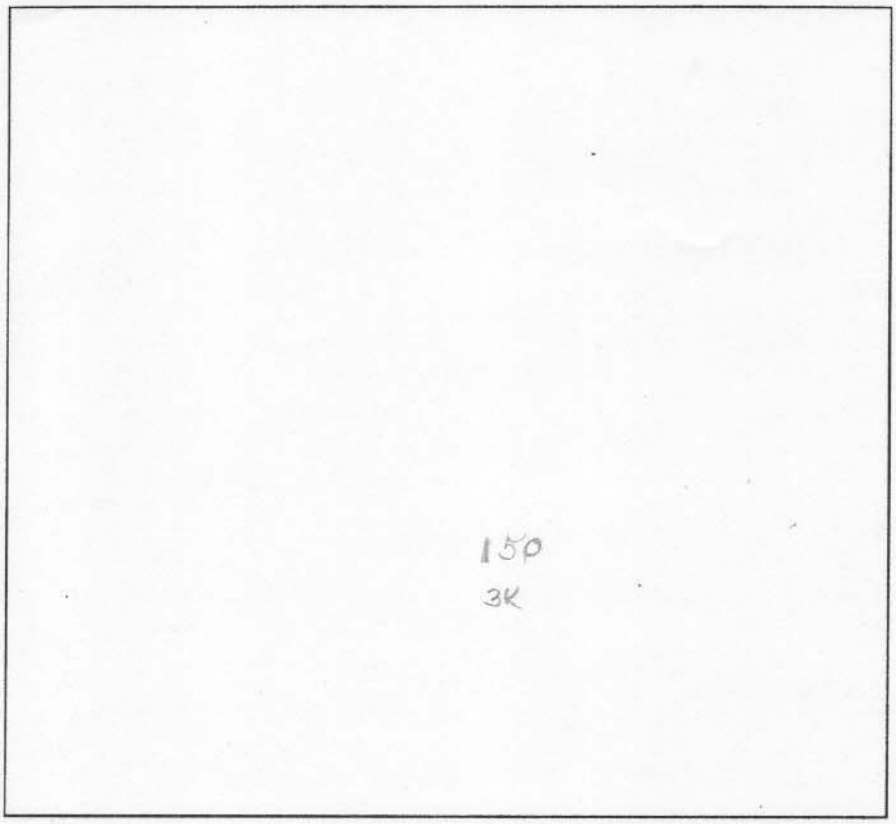


Model CX-1
Crossover Module

SPECIFICATIONS

Channel Configuration:
Monaural two-way

Filter Type:
Fourth-order Linkwitz-Riley (24-dB-per-octave attenuation)

Crossover Frequencies, Switch Selectable:
500, 800 Hz

Input,

Type:
Active differential

Maximum Level:
+18 dBu

Impedance:
32,000 ohms

Common-Mode Range:
±24 V (net of signal voltage)

Common-Mode Rejection Ratio,

Typical:
-55 dB

Connector:
Octal plug

Main Outputs,

Maximum Level:
+18 dBu

Impedance:
47 ohms

Connector:
Octal plug

Gain:
LF: Unity
HF: Switch selectable

Frequency Response, Sum of Outputs, 2,000-Ohm Loads:
20-20,000 Hz +0, -.5 dB

Total Harmonic Distortion, 20-20,000 Hz,

Typical:
0.002%

Maximum:
0.01%

Noise, Each Output, 20-20,000 Hz Noise Bandwidth, Typical:
-93 dB

Channel Crosstalk, Typical:
-85 dB

Transient Performance:
Not limited by slew rate or power bandwidth under any normal operating condition, 20-20,000 Hz

Chassis Construction:
Sheet steel; removable cover

Color:
Black

Mounting:
Dual octal plug

Power Requirements:
± 15 V dc

Overall Dimensions (see Figure 1):
69 mm (2.75 in.)
91 mm (3.58 in.)
32 mm (1.25 in.)

