



MODEL XO-2[®] **(1995-MSRP \$199.00)**

OWNER'S MANUAL AND INSTALLATION GUIDE

INTRODUCTION

The **LINEAR POWER™ XO-2[®]** has been engineered to include many features that will combine to make it a versatile and desirable foundation for multiple amplifier systems. The advantages of Bi-amp and Tri-amp systems have been demonstrated for years, with the most important being a dramatic reduction in intermodulation distortion and an increase in efficiency of about 3dB. Not only does the **XO-2[®]** provide the 12dB per octave roll off for both low and high pass filters, it also allows separate low and high adjustment with infinitely variable controls that operate over a range of 34 to 5000 Hertz. This will allow the installer to tailor the response of the system at the crossover point to best suit the needs.

The low pass output of the **XO-2[®]** can be configured to provide either conventional stereo, or bridged mono output for use with subwoofer systems. All this is accomplished with no external programming parts. The **XO-2[®]** is self-contained and can be programmed to perform any of its functions with simple screwdriver adjustments.

TECHNICAL DESCRIPTION

The **Linear Power™ XO-2[®]** is a 2-way, 12 dB active crossover utilizing a phase coherent Butterworth design and employs a self-oscillating power supply to provide isolation from the vehicle's electrical system with it's associated noises and to deliver the 30 volts necessary to operate the circuitry involved. Both high pass and low pass crossover points are continuously variable, allowing under lapping or overlapping for custom tapering of system frequency response. Overlapping has the effect of increasing energy between the crossover points. For example, with the low pass point set to 100Hz and the high pass point set to 50Hz, there will be a 3dB peak at around 60Hz. Under lapping can produce a notch of moderate to extreme depth, which can be used to get rid of mid-bass

boominess typical of car environments.

The low pass outputs can be selected as either stereo or bridged-mono for convenience. In mono mode, the outputs of the low pass filters are summed together and the left channel output is inverted. This setting allows for the use of amplifiers which are not internally configurable for bridged-mono output mode. In the stereo mode, both outputs are in phase with the inputs.

The **XO-2** is protected against reverse polarity connections to the power supply, and will except signal inputs from a source unit of 50 to 5000 millivolts (5 volts). The higher line levels are always recommended for the best signal-to-noise ratio in any system.

We use double-sided fiberglass epoxy circuit boards to help keep the size down, to insure years of trouble free operation, and to allow us to design a crossover with incredible bandwidth without fear of oscillations or noise.

In house construction of critical components like transformers and chassis, as well as total assembly, allows **Linear Power**™ to maintain uniform quality. 100% of the finished units are tested thoroughly, and must meet the design specifications before they earn the **Linear Power**™ Logo.

INSTRUCTIONS

Read the following instructions through completely. If they appear too complicated, we recommend that you have an authorized **Linear Power**™ Dealer do the work.

MOUNTING

Since the **XO-2** does not generate any heat of it's own, placement is not as critical as that of an amplifier. Consideration should be given, however, that the high and low pass adjustments are accessible during the initial setup of your system.

The case of the **XO-2** is also a shield against noise. Do not remove the rubber grommets when mounting the unit to a metal surface. This will ground the case and create the possibility of noise being introduced to the system. The grommets also provide for vibration isolation and should therefore not be removed.

WIRING

1.MAIN GROUND

The black ground wire should be connected to a solid ground point via a bolt or self-tapping screw. This connection must be to a clean, unpainted metal surface, preferably to the same point at which the amplifiers are grounded.

2.POWER

Since the current requirements of the **XO-2** is only 100 milliamps, the red wire can usually be connected to the power antenna or amp turn on lead provided by your deck. An alternate source of +12 volts would be from an accessory toggle

switch connected to a power source. The red wire should not be connected to a source of constant power as this would eventually drain the vehicle's battery.

3.INPUTS

The RCA (phono) jacks will accommodate either high or low level signals, ranging from 50 millivolts to 5 volts. For low-level signals, always use shielded cable and avoid routing signal cables in the vicinity of any power wires. The center pin of the RCA plug is always the positive signal input. Connect the right and left inputs on the **XO-2** to the full range right and left outputs from the music source or sound processor.

4.BIAMP STEREO OUTPUTS

Low Frequency:

Connect the low frequency outputs from the **XO-2** with shielded RCA cables to the low amplifier.

