



1/3 Octave | Waterfall | Correlation



Processor Owners Manual

ate | FFT Size | Time Window | Smoothing

Zapco Signal Processors

Welcome to the world of Zapco signal processing.

For over 25 years Zapco signal processors have been known as the best that money can buy; a reputation that began with the PEQ in the late 70's, then the PX (the worlds first true audiophile quality EQ / Crossover) in the 80's, and continues today with the SX-SL, the EQ-30, and DAll, the combination that has set the standards for the 90's and beyond.

Where will Zapco go next? Only time will tell. But, here's one thing you can count on...Zapco processing will continue to set the standards and challenge the industry, with innovative new designs and superior performance.

How superior is our performance? In a recent review of equalizers from seven different companies, the article described the quality and sonic performance of the Zapco unit as "Head and Shoulders" above the competition.

So, once again, welcome to Zapco Processing.

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Zapco Signal Processing

What makes Zapco processors different from any other? Better electronic design, combined with higher quality components inside, accounts for much of the added clarity and the "openness" of sound with Zapco processors. This also accounts for the superior imaging and the more accurate sound stage with our processors.

Some have tried to duplicate the Zapco sound by modifying Hi-End home gear for car use, but have met with limited success.

Why has Zapco succeeded? Because, right from the start, Zapco recognized the two major problems of in-vehicle processing, and solved them.

First: Power supply noise. Because a signal processor works with such a low level of signal, any noise it creates can be easily induced into the signal path. All power supplies create noise, even ours. Ours are just quieter than the others. To make sure our processors don't have power supply noise, we took the power supply out. Starting with the PX, in the early 80's, every Zapco processor uses "phantom power". If you are using a Zapco amplifier, the processor will simply pull its power right from the amp. If not, you can use the PSI-HPSL remote power supply. In either case, your Zapco processor will have ± 15 volts of clean, noise free power.

Why 15 volts, instead of 12 volts? Well, with 15 volts to work with, a Zapco processor can put out as much as 16 volts RMS of signal. More than any other preamp/processor. More signal means less noise.

Second: Signal loss and induced noise. An extremely important part of the processing is the signal transmission system. The low level, non-amplified, signal is always subject to induced noise and signal loss. It is most vulnerable when being transferred between components; this is an especially grave problem in the automotive environment because the components are so far apart. In 1992 Zapco adopted the SymbiLink™ Balanced Line system for use in all its amplifiers and processors; this gives Zapco the cleanest, quietest signal possible, while providing less distortion and less signal loss.

SymbiLink™ Balanced System

The most natural configuration for an audio system in the automobile places the signal source in the dash with the amplifiers located some distance away, usually under the seat or in the trunk of the vehicle. This arrangement dictates the necessity to make long runs of low level signal cable usually from the front to the back of the car. The electrical environment in an automobile is one that is inherently noisy and filled with conditions that threaten to degrade signal fidelity at every turn. Capacitive loading, (due to the long cable lengths), the potential for ground loops, and alternator charging currents or currents generated by the amplifiers, themselves are all factors that induce noise and distortion into the signal cables. ZAPCO has made this technology available for your car. ZAPCO engineers also discovered that the pulsating D.C. current in the automobile chassis and amplifier power wiring caused a significant amount of low frequency distortion. ZAPCO's SymbiLink™ balanced technology completely eliminates this distortion.

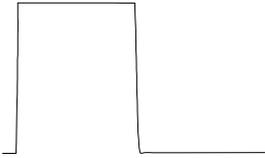
SymbiLink™ components convert a standard unbalanced audio signal into the fully balanced domain usually reserved for expensive professional audio equipment found in recording studios or at your local concert venue. After this conversion, the audio cabling becomes virtually immune to electrical interference in the surrounding environment making it much less susceptible to signal degradation over long cable runs. It is for this reason that balanced signal cables are common in professional or industrial applications.

Almost all Zapco Signal processors now employ the SymbiLink™ Balanced Line technology.

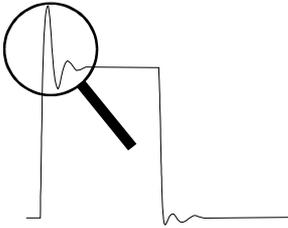
Why Use The SymbiLink™ Balanced Signal System?

RCA style unbalanced cables have the following disadvantages:

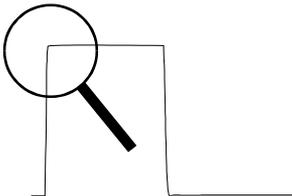
1. Magnetic & electrostatic pickup. Noise and audio distortion can be induced into the cable because the cable shield is also the audio (-) connection.
2. Unbalanced cables are typically driven into very high impedance's, causing transient ringing. (See the drawing, below)



Source transient Waveform

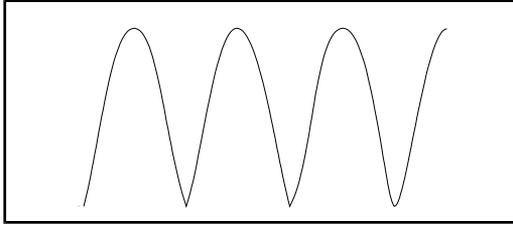


Waveform at the destination end of a long unbalanced RCA cable shows ringing

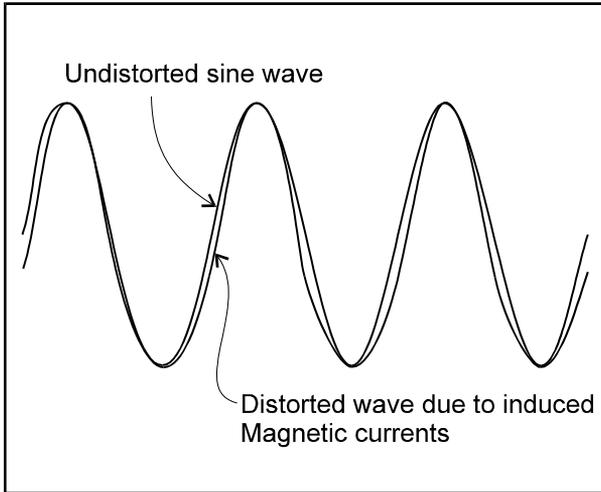


Waveform at the output of the SymbiLink™ system.