Net Weight:
0.25 kg (8.5 oz)

Shipping Weight:
0.40 kg (14 oz)

DESCRIPTION

The CX-1 crossover module is designed for use with Electro-Voice amplifiers (such as the 7300 or AP2600) and Mark IV Theatre Systems such as the TS9040D-LX or the TS940D-LX. Horn EQ and delay modules which may be plugged into the CX-1 crossover are available for both Theater Speaker systems.

The CX-1 may also be used for general purpose applications by using other horn EQ modules, changing the time delay, changing the gain or changing the crossover frequencies.

Features of the CX-1 include:

- Fourth-order Linkwitz-Riley filters (24-dB-per-octave attenuation)
- A socket for a horn EQ module to be used with constant-directivity horns
- A socket for a delay EQ module for acoustic phase alignment at the crossover frequency
- Selectable crossover frequencies at 500 Hz, 800 Hz, or user-determined values (by installing four resistors)

Fourth-order Linkwitz-Riley frequency-dividing networks have two unique advantages over the third-order Butterworth networks often used in high-performance professional sound systems. First, a fourth-order network offers an out-of-passband attenuation rate of 24 dB per octave, greater than the 18-dB-per-octave rate of a third-order network. This provides better protection of drivers from energy outside their frequency range, important in some applications. Second, the Linkwitz-Riley network has "zero lobing error," for smoother overall frequency response in the crossover region.

