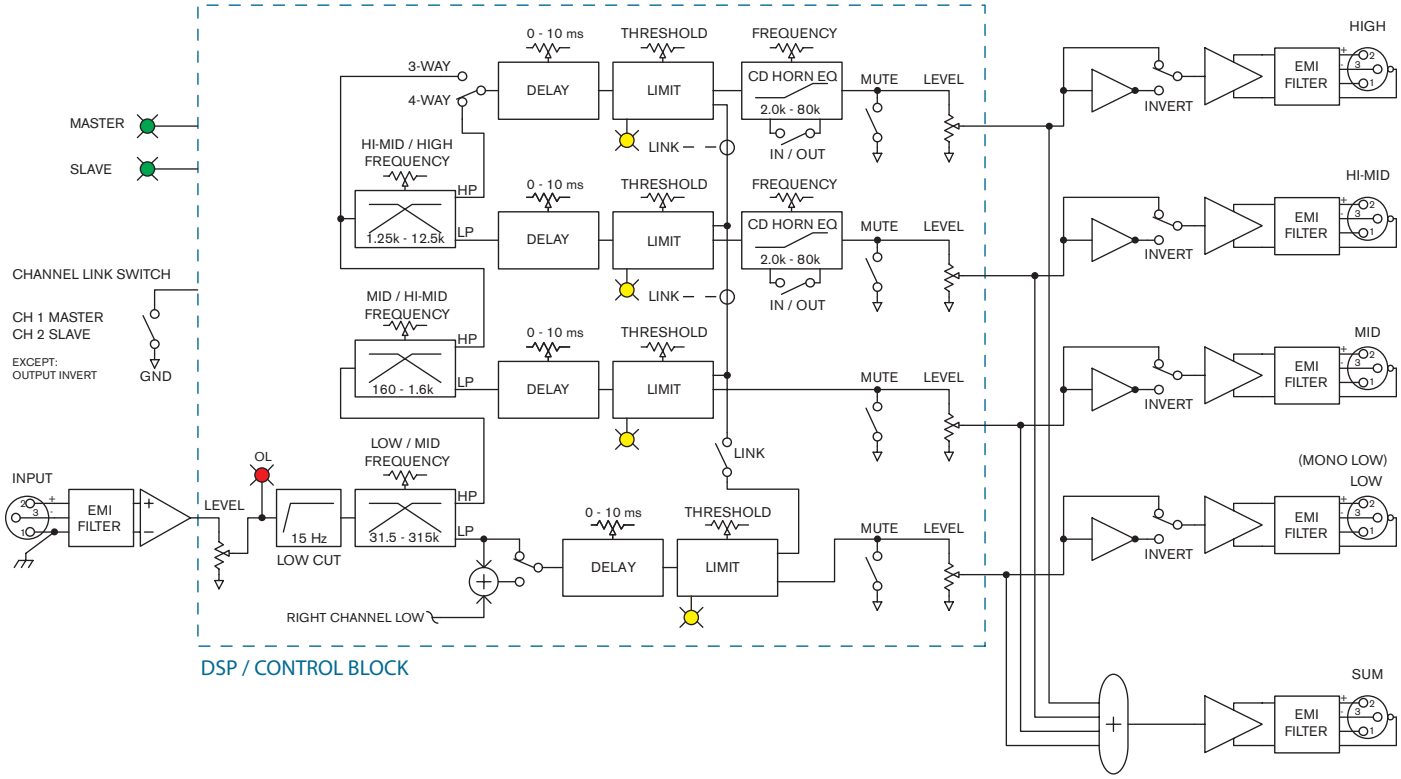
- 4-Way or 3-Way Operation
- Independent, Dual-Mono Crossover
- Linked Control, Stereo Crossover
- Split-Band Limiter
- 4-band, 4th-order, 24 dB per Octave Tone Controls