Non-Linear Induced Distortions



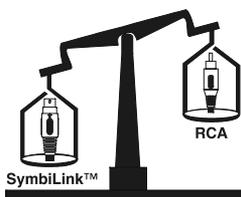
(A) These non-linear currents from the power amp supply are present in the vehicle's chassis and power wiring.



(B) Non-linear distortion from unbalanced cables caused by induced magnet fields (see (A))

Balanced or Unbalanced?

Advantages



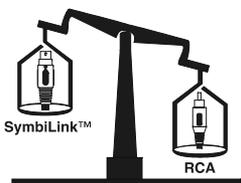
SymbiLink™
Balanced System

1. High noise rejection.
2. Higher audio signal level (16V).
3. Higher S/N ratio.
4. Improved stereo separation.
5. Improved T.H.D.
6. Low impedance (600 Ohms).
7. Easier to install, and cables can be run anywhere.
8. Less expensive than high-end RCA cables.

RCA
Unbalanced System

1. Widely used and readily available.
2. The average customer and installer is more familiar with RCA type cables.

Disadvantages



SymbiLink™
Balanced System

1. Limited availability.
2. Most customers and installers are used to using RCA cables.

RCA
Unbalanced System

1. Poor noise rejection.
2. Typically low audio signals (.5 – 1V).
3. Lower S/N ratio.
4. Susceptible to Non-linear distortion.
5. RCA cables can pick up alternator whine if by noise radiating wires or equipment.
6. High impedance (20-100K).
7. Poorer stereo separation.
8. Even most high-end RCA cables will usually pick up radiated noise.

Setting the Gains in Your System

Proper gain setting is one of the most important factors in setting up a stereo system; at the same time, it is the setting most often done wrong. Turning up the gain of an amp is the very last thing you should ever do to a system.

An amplifier is a step up transformer, Period. Anything you put in gets boosted by a fixed factor. Music, hiss, or any other noise. It doesn't matter.

A large number of noise problems are simply a matter of improper gain settings. The goal of gain setting is to achieve the maximum amount of musical output from the amp while getting the least amount of hiss or noise from the system; you are attempting to find the "maximum unclipped" signal level.

The basic gain setting is very simple and requires no special tools. Advanced settings can be made with a Digital Volt Meter, but these should be left to an experienced installer. Whether you have a system with a deck and an amp, or a system with a deck, line driver, eq, crossover, and amp, the procedure always is the same.

Start at the deck! Not at the amp!

First, hook up the system with all gain controls at minimum (turn all gain pots fully counter-clockwise with a small screwdriver). Then turn on the head unit and turn up the volume. If you get clean sound, and more volume than you want, you don't need to make any adjustments. However, if you turn up the volume and begin to hear distorted sound before it becomes loud, you are clipping (distorting) the deck (probably a little over $\frac{3}{4}$ volume). If this happens, turn the deck down just enough to hear clean sound again. This is your "Maximum Unclipped" volume. Now move to the next component in your system. With the deck playing at "maximum unclipped" volume, adjust the gain of the next component in the system to its "maximum unclipped" volume. If you adjust your gains this way, always starting at the head unit and working down the line to the amp, you will get the most performance out of your amp with the least unwanted noise.

You do not "feel" high volume sound in your ears, it's distortion that makes a system "uncomfortable". Proper gain setting will allow the maximum volume with the minimum distortion so you can turn the system up till the windows rattle, and it will never sound "too loud".

“Use Safe Sound”. Having properly set gains will allow you to comfortably play the system at a much higher SPL, the fact that it is now more comfortable to play at a higher SPL does not mean it is safer. The functioning devices in your ear do not have very good pain receptors; even if it does not “feel” like it hurts, excessively high SPL absolutely will damage your hearing. So, please practice safe sound!

Cumulative Error

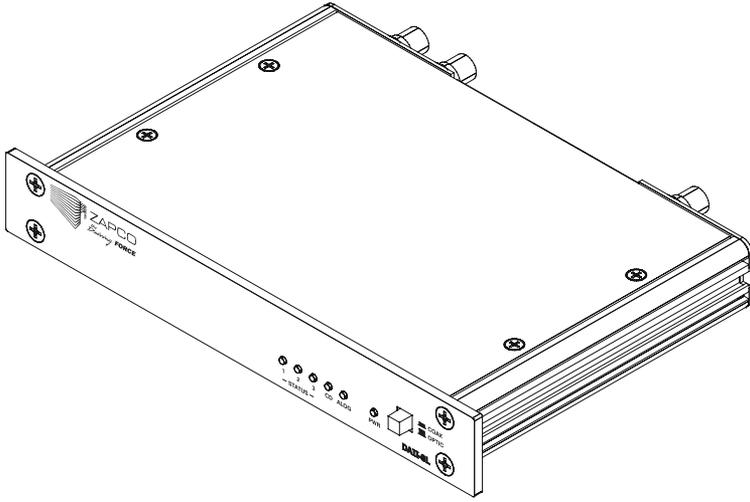
An issue that often is debated is at what level does distortion become detectable to the human ear? Is there truly an audible difference between a unit that measures .05% THD and one that measures .1% THD? There are many who contend, with good cause, that distortion does not become audible until the magnitude approaches 1% or more. Why do we go to such great lengths in order to ensure the accuracy of each unit when such minute differences are most likely inaudible?

The answer to this question underlies ZAPCO’s entire design philosophy and is based on the simple concept of cumulative error. To understand the point you must consider all the pieces of electronic equipment that comprise the chain between the original performance and your ears. From the microphone used to record the performance, to the speakers used to reproduce it, the ultimate accuracy of the final output is directly dependent on the accuracy of all of the pieces that comprise the system. Given that this is not a perfect world, it is inevitable that each piece of equipment will add some distortion or error to the original signal, and signal degradation along this chain can be nothing but cumulative. It is the cumulative error of the system as a whole of which we must be mindful.