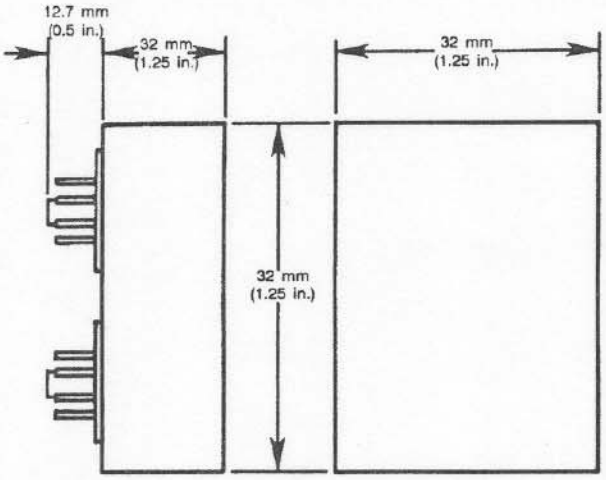


Figure 1 - CX-1 Dimensions

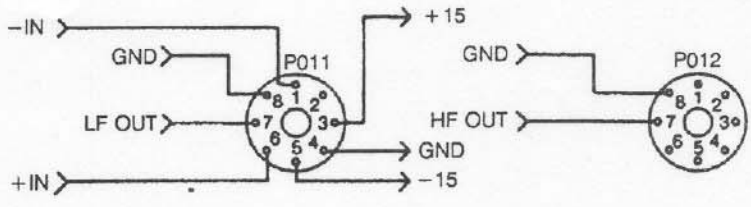


Figure 2 - CX-1 Octal Plug Connections

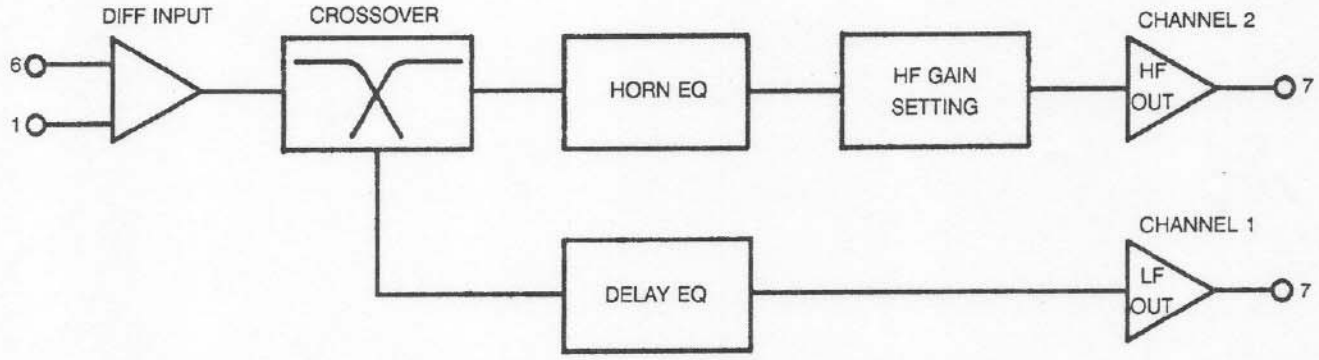


Figure 3 - CX-1 Block Diagram

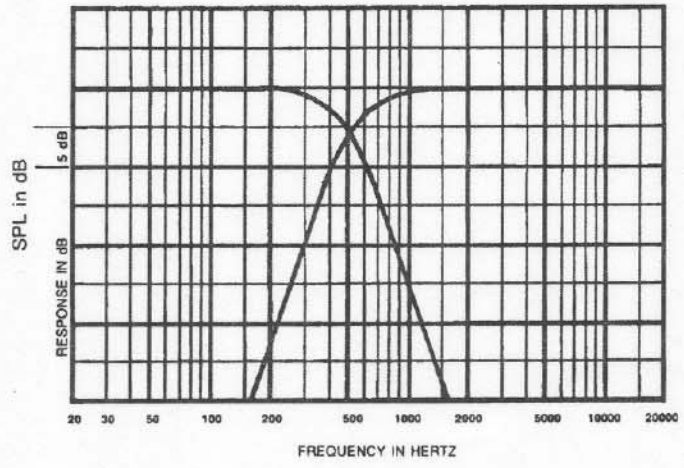


Figure 4 - Typical Crossover Frequency Response

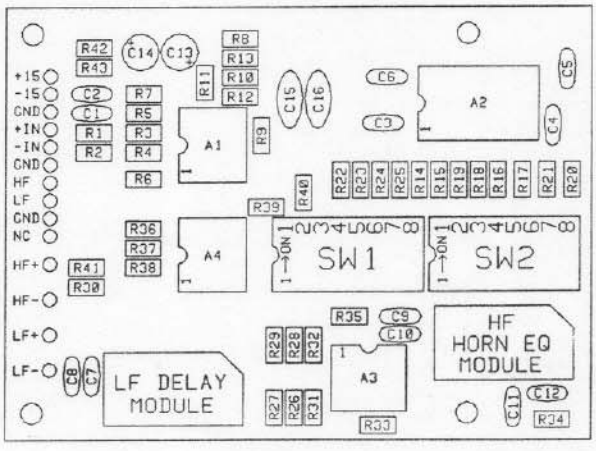


Figure 5 - CX-1 PCB Layout

CROSSOVER FREQUENCY SELECTION

CAUTION: Do not change the crossover frequency setting on the CX-1 while power is on. Turn the power amplifier off and remove the CX-1 before changing the crossover frequency.

1. Remove the four screws that secure the cover to the module.

2. Locate switch 2.

3. See Table 1 for a list of switch settings for the 500- and 800-Hz crossover frequencies.

CROSSOVER FREQUENCY	SWITCHES SET ON, OTHERS OFF
500 Hz	SW2: 1, 2, 3, 4
800 Hz	SW2: 5, 6, 7, 8
Other Frequencies (F): Install R22, R23, R24, R25 (all same value) $R=\frac{1.59\times10^7}{F}$	SW1: 5, 6, 7, 8 SW2: All Off

Table 1 - Crossover Frequency Switch Settings

4. Move each setting in switch 2 to the position (on or off) that corresponds to the desired crossover frequency.

5. To select a crossover frequency other than 500 or 800 Hz, four resistors (all the same value) must be added.

6. To calculate the resistor values, the following formula should be used:

$$R = \frac{1.59 \times 10^7}{F}$$

where R is the resistor values and F is the desired crossover frequency. See Figure 5 for the resistors' locations.