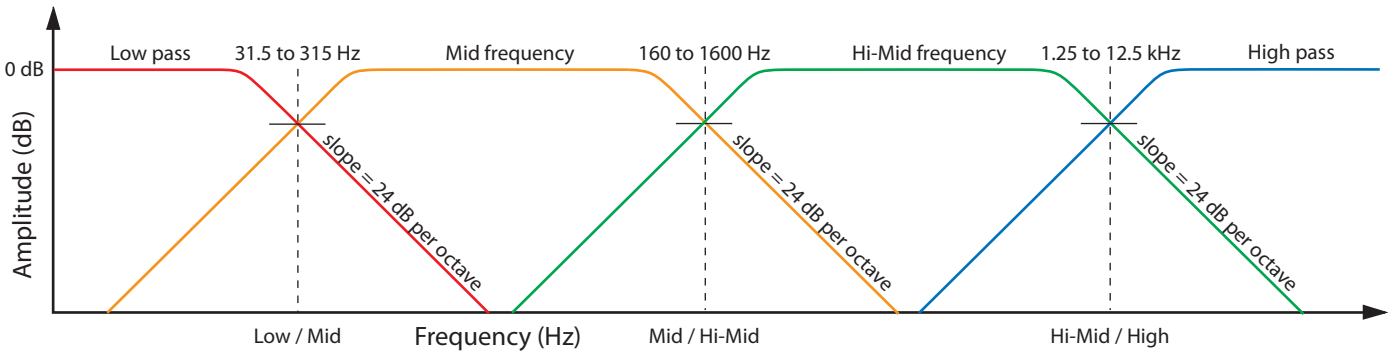
## Features and Specifications

| Parameter | Specification | Limit | Units | Conditions/Comments |
|---|---|---|---|---|
| Inputs: Type | Active Balanced | | | Channel A, Channel B |
| .....Connectors | XLR | | | Pin 2 hot per AES standards |
| .....Maximum Input | +22 | 1 | dBu | 1 kHz |
| .....Common Mode Rejection | 40 | min. | dB | 60 Hz |
| .....Impedance | 7.33k | 1 | Ω | Each leg to ground @ 1 kHz |
| 24-bit Converters: Sample Rate | 48 | | kHz | |
| .....Dynamic Range | 106 | typ. | dB | A-weighted (input to output); unity |
| DSP Block | | | | |
| .....Low-Cut Filter | 15 | | Hz | 12 dB per octave |
| .....Input Level: Range | 80 | | dB | 256 steps; audio taper |
| .....Maximum Gain | 6 | | dB | |
| .....Input Overload Indicator | 4 dB before clip | | dB | After Input Level control |
| .....4-Way Crossover | | | | |
| .....Low / Mid: | 31.5 to 315 | | Hz | 64 steps |
| .....Mid / Hi-Mid | 160 to 1.6k | | Hz | 64 steps |
| .....Hi-Mid / High | 1.25 to 12.5 | | kHz | 64 steps |
| .....Phase Compensation | Automatic | | | Crossover-Filter |
| .....Mono Low Out switch | Yes | | | |
| .....4-Way / 3-Way switch | Yes | | | |
| .....Delay | Each Output | | | 240 steps; 41.67 µs resolution |
| .....Range | 0 to 10 | | ms | (10 ms = 135 inches = 3.43 meters) |
| .....Limiter | Each Output | | | Independent Threshold Controls |
| .....Linking | High, Hi-Mid and Mid | | | Link Switch for Low |
| .....Range | 0 to -64 | | dBFS | (128 steps = .5 dB per step) |
| .....CD Horn EQ | Independent Hi-Mid and High | | | Separate Engage switches |
| .....Range | 2 to 8 | | kHz | 32 steps |
| .....Filters | 6 dB | | oct. | |
| .....Band Muting Switches | Yes | | | Each band |
| .....Band Level Control | Yes | | | Each band |
| .....Range | 80 | | dB | 256 steps |
| .....Maximum Gain | +6 | | dB | Audio taper |
| .....Channel Link Switch | Yes | | | Channel-1 Master / Channel-2 Slave |
| Outputs: | Active Balanced | | | Low, Mid, Hi-Mid, High, Sum |
| .....Connectors | XLR | | | Pin 2 hot per AES standards |
| .....Impedance | 100 | 1% | Ω | Each leg to ground |
| .....Maximum Output | +22 | 1 | dBu | 600 Ω or greater |
| .....Invert Switches | Yes | | | Low, Mid, Hi-Mid, High only |
| EMI Filters | Yes | | | Inputs and Outputs |
| Frequency Response | 15 Hz to 20 kHz | +0/-3 | dB | |
| THD+Noise | .005 | typ. | % | +4 dBu, 20-20 kHz |
| Power Supply Requirement | 100 to 240 VAC, 50/60 Hz, 20 W | | | |
| Unit: Agency Listing | | | | UL/cUL/CE |
| Unit: Construction | All Steel | | | |
| .....Size | 3.5" H x 19" W x 8.25" D (2U) | | | (8.9 cm x 48.3 cm x 21 cm) |
| .....Weight | 7.3 lb | | | (3.3 kg) |
| Shipping: Size | 4.5" x 20.3" x 13.75" | | | (11.5 cm x 52 cm x 35 cm) |
| .....Weight | 12 lb | | | (5.5 kg) |
| *Note: 0 dBu=0.775 Vrms* | | | | |