From ZAPCO’s perspective, the idea that .1% THD, inaudible in and of itself, is good enough, is unthinkable! If .002% THD is possible it is the obligation of the manufacturer to do all that is feasible to attain that maximum level of performance.

The Zapco Processors

DAII-SL



Specifications

Maximum balanced output level	8 Volts, R.M.S.*
Maximum unbalanced output level	4 Volts, R.M.S.
Indicators	Six: Three error, input select, zero bit detect, & power
Outputs	Balanced & unbalanced RCA
Minimum output impedance	600 Ohms
Digital Input format	AES/EBU, IEC 958, S/PDIF, & EIAJ CP-340 digital audio standards
Digital input type	44.1 or 48kHz, Coax or Toslink
Frequency response, DC – 20kHz	±.2dB
S/N ratio “A” weighted, Zero bits	> 115dB
Separation @ 1KHz, “A” weighted	> 105 dB
Current requirements	300 mA
Harmonic distortion	< .001%
De-Jitter	Two stage, VXO PLL
Dimensions	4.5”D x 6.9”W x 1”H

*Note: The DAII-SL can produce 18 volts RMS, but it is calibrated to 8 volts RMS when the maximum digital waveform is applied.

What is the DAI-SL?

Because it is the first component in the ultimate signal processing system, we present the DAI-SL first in this manual.

Why an outboard D/A converter if every deck already has one? It is the only way to achieve the highest possible sound quality from a digital source. Every head unit with a digital function (like a CD) must have a D/A in order to work. The D/A in a head unit, though, is barely passable, for two reasons. The first is size, the Zapco DAI circuit board is roughly the same size as the average CD player's board' there simply isn't room in most decks for a converter of this caliber. The second is cost, an audiophile D/A like the DAI costs three to four times as much to build as a typical CD deck. Only those who demand the absolute finest sound quality will make the investment for a truly accurate D/A. Those who do demand the very best, will accept nothing else.

The DAI-SL can accept practically any format of signal. Provisions for analog as well as optical or coaxial digital inputs are available. The analog input is automatically selected when two seconds of zero bits are detected. The zero bit detector is available for control of an external noise gate via an optically isolated output. Internal mode switches configure the DAI-SL for compatibility with a wide range of professional and consumer digital formats. Unsurpassed in performance and features, the design incorporates two stages of jitter removal, an 8X interpolating filter and a 64X fifth order Delta-Sigma modulator. Dual Phase Locked Loops (PLL) are included to ensure the complete removal of digital jitter. The second PLL is crystal stabilized to provide perfect digital timing. A one bit differential DAC feeds balanced analog output filters. This method of conversion eliminates temperature drift and the need for laser trimmed resistors. Five precision voltage regulators minimize crosstalk and ensure the purity of the conversion process. The DAI-SL's dynamic range exceeds 107dB with a noise floor greater than -115 dB. Total Harmonic Distortion measures less than an incredible .0009%. Both RCA and SymbiLink™ balanced outputs are available at the back of the sleek half-DIN chassis, providing the ultimate in flexibility.

The DAI-SL's optical, coaxial, and balanced analog inputs permit integration into any high quality audio system. The DAI-SL has switch configurable formats for AES/EBU, IEC 958, S/PDIF, & EIAJ CP-340 digital audio standards.

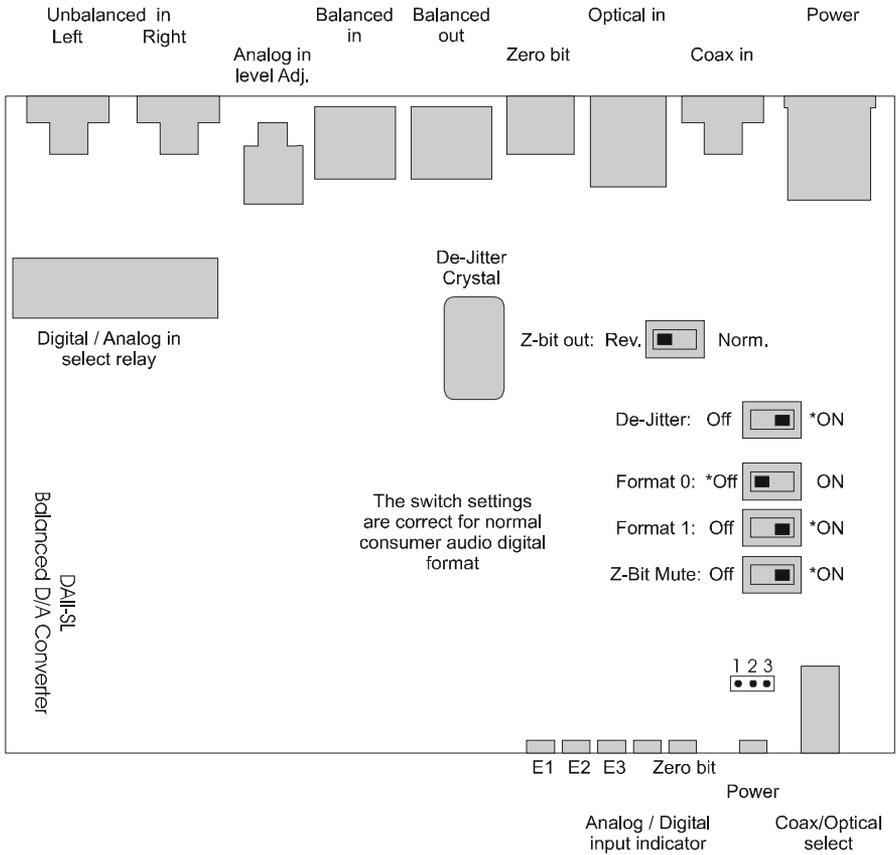
What to Expect

You should expect to hear a more focused, yet broader image than you've ever heard before. In addition, expect to notice a silky smoothness in the upper high frequency range. First reports of listener's experience with the DAI-SL also included added detail, never heard before in the recording.