7. After installing the resistors, locate switches 1 and 2.

8. Move the switch settings to the positions (on or off) that are listed in Table 1.

INSTALLATION

1. Turn the power amplifier off and turn the input attenuators down.

2. Remove the four jumper pins from the two octal sockets on the amplifier.

3. Orient the CX-1 module so that the octal connector keys are aligned and plug it into the amplifier.

4. Disconnect the speaker cables from the amplifier and turn the amp on.

5. Turn the volume controls up and check the clip indicators. If the clip indicators are on, STOP, turn the amplifier off and go back to the beginning of the Crossover Frequency Selection section. Check all the switch settings. If the clip indicators are not on, there is a good chance that the crossover frequency was selected properly.

6. Turn the volume controls down.

7. Connect the low-frequency driver to amplifier channel 1 and the high-frequency driver to channel 2.

8. Apply pink noise or a music signal to input 1.

9. Slowly increase (clockwise) the channel 2 attenuator to verify that a high-pass signal is coming from the high-frequency driver.

10. Rotate the channel 1 attenuator clockwise until the low-pass signal is balanced with the high-pass signal.

AUXILIARY SIGNAL OUTPUTS

To feed the high- and low-pass signals to another amplifier, solder cable to the high- and low-pass output pads on the PC board as shown in Figure 5. The pads are labeled HF+, HF−, LF+ and LF−.

CUSTOM TIME DELAY MODULES

A time delay module may be constructed by using the optional BMK blank module kit. To customize the value of the time delay, two resistors (both the same value) must be added. The resistor values may be calculated from the following formulas:

First, the phase shift must be known. Use the following equation to calculate the phase shift:

$$\theta_s = 360 \times f \times t_d,$$

where f is the crossover frequency and t_d is the desired time delay in milliseconds.

The following formula may now be used to calculate R:

$$R = \frac{\tan\left(\frac{-\theta_s}{4}\right)}{2 \times 10^{-8} \pi f},$$

where R is in ohms.

Module Construction

In addition to the Electro-Voice BMK blank module kit, the following items are required:

1. Two resistors, calculated from the formulas given above.

2. Low-wattage soldering iron with small chisel tip.

3. Electronic-grade solder, 63/37 or 60/40 alloy, rosin core.

4. Flush-cutting diagonal cutters.

5. A spare 16-pin DIP socket.

6. Adhesive epoxy, super glue, or hot melt.

7. Various hand tools, as needed.

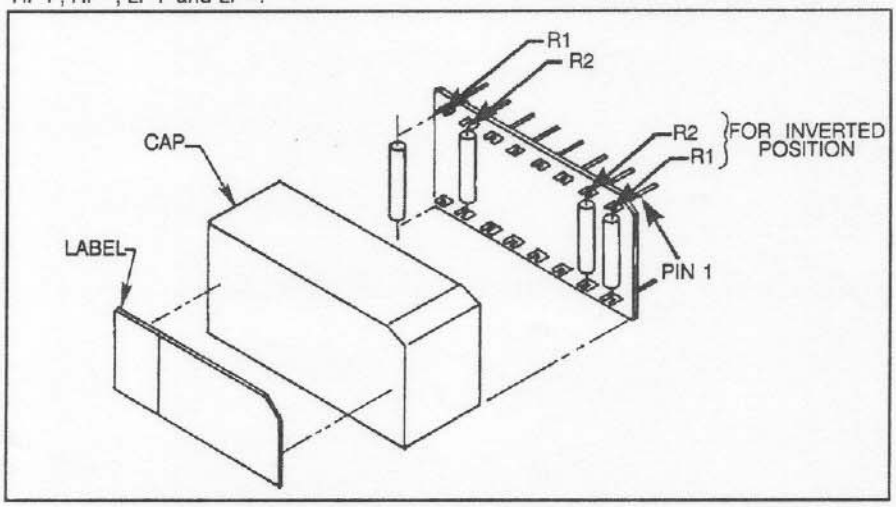


Figure 6 - Time Delay Module Assembly

Refer to the diagram in Figure 6.

1. Insert the DIP plug into the spare socket. This helps to keep the pins in alignment during soldering.

2. Locate pin 1 by the cut-off corner on the plug.

3. Place and solder the resistors one by one and trim each lead close enough to the pin to allow later installation of the cap. If you are using conformally-coated (dipped) resistors, be sure the leads are free of coating material where they emerge from the resistor body. Be careful not to overheat the pins, or the plastic base will melt.