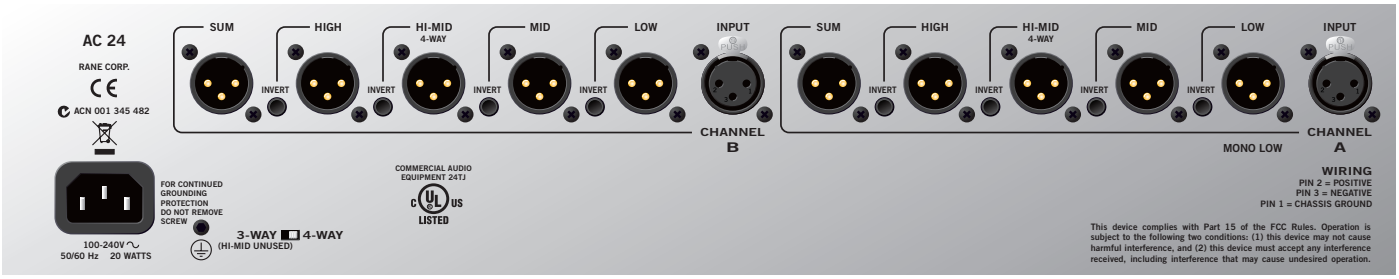
## Block Diagram

**(typical for both channels)**



## Rear Panel




## Architectural Specifications

The active crossover shall contain digitally-controlled 4th-order Linkwitz-Riley-Plus phase-compensated filters. All control shall be provided from standard controls and switches on the front panel. The crossover shall provide a switch to allow 3-way or 4-way operation on the rear of the unit.

Provisions shall exist to correct for driver misalignment by adding 0 to 10 ms of time delay to the low, mid, hi-mid and high frequency outputs.

Signal inputs and outputs shall be active balanced design terminated with XLR connectors. EMI filters shall be built-in.

Signal limters shall be built in, with individual threshold controls for each output. The mid, mid-high and high output limiters shall be linked, and a switch shall be provided to link the low output limiter.

The crossover shall supply two independent channels. A switch shall be provided to link the two channels.

The unit shall provide summed outputs that recombine the crossover outputs for each channel. The unit shall provide a switch to sum the low outputs for mono subwoofer operation.

The active crossover shall allow an input level range of Off to +6 dB. The output level controls shall allow a level range of from Off to +6 dB. Mute and invert switches shall be provided on the low, mid, hi-mid and high frequency outputs.

The unit shall include a 19" by 3.5" security cover.

The unit shall meet CE and UL agency safety requirements and be powered from an internal universal power supply (100 to 240 VAC) via a rear panel IEC connector. The unit shall be constructed entirely from cold-rolled steel. The unit shall be supplied with ears for mounting into a standard 2U EIA rack.

*The unit shall be a Rane Corporation AC 24 Active Crossover.*

## References

1. S.H. Linkwitz, "Active Crossover Networks for Noncoincident Drivers," *J. Audio Eng. Soc.*, vol. 24, pp. 2-8 (Jan/Feb 1976).
2. D. Bohn, "A Fourth-Order State-Variable Filter for Linkwitz-Riley Active Crossover Designs," presented at the 74th Convention of the Audio Engineering Society, New York, Oct. 9-12, 1983, preprint no. 2011.
3. D. Bohn, "Linkwitz-Riley Crossovers," *RaneNote*, (1983).
4. D. Bohn, "Why Not Wye?" *RaneNote*, (1984).
5. D. Bohn, "Overload Characteristics of State-Variable Crossovers," *RaneNote*, (1985).
6. D. Bohn, "Linkwitz-Riley Active Crossovers Up To 8th-Order: An Overview," *RaneNote,* (1989).