



OWNERS MANUAL

**ELECTRONIC
CROSSOVER**

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FEATURES

- Stereo two-way or mono three-way modes with mono-summed subwoofer output. LED indication for stereo or mono modes.
- Sweepable frequency controls makes crossover frequencies easy to select and allows freedom to select non-ISO frequencies
- Mono-summed subwoofer output delivers maximum bass impact and helps avoid frequency cancellations inherent with stereo LF systems. The mono subwoofer output is continuously variable from 60 Hz to 250 Hz.
- A switchable 30 Hz third-order high-pass filter is included to protect speakers from overexcursion at infrasonic frequencies.
- Individual mute controls on each output makes system setup and adjustment easier
- A rear-panel groundlift switch helps minimize hum caused by ground loop problems

SPECIFICATIONS

Channel Configurations:

Stereo two-way or monaural three-way

Filter Type:

4th-order Linkwitz-Riley

Filter Slope:

24-dB-per-octave

Crossover Frequencies:

Continuously variable from 80 Hz to 8,000 Hz. A mono-summed subwoofer section operates from 60 Hz to 250Hz or 60-250 Hz

High-Pass Filter:

Switchable, 30 Hz, 18-dB-per-octave

Output Level:

Adjustable, off to +20 dBu (7.75 V)

Frequency Response:

20 Hz to 20,000 Hz (± 1 dB) (sum of outputs)

Total Harmonic Distortion:

Less than 0.1%

Inputs:**Type: Electronically-balanced**

Impedance: 20,000 ohm balanced

Maximum Level: +20 dBu (7.75 V rms)

Outputs:**Type: Electronically servo-balanced**

Maximum Level: +20 dBu (7.75 V rms)

Impedance: 600 ohm active-balanced

Connectors: Male 3-pin XLR-type wired to IEC 268 configuration (pin 1: shield, pin 2: positive, pin 3: negative)

Power Requirements:

120 V, 220 V - 240 V, 50/60 Hz, 12 watts max

~~16 channel: 86 watts (120, 230, or 240 volts, 50/60 Hz)~~

Dimensions:

1.75 in (44 mm) H x 19 in (482 mm) W x 11 in (280 mm) D

Weight:

8.8 lb (4 kg)

EX23 ELECTRONIC CROSSOVER

1. ELECTRICAL

The crossover is delivered with the power supply adjusted for either 120 volt or 220-240 volt operation.

WARNING: Verify that the voltage setting is correct for your locality **BEFORE** applying power to the crossover.

The power supply setting can be easily changed to meet any requirements. See Figure xx for top-cover removal instructions. Inside the chassis by the IEC connector, are two wires, one blue and one orange. To change voltage settings, simply reverse the wiring scheme (directions are listed on the power supply circuit board).

2. INSTALLATION

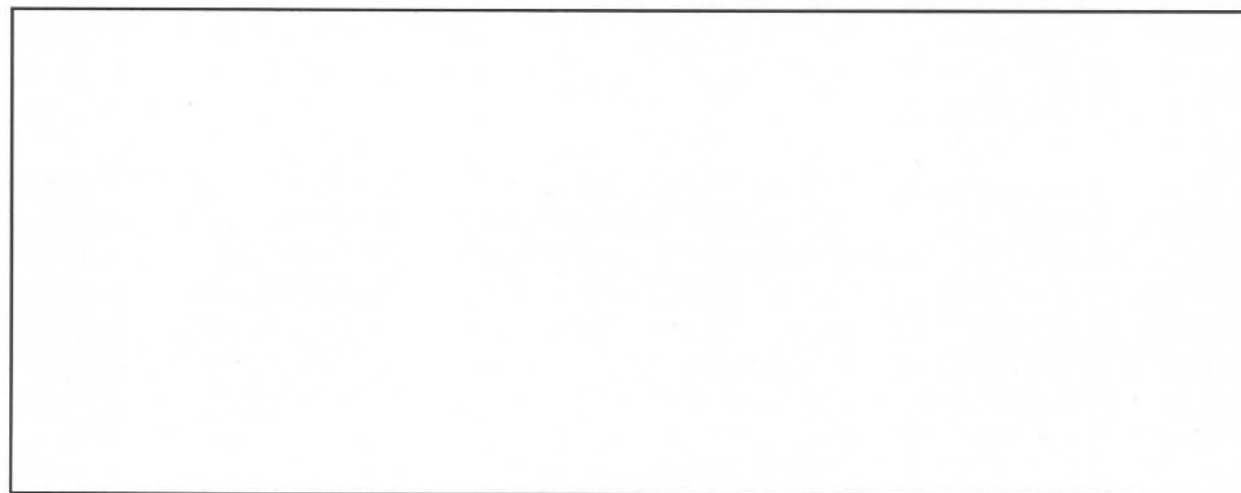
The crossover may be installed in a standard 19-inch equipment rack. It requires 1.75

inches of vertical space and the four rack screws supplied with the unit. The crossover should not be used in areas where the ambient temperature exceeds 60°C (140°F).