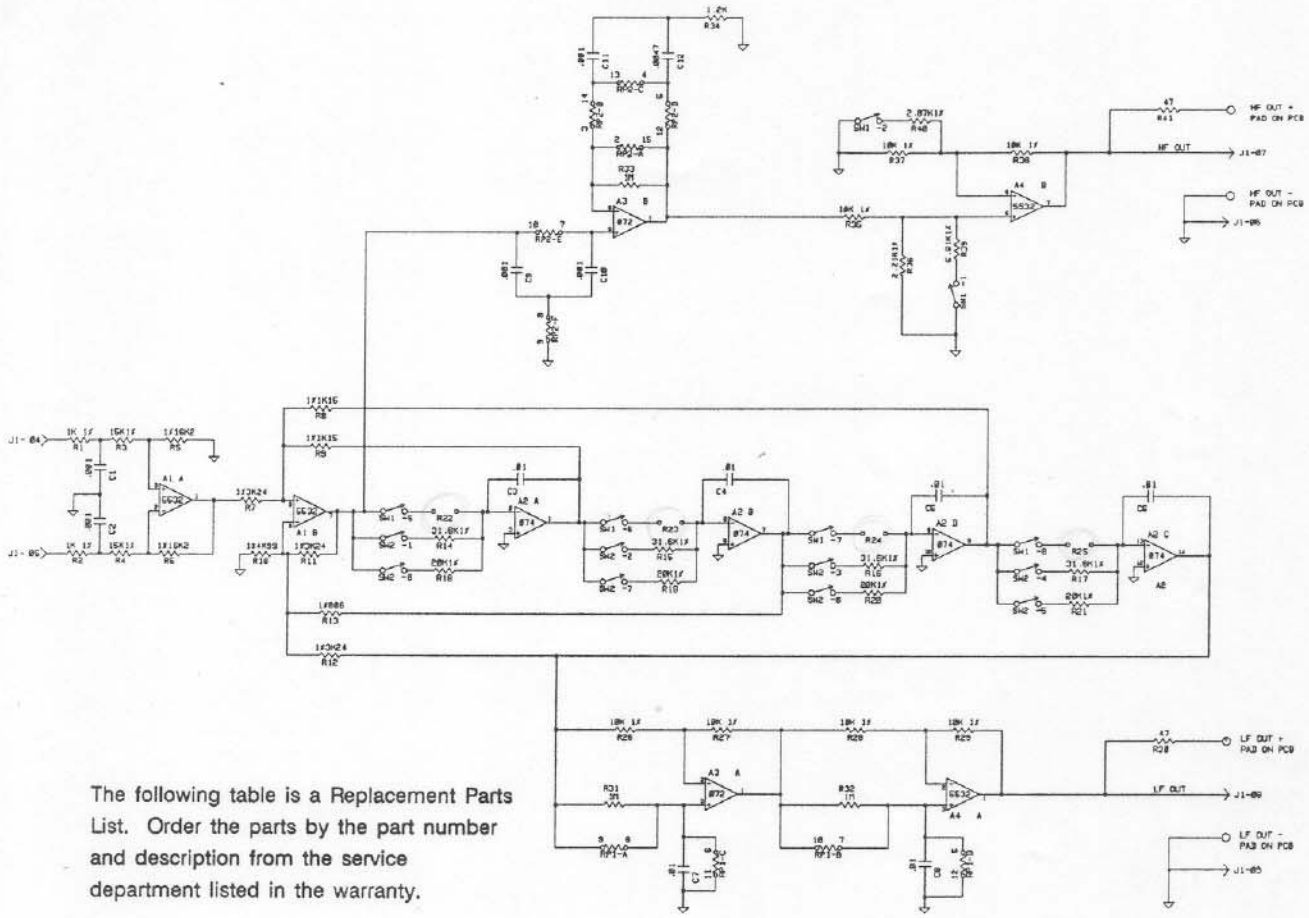
4. Check all connections and resistor values.

