



General Description

The Rane AC 23B Active Crossover can be configured as a stereo 2- or 3-way, or a mono 4- or 5-way. It employs 4th-order Linkwitz-Riley filter alignments to minimize phase difficulties in the critical crossover region. The AC 23B uses XLR connectors with active balanced Inputs and Outputs.

Simply put, a Linkwitz-Riley alignment is two cascaded 2nd-order Butterworth filters exhibiting identical phase characteristics on their low-pass and high-pass outputs. This characteristic guarantees in-phase outputs at all frequencies. In-phase outputs are mandatory for proper acoustic summing of common signals from adjacent drivers in the crossover region. An added benefit of this topology is steep 24 dB per octave rolloff slopes. A slope of this magnitude guarantees drivers designed to produce a specific range of frequencies, and no more, will not be driven past their

limits, thereby minimizing distortion and driver fatigue.

To further guarantee the transparent operation of the AC 23B, adjustable Delay circuits appear on the Low & Mid Outputs of each Channel to compensate for any physical misalignment of the drivers. Time correction ensures the mechanical phase alignment of adjacent drivers will be acoustically correct, thus maintaining the integrity of the electrical phase alignment of the crossover's filters.

In 2- or 3-way stereo mode, the low outputs may be mono'ed by moving an internal jumper. Constant directivity (CD) horn equalization is possible with an internal modification. See the manual for details.

See the RaneNote *Linkwitz-Riley Crossovers* for more information, available at www.rane.com.