Key Features

- SymbiLink™ balanced input and output
- Optical, coax and analog inputs
- Ultra high signal to noise ratio greater than 115 dB
- Better than 105 dB separation
- De-Jitter / Re-clocking circuit
- Digital error status indicators
- Fully balanced, including output filters
- Zero bit detect output for triggering external noise gates
- Zero bit detect / automatic analog input selection
- Small, sleek 1/2 DIN chassis
- Quality Zapco construction
- Designed and built in the USA

Switch Setting Layout



Switch Settings

Z-Bit switch:

The DAII-SL has an output that indicates when it detects no audio data on the CD. This output is useful to trigger external components such as a noise gate. This output coincides with the front panel "Zero bit" LED. The zero-bit out is an opto-isolated output. The state may be reversed with the "Z-bit out" switch. (See the figure, "Switch Settings")

Z-Bit mute:

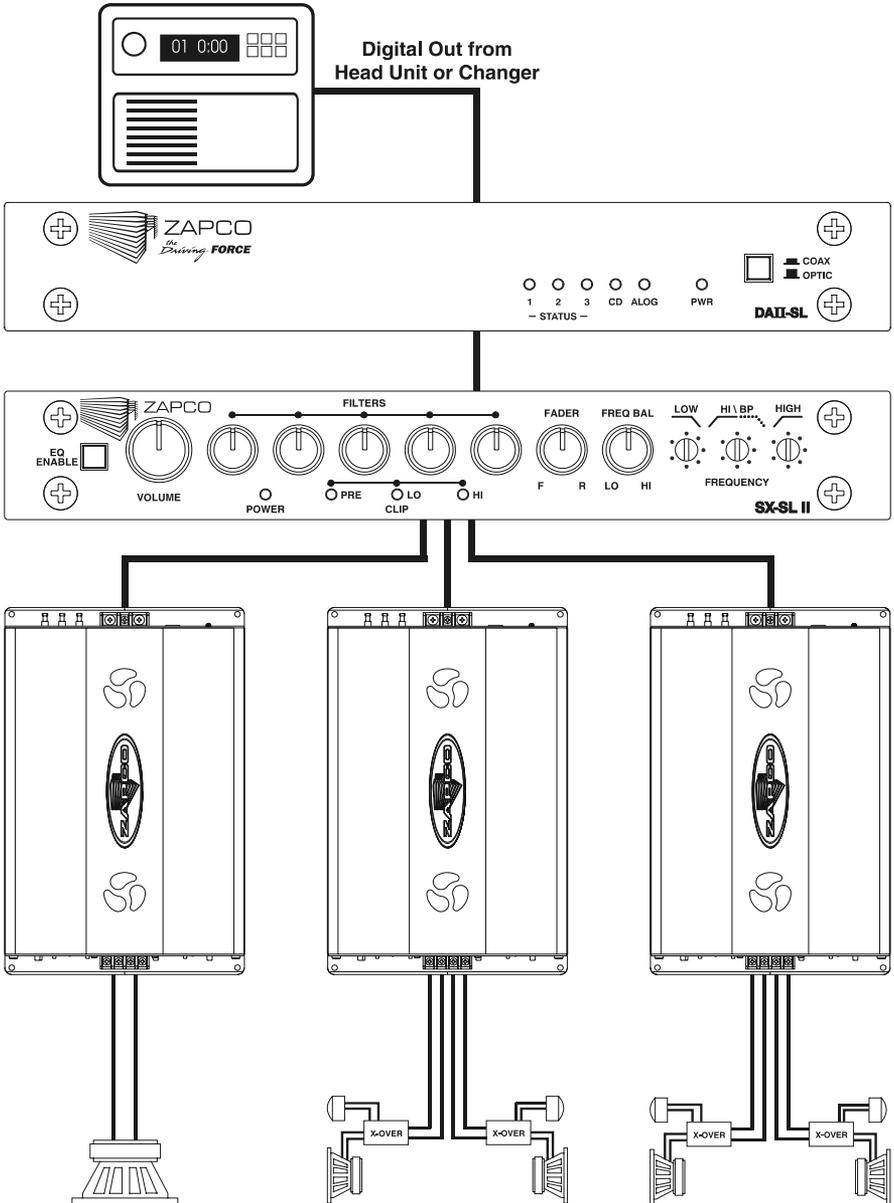
The DAII-SL also has Z-Bit muting capability. When the DAII-SL detects a zero bit condition, it can mute its outputs. This is enabled by the "Z-Bit Mute" switch. See the figure "Switch Settings" This is useful if the CD player outputs invalid data during pause or when switched to FM or AM mode.

De-Jitter:

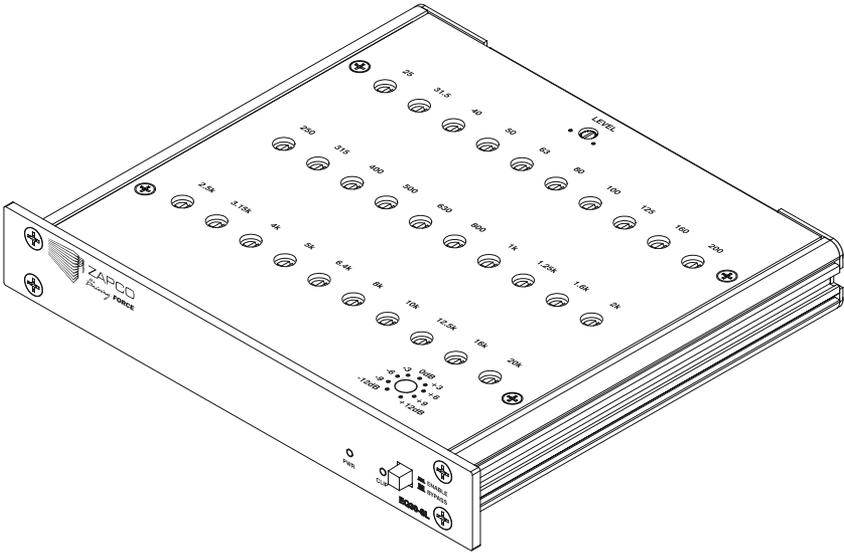
The "De-Jitter" switch enables or disables the De-Jitter Digital Processor circuit. This circuit greatly improves the overall imaging and high frequency "smoothness" of the system. You would never want to disable this circuit unless:

1. Your CD transport is out of spec. and its clock rate is off more than 200 parts / million.
2. You wish to listen to 48kHz audio from DDS satellite or DAT and do not have the correct crystal.