3. SIGNAL CONNECTIONS

Balanced input connections may be made to the female 3-pin XLR-type connectors.

The outputs of the crossover are electronically servo-balanced. Balanced output connections may be made to the male 3-pin XLR-type connectors. Be sure to use high-quality cables in good working condition. The connectors are wired according to the IEC 268 standard: pin 1 shield, pin 2 positive, pin 3 negative.



4. OPERATION

Front Panel Controls and Indicators (refer to Figure A)

1. Input Level Controls

Clockwise rotation of these controls increases the level. Operation of the unit should be at unity gain (0 dBu = 0.775 V) with proper attention paid to system gain structure.

2. Peak LED

These lights illuminate when the input signal exceeds +4 dBu. When the LED illuminates, the input level control should be lowered to avoid exceeding rated input level and causing distortion.

3. Output Level Controls

Level controls are provided to adjust the

output levels of the low and high outputs of each channel and the subwoofer individually. Care should be taken not to over-drive or under-drive the inputs of the power amplifiers.

4. Mute Switches

To expedite setup, mute facilities allow each of the five outputs (depending on mode of operation) to be listened to individually without affecting level settings of other frequency bands.

5. Crossover Frequency Controls

The crossover frequencies between each output band are selected with these controls. The frequency range is from 80 to 800 Hz in channels A and B and from 60 to 250 Hz in the subwoofer section.

6. Frequency Range Selector Switches

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The frequency range selector switches shift the range of each respective frequency control by a factor of 10 (when pressed, multiply the front panel marking by 10). With this switch depressed, the range of the crossover frequency control becomes 80 to 8000 Hz. This allows the selection of crossover points desired in two- and three-way systems. These switches should not be adjusted when the system is active and the power amplifiers are on.

7. High-Pass Filter Switch

This switch engages a 30 Hz high-pass filter to protect speakers from

overexcursion caused by infrasonic information. Engaging this filter also helps preserve amplifier power and headroom by eliminating extraneous low frequency information. Unless other devices in your signal chain (such as equalizers) have high-pass filters, it is recommended to keep this switch engaged at all times.

8. Mode Indicator

This lamp illuminates when the rear-panel mode switch is in the stereo two-way position.

9. On/Off Switch

(see setup procedure #12)

REAR-PANEL CONTROLS AND CONNECTIONS

1. IEC Power Connector

This socket accommodates three-prong IEC standard power cables that are universally available and contain plugs that are compatible with locally varying ac outlets.

2. Fuse Holder

The fuse holder requires a 200 mA/250 V Slo-Blo fuse when used with a 120 Vac line. The crossover requires a 200 mA/250 V Slo-Blo fuse when used with a 220-240 Vac line. If replacement is ever needed, please use the correct size and rating.

3. Ground Lift Switch

This switch helps avoid ground noise loops. Electrically, the ground lift switch separates the chassis from the crossover's ground potential. When the crossover is installed in a rack with other pieces of electrical equipment of different ground potentials, the switch should be set to the ungrounded position.

4. Crossover Output Connectors (two-way mode)

When the EX23 is being operated in the stereo two-way mode, these output connectors provide convenient connection of the low and high outputs of each channel to the power amplifiers.

5. Input Connectors

The inputs for channels A and B are electronically balanced and use XLR-type connectors.

6. Subwoofer Output Connector

For connection of a mono-summed subwoofer output (two-way mode) or a mono subwoofer output (3-way mode) to the respective power amplifier. Even when the system is operated in the two-way stereo mode, mono-summed subwoofer(s) will provide better performance due to lower interaction.

7. Mode Selector

This switch selects stereo two-way or mono 3-way operation. There is a front panel indicator to show when stereo two-way operation is selected.

SETUP PROCEDURE

1. Ensure that all power amplifiers are off.
2. Check loudspeaker connections. Be certain that the high-frequency amplifier actually feeds the high-frequency loudspeakers and that the low-frequency amplifier actually feeds the low-frequency loudspeakers.
3. Select proper mode of operation and the crossover frequency(s) for the system. Special care must be taken to select a crossover frequency that will elicit maximum performance from your speaker system. Please consult the owner's manual, engineering data sheet or the manufacturer of your speakers to determine the optimum frequency selection.
4. Switch off all outputs on the crossover by engaging the mute switches. Set gain controls to the center position.
5. Turn on the crossover, mixer and signal processing equipment.
6. Set any overall system equalization (graphic, parametric, or other) to flat.
7. Turn on the power amplifiers.
8. Feed a signal to the crossover input. Switch on the high-frequency outputs on the crossover. Slowly advance the high-frequency power amplifier level control. Check to be sure that the sound heard is actually coming from the high-frequency loudspeakers. The power amplifier level control should be set between full gain and -12 dB, depending on the amplifier's input sensitivity. Typically, turning the amplifier down about 6 dB from full gain (a sensitivity of about +10 dBu) will reduce the system's noise while maintaining adequate level. When done, switch off the high-frequency output(s).
9. Repeat steps 7 and 8 with the mid output (if used) and then the low output(s).
10. When all outputs are functional and amplifier levels are approximately set, switch on all of the outputs.
11. Using a wide-range signal source, adjust the crossover level controls for proper frequency balance.
12. Remember, when using the system, always switch the power amplifiers **on last and off first. Loud transients can result from the crossover being switched on/off with the amplifier on.**