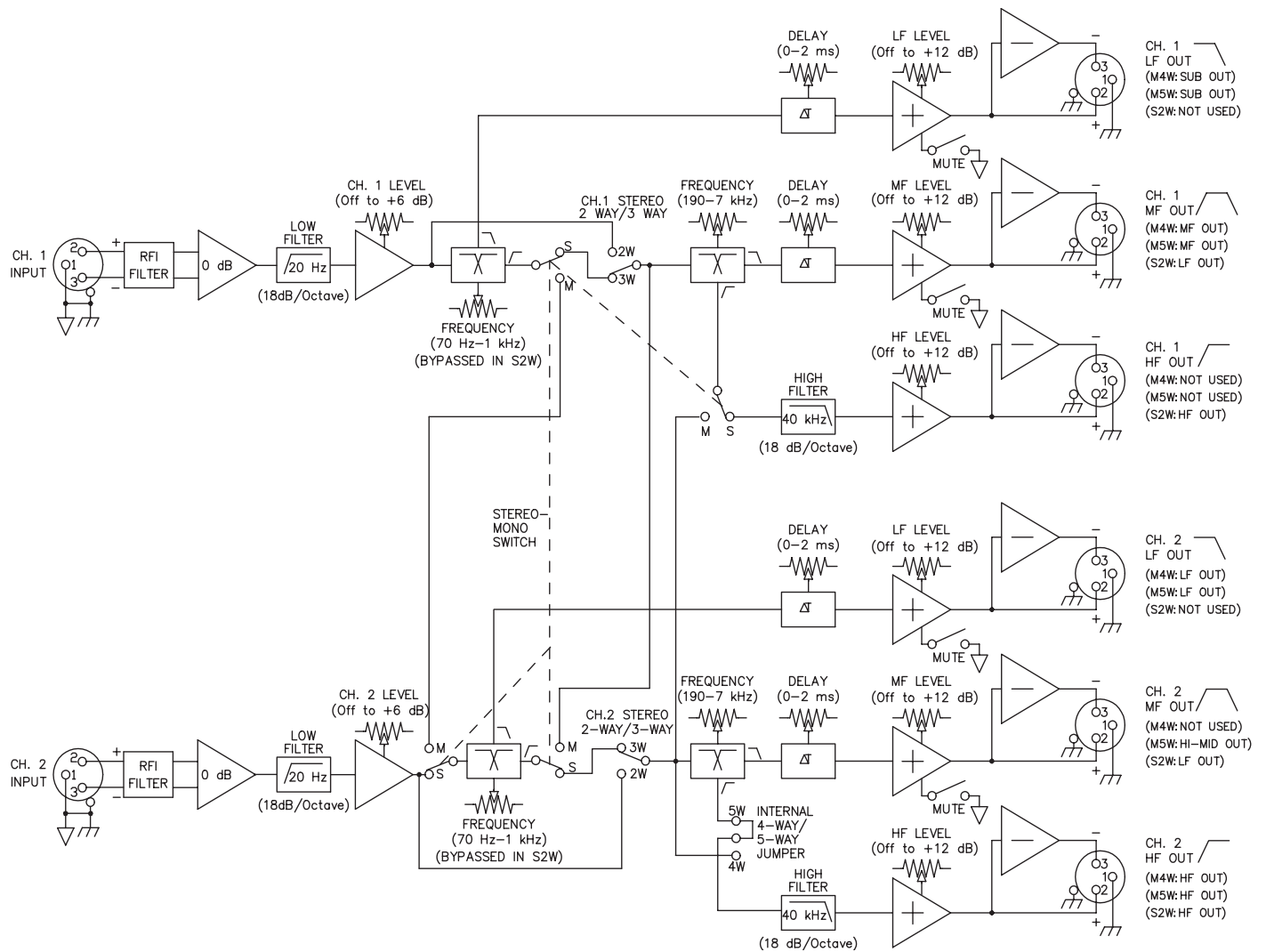
Features

- Stereo 2- or 3-Way, Mono 4- or 5-Way
- Linkwitz-Riley Alignment with 24 dB per Octave Slopes
- Adjustable Delays
- Infrasonic, Ultrasonic and RFI Filters
- Low & Mid Output Muting (3-Way)
- Input & Output Level Controls
- Fully Active Balanced XLR Inputs & Outputs
- UL/CSA/CE and 100/120/230 VAC Remote Power Supplies