DAII-SL System Diagram



EQ30-SL



Specifications

Maximum balanced output level	16 Volts RMS
Maximum unbalanced output level	8 Volts RMS
Input impedance	3k Ohms
Minimum output impedance	600 Ohms
Filter center frequencies	EIA standard
Frequency response, 5Hz – 20kHz	±.25dB
S/N ratio "A" weighted, EQ in	> 110dB
Separation @ 1KHz, "A" weighted	> 90 dB
Maximum boost / cut	+12dB / -12dB
Harmonic distortion, EQ in	< .003%
Current requirements	300 mA
Transient distortion, EQ in	< .001%
Dimensions	6"D x 6.9"W x 1"H

What is the EQ30-SL?

The EQ30-SL is fully balanced, 30 band, graphic equalizer using SymbiLink™ technology for ultra low distortion and superior signal to noise ratio, making the EQ30-SL the highest quality third octave equalizer available today.

The EQ30 has thirty 1/3 octave bands of ± 12 dB boost/cut equalization. This type of equalization is often required if the listener desires to correct the tonal balance of the car's interior. The EQ30 allows the user to fine-tune the system to correct acoustic problems or to simply make adjustments to suit their own musical tastes. A front panel bypass switch allows the listener to compare the changes made to the system. Front panel clipping indicators indicate clipping at any point within the EQ30, including the 1/3 octave filters. Often, incorrect adjustment of these types of equalizers result in individual filter bands clipping without any external indication. This problem is eliminated with a high headroom design and "sense all" clipping indicators.

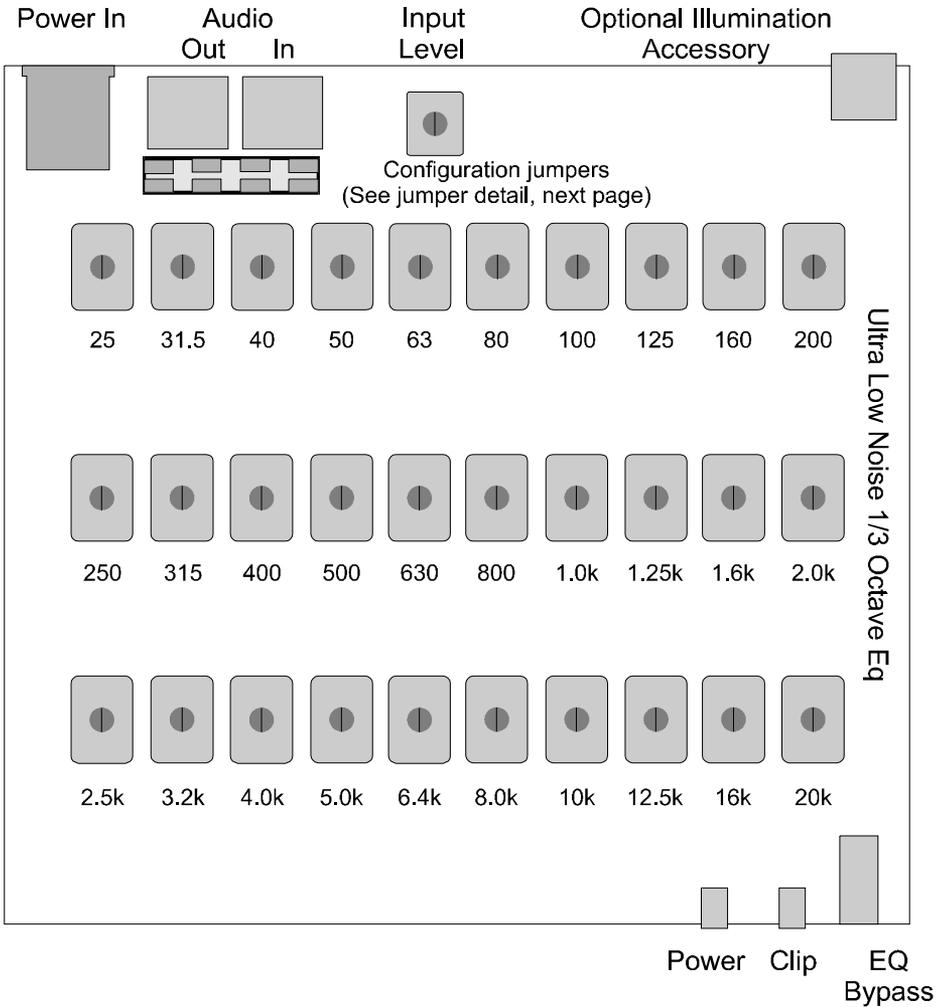
In the Zapco tradition, using surface mount technology and adhering to an engineering philosophy to only build a product as large as it has to be, the EQ30-SL comes in a very small Half Din chassis. A pair of these mono units may be dash mounted in a single Din space allowing the user to tune the system from the listening position.

A pair of EQ30-SL's requires the use of the Zapco PSI-SL. This power supply can power up to five SymbiLink™ processors.