High Frequency:

Connect the high frequency outputs from the **XO-2** with shielded RCA cables to the high amplifier.

5.BIAMP BRIDGED MONO OUTPUTS

Connections are made for both high and low frequency as described above for the stereo mode. Switch the mono-stereo switch into the "mono" position. This setting allows the low frequency outputs to be connected to an older stereo amp that is not internally capable of bridgeable operation. Follow the installation guide for that amplifier for the correct speaker hook up configuration. Generally the mono setting will only be used for subwoofer applications with the low pass adjustment set at 150 Hertz or less. When set for mono operation, the low frequency signals are added together, then the left channel is inverted on the output. This works well for very low bass information, but will not be desirable at higher frequencies where stereo separation is important. In this setting the high frequency outputs are not altered in any way.

ADJUSTMENT

The adjustment of the **XO-2** low and high pass settings will be determined by both the configuration of your overall system, and the specification of the speakers you are using. The following is meant to provide you with a general idea for possible adjustments. Please note that in any configuration the mono-stereo switch can be set for "mono" where the low frequency outputs are used to drive ONLY a subwoofer amplifier.

BIAMP STEREO TWO-WAY SYSTEM

Low Frequency: Amplifier used for woofers.

High Frequency: Amplifier used for tweeters.

Settings: Set mono-stereo switch to "stereo". Set crossover points at 1.2 to 4 KHz.

BIAMP STEREO THREE-WAY SYSTEM

Low Frequency: Amplifier used for woofers.

High Frequency: Amplifier used for mid and tweeter.

Settings: Set mono-stereo switch to "stereo". Set crossover points at 500 to 800Hz. **Note:** Passive crossovers must be used between the mid and tweeter speakers, or coaxial speakers may be used.

BIAMP STEREO THREE-WAY SYSTEM + SUBWOOFER

Low Frequency: Amplifier used for subwoofer.

High Frequency: Amplifier used for woofer, mid, and tweeter.

Settings: Set mono-stereo switch to "stereo". Set crossover points at 75 to 150Hz. Note: This arrangement is used where the high frequency amp is used to drive tri-axial speakers.

TRI-AMP SYSTEM: In a tri-amp system, individual amplifiers are used for bass, midrange, and treble frequencies. In this configuration, two XO-2's are "cascaded" in order to obtain the third frequency range.

All crossovers presently available for the car will cause some phase shift at the crossover point. In a three-way system with two crossovers, there will be a phase shift at both crossover points. By reversing the electrical phase of the midrange driver relative to the woofer and tweeter, this phase shift will be compensated so that the system will be acoustically in phase though electrically out of phase. In most cases, the system will sound better with the phase of the midrange drivers reversed. Although this sounds complicated, it is really quite simple.

After your system is installed and operating, reverse the leads to the midrange drivers, positive (+) to negative (-) and negative to positive. Listen to the system, then return the leads to their original position and listen again. Leave the leads connected in whichever position achieves the best sound.

GENERAL TROUBLESHOOTING

NO SOUND

Check all connections. Check main power fuse. Check accessory fuse of your vehicle. Check to see that +12Vdc is present at the amplifier on the power wire, and on the red/white remote turn-on wire. Check for a solid ground connection. Check that the main music source is putting out signal.

BLOWS FUSES

Check all connections to be sure no wires are touching each other or the chassis of the vehicle or any other equipment in your install. Check that your speakers are in proper working order.

SERVICE OR REPAIR

To obtain modification, service or repair, please contact our **ONLY Authorized LINEAR POWER™ Product Service Center:**

T.I.P.S. INC.

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Specifications

XO-2[©]

Output level *(max output level 9 Volts RMS)	0 – 5 Volts Nom.
Input Impedance	150K Ohms
THD @ full output 20-20KHz	.01%
Signal to Noise Ratio	80 dB
Frequency Response	1.6 Hz to 200 KHz
Gain	Unity in the Band Pass
Channel separation	>60dB
Crossover Slope	12 dB per Octave
Crossover Filter Design (Phase Coherent)	Butterworth
Crossover Points	34 Hz to 5 KHz
Current Draw	100 mA
Fuse rating	.5A
Dimensions	1 3/8"x4"x4 1/2"

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