5. Attach the cap with glue.

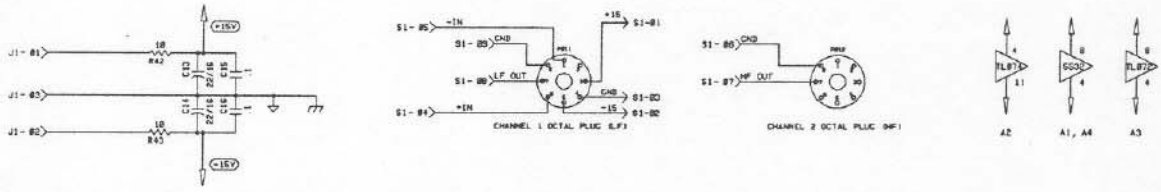
6. Label the module.

WARRANTY (Limited)-
Electro-Voice Professional Sound Reinforcement Electronic Components are guaranteed from two years from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not extend to finish, appearance items or malfunction due to abuse or operation under other than the specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee. A list of authorized service centers is available from Electro-Voice, Inc., 600 Cecil Street, Buchanan, MI 49107 (AC/616-695-6831), Electro-Voice West, 8234 Doe Avenue, Visalia, CA 93291 (AC/209-651-7777). This warranty gives you specific legal rights which vary from state to state.

Specifications subject to change without notice.



The following table is a Replacement Parts List. Order the parts by the part number and description from the service department listed in the warranty.



PART NUMBER	DESCRIPTION	REFERENCE	PART NUMBER	DESCRIPTION	REFERENCE
14-02-027317	TOP COVER, PAINTED AND SCREENED		47-03-109437	RESISTOR, 10 KΩ 1% .25 W	R26, R27, R28, R29, R35, R37, R38
14-04-027318	CHASSIS, PAINTED		47-03-121532	RESISTOR, 1 KΩ 1% .25 W	R1, R2
15-01-124504	CAPACITOR, 22 µF 50 V	C13, C14	47-03-124484	RESISTOR, 15 KΩ 1% .25 W	R3, R4
15-02-122891	CAPACITOR, 100 µF 20% 50 V-X7R	C15, C16	47-03-124489	RESISTOR, 31.6 KΩ 1% .25 W	R14, R15, R16, R17
15-06-026824	CAPACITOR, .0047 µF 5% 50 V	C12	47-03-124650	RESISTOR, 2.87 KΩ 1% .25W	R40
15-06-124587	CAPACITOR, .001 µF 5% 100 V	C1, C10, C11, C2, C9	47-03-124694	RESISTOR, 806 Ω 1% .25 W	R22
15-06-124588	CAPACITOR, .01 µF 5% 100 V	C3, C4, C5, C6, C7, C8	47-03-124696	RESISTOR, 4.99 KΩ 1% .25 W	R10
17-01-122832	5532A DUAL OP AMP	A1, A4	47-03-124697	RESISTOR, 3.24 KΩ 1% .25 W	R11, R12, R7
17-01-124461	TL074CN QUAD OP AMP	A2	47-03-124699	RESISTOR, 1.15 KΩ 1% .25 W	R8, R9
17-01-124688	TL072CP DUAL OP AMP	A3	47-03-124930	RESISTOR, 16.2 KΩ 1% .25 W	R5, R6
47-01-102030	RESISTOR, 10 Ω 5% .25 W	R42, R43	47-03-124956	RESISTOR, 6.81 KΩ 1% .25 W	R39
47-01-102046	RESISTOR, 47 Ω 5% .25 W	R30, R41	47-03-124957	RESISTOR, 2.21 KΩ 1% .25 W	R36
47-01-102080	RESISTOR, 1.2 KΩ 5% .25W	R34	28-01-114316	SCREW, MACHINED 4-40 x 1/4 PAN	
47-01-108491	RESISTOR, 1 MΩ 5% .25 W	R31, R32, R33	28-01-124701	SCREW 4-40 x 1/4 ROLOX	
47-01-109434	RESISTOR, 20 KΩ 1% .25 W	R18, R19, R20, R21	21-01-124693	OCTAL PLUG W/ FLANGE	