Key Features

- SymbiLink™ balanced input and output
- Ultra high signal to noise ratio greater than 110 dB
- Full third octave - 30 bands of 12 dB boost / cut equalization
- Equalizer bypass switch
- Input, output, and internal filter clipping LED
- Output level control
- Transparent competition Lexan top cover
- Left / right channel designation jumper block
- Dash tuning capable
- Small, sleek 1/2 din chassis
- Quality Zapco construction
- Designed and built in the USA

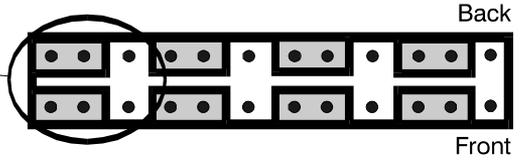
Switch, Jumper, and Control Layout



Jumper Settings

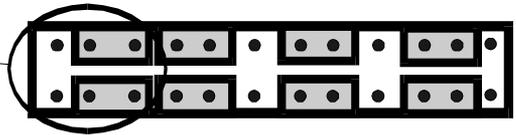
Gain jumpers allows / eliminates input gain stage. Shown in unity gain setting. (No gain)

Right Channel EQ, no gain



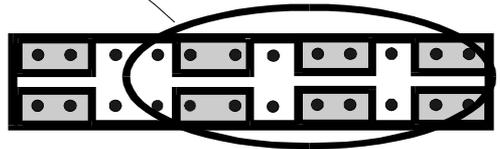
Gain jumper shown in variable gain setting. (Level Control adjusts gain)

Right Channel EQ, variable gain



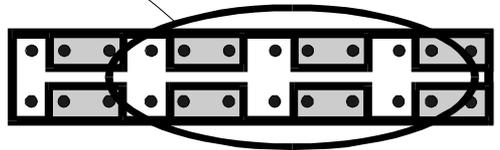
Gain jumpers allows / eliminates input gain stage. Shown in unity gain setting. (No gain)

Left Channel EQ, no gain

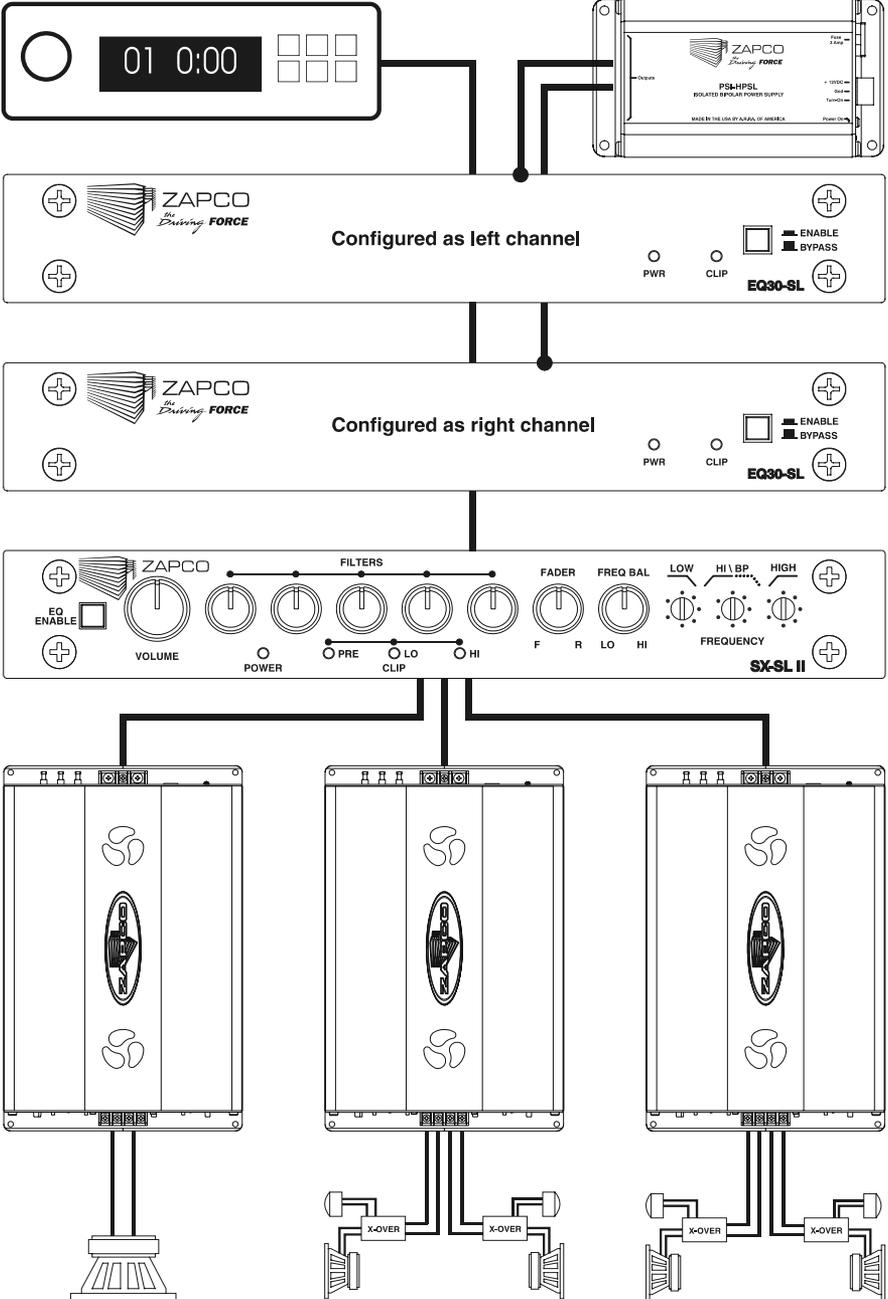


Gain jumper shown in variable gain setting. (Level Control adjusts gain)

Left Channel EQ, variable gain



EQ30-SL System Diagram



Tuning

Proper tuning of the EQ30-SL should be done by a qualified and experienced professional, as tuning a car requires both the science of acoustics and the art of musical listening.

Setting the 30 bands of a 1/3 octave equalizer can be very difficult, even with 1/3 octave Real Time Analyzers (RTA). The biggest problem using RTAs is that the microphone does not hear as we do. Another problem is that a RTA may tell you that some frequencies need cutting, but these frequencies may be the result of something in the interior of the vehicle resonating, or harmonic distortion caused by speakers or poor quality equipment. For example, a 40 Hz tone may be lower than your speaker cabinets can reproduce. The RTA will tell you to boost the 40Hz filter. What will happen is that the RTA shows not 40Hz coming up, but the second harmonic, 80 Hz! An easy way to tell if the system is distorting is to compare a RTA taken at the lowest possible volume with one taken at a higher volume. If these results are not the same, the system is distorting.