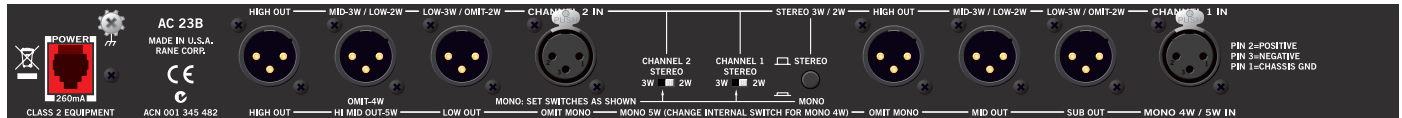
Features and Specifications

| Parameter | Specification | Limit | Units | Conditions/Comments |
|-------------------------------|----------------------------------|-------|----------|--|
| Crossover: Alignment | Linkwitz-Riley | | | Proprietary 4th-order state-variable |
|Slopes | 24 dB per Octave | | | |
|Range (3-way) | 70-1 kHz Low to Mid | | | 41-detent continuously variable pot |
|Range (3-way) | 190-7 kHz Mid to High | | | as above |
|Range (2-way) | 190-7 kHz Low to High | | | as above |
| Time Delay Adjust Range | Off to +2 | 5% | ms | Low & Mid Outputs only |
| Inputs: Impedance | 20k | 1 | Ω | |
|Maximum Level | +21 | 1 | dBu | |
|Gain Range | Off to +6 | -0/+4 | dB | |
| Inputs: Type | Active Balanced XLR | | | Pin 2 hot per AES standards |
| Outputs: Type | Active Balanced XLR | | | Pin 2 hot per AES standards |
|Impedance | 200 | 1% | Ω | |
|Maximum Level | +20 | 1 | dBu | 600 Ω or greater |
|Gain Range | Off to +12 | -0/+4 | dB | |
| Band Muting Switches | Yes | | | Low & Mid Outputs only |
| RFI Filters | Yes | | | |
| Infrasonic Filter | 20 Hz, 18 dB/Oct, Butterworth | 3% | Hz | |
| Ultrasonic Filter | 40 kHz, 18 dB/Oct, Bessel | 3% | Hz | Linear phase |
| Frequency Response | 20-40 kHz | +0/-3 | dB | |
| THD+Noise | 0.02 | .01 | % | +4 dBu, 20-20 kHz |
| IM Distortion (SMPTE) | 0.02 | .01 | % | 60 Hz / 7 kHz, 4:1, +4 dBu |
| Signal-to-Noise Ratio | 92 | 2 | dB | re +4 dBu, 20 kHz noise bandwidth |
| Unit: Agency Listing | | | | |
|120 VAC model | Class 2 Equipment UL & CSA | | | National Electrical Code Class 2 |
|230 VAC model | VDE, SELV CE-EMC CE-Safety | | | Safety Extra Low Voltage EMC directive 89/336/EEC Exempt per Art. 1, LVD 73/23/EEC |
| Power Supply: Agency Listing | | | | |
|120 VAC model | UL CSA | | | File no. E88261 File no. LR58948 |
|230 VAC model | CE-EMC CE-Safety | | | EMC directive 89/336/EEC LV directive 73/23/EEC |
|100 VAC model | Built to JIS | | | Japan only |
| Power Supply Requirement | 18 VAC w/center tap | 0.1 | Vrms | Model RS 1 |
| Maximum Current | 750 | | mA | RMS Current from Remote Supply |
| Unit: Construction | All Steel | | | |
|Size | 1.75" H x 19" W x 5.3" D (1U) | | | (4.4 cm x 48.3 cm x 13.3 cm) |
|Weight | 5 lb | | | (2.3 kg) |
| Shipping: Size | 4.25" x 20.3" x 13.75" | | | (11.5 cm x 52 cm x 35 cm) |
|Weight | 9 lb | | | (4.1 kg) |
| <i>Note: 0 dBu=0.775 Vrms</i> | | | | |

Block Diagram



Rear Panel



Choosing the Right Configuration: Mono, Dual Mono, or Stereo?

Very few systems indeed will utilize a two channel crossover for the purpose of true stereo imaging. Discrete stereo channels which are run from the mixing board are usually used for panning effects and/or for separate equalization of left and right speaker stacks. Different sides of the room often require significantly different equalization due to varying room acoustics, dimensions, positioning of speaker stacks near walls, curtains and the like.

Even though you may not plan to use stereo equalization or panning effects, it is recommended that your system utilize discrete crossover channels for each stack of speakers to ensure flexibility and control for consistent, optimum sound quality. For example, if you plan to run a multi-stack system mono three-way, use the AC 23B rather than the AC 22B for separate control over each set of speakers—especially since phase alignment may differ with each stack requiring separate time delay adjustments. Even with only a single system equalizer, the AC 23B can deliver the extra independent control which can make a difference in sound throughout the listening area. If all drivers are built into a single cabinet, or you are running bi-amped monitors, then the AC 22B is the one for you.

Architectural Specifications

The active crossover shall contain 4th-order Linkwitz-Riley filters. Provisions shall exist to correct for driver misalignment by adding time delay to the low and mid frequency outputs.

The crossover frequency shall be controlled by a continuously variable control with 41 detents to allow mechanical reference of crossover setting.

Signal inputs and outputs shall be of active balanced design terminated with XLR connectors. RFI, infrasonic, and ultrasonic filters shall be built-in.

The active crossover shall afford an input level range of Off to +6 dB. The output level controls shall afford a level range of from Off to +12 dB with muting capability on the low and mid frequency outputs. The crossover shall supply two independent channels.

The unit shall be exempt from agency safety requirements and powered from a UL listed, CSA certified remote power supply (120 VAC) or CE approved (230 VAC) via a rear panel modular plug input. The unit shall be constructed entirely from cold-rolled steel, and mount into a standard 1U EIA rack.

The unit shall be a Rane Corporation AC 23B Active Crossover.

Available Accessories

- SC 1.7 Security Cover

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, "Linkwitz-Riley Active Crossovers Up To 8th-Order: An Overview," *RaneNote*, (1989).