APPLICATIONS

For most sound system applications, bi- or tri-amplification can provide a significant performance advantage over conventional passive crossovers. When going through a typical passive network,

50% of the amplifier power is simply turned into heat because of the electrical inefficiency. A bi-amplified system uses a separate power amplifier for the woofer and tweeter in the system. Similarly, the tri-amplified system would require three amplifiers. The crossover is placed before the amplifiers and after the mixer, preamplifier, or equalizer. Thus, each amplifier need only handle the frequency range of its respective loudspeaker(s). This arrangement allows each loudspeaker(s) to be driven by an amplifier that exactly suits the needs of that particular loudspeaker. For a low-frequency loudspeaker, this means having enough power to insure adequate low-frequency headroom.

The elimination of a passive crossover network removes the passive crossover's insertion loss and improves the damping factor seen by the woofer. This improves low-frequency performance allowing the woofer's cone movement to be more precisely controlled.

Most high-frequency loudspeakers are about 10 dB higher in sensitivity than most low-frequency loudspeakers. This means that for the same acoustical output level, the power requirements are about 10:1. For example, if the tweeter requires 10 watts for a given sound pressure level, the woofers will require 10 times more power to produce the same level (100 watts). Since the high-frequency amplifier has limited power, it is less likely to damage the tweeters if an accident occurs, such as a dropped microphone or loud feedback.

Musical signals demand the largest amount of power at low frequencies. This is compounded by the lower efficiency of most woofers. A passively crossed-over system requires tremendous amounts of power to accurately reproduce musical transients at real-life (live performance) levels.

In an active system, when a large low-frequency transient clips the low-frequency amplifier, the accompanying high frequencies are not clipped because they have their own amplifier. The low-frequency clipping is reproduced by the low-frequency loudspeaker, but is masked by the clean highs coming out of the tweeter. The net result is that the system will sound cleaner and be more reliable.

HIGH-FREQUENCY DRIVER PROTECTION

In any bi-, tri- or multi-amplified system, it is especially important to provide low-frequency roll-off for the high-frequency loudspeakers. This protection can take the form of a series capacitor. The roll-off should occur at about one octave below the crossover point. This will help protect the driver from dc should the amplifier short out, or from low-frequency energy if the high and low-frequency signals from

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the amplifiers are accidentally reversed.

To find the capacitor value, use the equation,

$$C = 10^9 / p f Z$$

Where, C is the capacitor value in microfarads, f is the crossover frequency in hertz, and Z is the loudspeaker impedance in ohms.

Use (in order of preference) mylar or film, nonpolar electrolytic or series connected (+ to +, 2 x the calculated value) polar or electrolytic capacitors with at least one having a 50 volt rating.

NOTICE

Repairs performed by others than authorized Electro-Voice warranty stations or qualified personnel shall void the warranty period of this unit. To avoid loss of warranty, see your nearest Electro-Voice authorized dealer, or call Electro-Voice Customer Service directly at 616-695-6831, or write:

Electro-Voice Customer Service / Repair
600 Cecil Street
Buchanan, MI 49107 U.S.A.

Uniform Limited Warranty Statement

Electro-Voice products are guaranteed against malfunction due to defects in materials or workmanship for a specified period, as noted in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual, beginning with the date of original purchase. If such malfunction occurs during the specified period, the product will be repaired or replaced (at our option) without charge. The product will be returned to the customer prepaid.

Exclusions and Limitations: The Limited Warranty does not apply to: (a) exterior finish or appearance; (b) certain specific items described in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual; (c) malfunction resulting from use or operation of the product other than as specified in the product data sheet or owner's manual; (d) malfunction resulting from misuse or abuse of the product; or (e) malfunction occurring at any time after repairs have been made to the product by anyone other than Electro-Voice Service or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Electro-Voice Service or any of its authorized service representatives together with proof of purchase of the product in the form of a bill of sale or receipted invoice. A list of authorized service representatives is available from Electro-Voice Service at 600 Cecil Street, Buchanan, MI 49107

(800/234-6831 or FAX 616/695-4743). **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are the only remedies provided to the customer. Electro-Voice shall not be liable for any incidental or consequential damages including, without limitation, injury to persons or property or loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **Other Rights:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Electro-Voice Electronics are guaranteed against malfunction due to defects in materials or workmanship for a period of three (3) years from the date of original purchase. Additional details are included in the Uniform Limited Warranty statement.

For warranty repair, service information, contact the service repair department at: 616/695-6831 or 800/685-2606.

For technical assistance, contact Technical Support at 800/234-6831 or 616/695-6831, M-F, 8:00 a.m. to 5:00 p.m. Eastern Standard time.

Specifications subject to change without notice.