Because the microphone does not hear as we do, it is often a good idea to find a RTA taken on a known, "reference" system and try to tune your vehicle to that reference, using the same microphone and position. The last method is to adjust the RTA by ear. To test yourself on the difficulty of this task, try changing only one of the EQ30 bands from full cut to full boost and listen to the change. 1/3 octave is so narrow that it takes a very trained ear to effectively tune by ear.

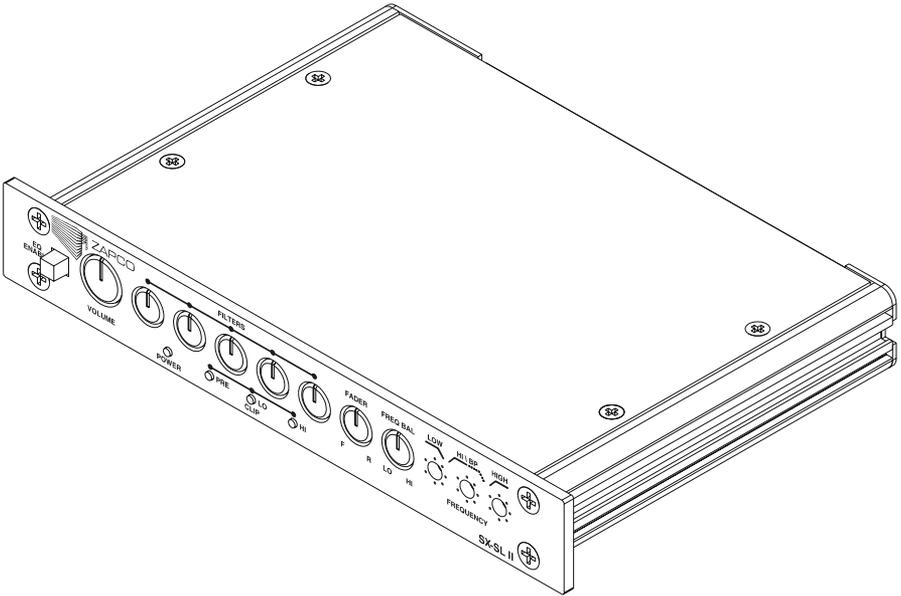
In general, try to use cut mode instead of boost to minimize noise and maximize headroom. If you notice that most of the bands are above 0 dB, try moving them all down and re-equalizing. The EQ30-SL has lower noise, higher headroom, and lower distortion than other 1/3 octave products, so this problem is minimized!

Troubleshooting

Symptom	Possible cause
Distorted output	Check for flashing clipping, reduce input gain. Also attempt to use cut instead of boost whenever possible.
Excessive noise	Increase input gain, reduce the gain of other products in the system. Use cut mode instead of boost mode.
The boost / cut has no effect.	Check the internal jumper block settings
Power LED does not come on.	The EQ30 must be powered by a PSI-SL or PSI-HPSL. Make sure that the PSI-SL or PSI-HPSL is on.

If you are experiencing a problem that is not listed here, or have a situation that requires special attention, please see the technical assistance section of this manual.

SX-SLII



Specifications

Maximum output level	
Balanced	16 volts, RMS
Unbalanced	8 volts, RMS
Maximum input level	
Balanced or Unbalanced	12.5 volts, RMS
Input Impedance	
Balanced	5K ohms
Unbalanced	11.5K ohms
Minimum Output Impedance	600 Ohms
Frequency Response	
+ 0, - .25dB	20Hz – 20KHz
S/N Ratio "A" weighted, EQ in, all outputs	> 110dB
Transient Distortion, full range	< .003%
Harmonic Distortion, EQ in – with crossover	< .005% THD + N
Separation @ 1 kHz, "A" weighted, all outputs	> 80dB
Input Sensitivity for 16V RMS output	
Balanced	3, 6, 12VRMS
Unbalanced	.7, 1.6, 3VRMS
Current Requirements	600 mA
Dimensions	L= 4.8", W= 6.9", H= 1"

What is the SX-SLII?

The ultimate In-car audio control center

The SX-SLII is a fully balanced in-dash signal processor, which combines several units into one compact chassis. The SX-SLII features a paragraphic equalizer, a two or three way electronic crossover, a front/rear fader, and a frequency balance control - giving you total control over your audio system from your listening position.

The paragraphic equalizer featured in the SX-SLII can be programmed to meet the exact requirements of your audio system by changing the internal equalizer modules. Over 120 different modules are available from Zapco, or custom modules can be made to suit your particular requirements.

The SX-SLII's electronic crossover can be configured for a variety of different possible installation scenarios. The front and rear outputs can be used as full range, high pass, or band pass. The subwoofer has a low pass output that can have a 12 or 24dB per octave slope. With these options, two way, three way, and other types of system layouts can be created while making all critical crossover adjustments from the dash and in the listening position.

The front/rear fader adjusts the balance between the front and rear outputs and the frequency balance control adjusts the balance between the subwoofer output and the front/rear outputs.

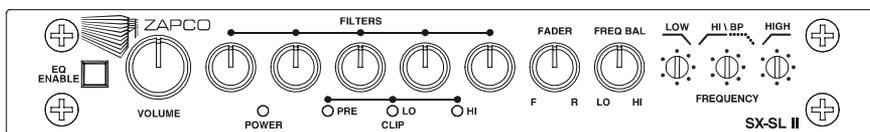
Retractable knobs are featured on all of the main controls for a smoother look and to prevent knobs from being moved when not in use, and an LED illumination system is included to allow ease of visibility and use at night.

An optional PSI-SL power supply is necessary for the SX-SLII when it is to be used in systems that do not feature a SymbiLink™ amplifier. If you need more information on this type of installation, please consult your local Zapco dealer, or contact the Zapco technical service department directly.

Key Features

- SymbiLink™ balanced input and outputs
- Five paragrahpic equalizer filters with stock frequencies at:
Filter center frequencies: 35Hz, 92Hz, 620Hz, 3.1KHz, 15KHz
Filter "Q": 2.1 1.5 1.2 1.1 1.4
- Equalizer defeat switch
- Front / rear fader control
- Frequency balance control
- Two or three way electronic crossover
- Retractable control knobs
- 12 or 24dB per octave slope on the subwoofer output
- 18dB per octave slope on the X1 crossover
- Times ten range switch on the X1 crossover
- 10dB boost switch on the subwoofer output
- 0, 6, or 12dB gain switch on the input
- Balanced or unbalanced input switch
- Changeable red / green illumination color
- Isolated power terminal for illumination
- Optional PSI-HPSL external power supply
- Quality Zapco construction
- Precision 1% tolerance resistors used throughout
- Designed and built in the USA

Front Panel Controls



EQ Enable:

Defeats or engages the five equalization filters. This switch does not affect the crossover functions. In = enable, Out = EQ bypassed.

Volume:

Adjusts the system's total volume. This control may be left in one place while the source unit's volume is used, or vice-versa. This control is retractable when not in use.

Equalization Filters:

Five equalization filters allow you to contour the system's frequency response to suit your specific requirements. Each of these filters has a removable frequency module that can be customized to your exact needs. These controls are also retractable when not in use.

Front/Rear Fader:

Adjusts the proportion between the front (output 2) and rear (output 1) outputs. This can be used for a front/rear or midrange/treble balance control depending on the configuration selected.

Frequency Balance Control:

Adjusts the proportion between the low pass output and the front/rear outputs. This control is used to alter the amount of bass in proportion to the rest of the system.

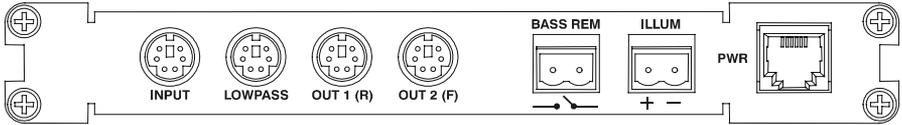
Crossover Controls:

These variable controls alter the crossover frequencies of the three onboard crossovers. Consult this manual or the inside top cover for the frequency scales and their functions.

Input and Output Clipping LED's:

Indicate excessive signal voltage within the internal audio circuitry. Lightly flashing LED's begin within 1dB of the clipping point. These LED's may occasionally blink, but should never go completely solid.

Back Panel Connections



Input:

Audio signal input from the head unit or other audio source. This can be a balanced SymbiLink™ input or a standard unbalanced RCA style input using the supplied adapter cable. Be sure to set the internal input selector switch to the applicable position.

Low Pass Output:

Sends a low frequency output to the subwoofer amplifier or other component. The level can be altered with the Frequency Balance Control.

Output 1 (rear output):

This output can be full range, high pass, or band pass depending on the configuration of the internal Configuration Switches. It can get its signal from either the X1 or X2 crossovers, or provide a full range signal. The Front/Rear Fader control can control its output level.

Output 2 (front output):

This output is independent from Output 1, but performs with exactly the same rules and guidelines. The internal configuration switches determine the assignment of both of these outputs.

Bass Remote:

An on/off switch may be added to this plug to control the internal bass boost control. When the internal switch is in the off position, the remote switch will operate as an over ride to turn bass boost on and off.

Illumination:

This removable two-pin terminal supplies power to the internal LEDs for nighttime illumination. Polarity at the plug allows you to choose either red or green as illumination color.

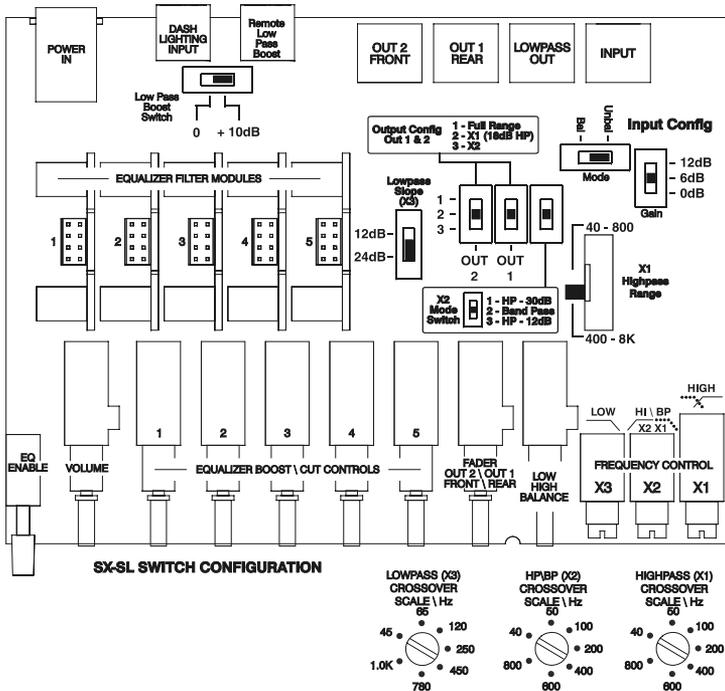
Power Supply:

When installed with a SymbiLink™ amplifier, no power connections are necessary. When the SX-SLII is to be used in a system that does not contain a SymbiLink™ amplifier, a PSI-HPSL power supply is needed to power up this and some other SymbiLink™ components.

Into the Heart of the SX-SLII

Remove the top cover of the SX-SLII and you will see the most advanced preamp ever designed for automotive use. It will surely look daunting at first view, but, after a little study and practice, we think you will be amazed at what you will be able to accomplish with this piece.

Internal Switch Configuration



Input Balanced / Unbalanced switch:

Selects between two different input sensitivity ranges for high voltage balanced (SymbiLink™) or standard unbalanced signals. When using unbalanced inputs, use the supplied SymbiLink™ to RCA adapter cable for the input connection.

Gain Switch: 0, 6, 12dB

Applies specified gain to the input signal. Higher input signal voltage will help to maximize the signal to noise ratio. 6dB will double the input voltage and 12dB will quadruple the input voltage. Monitor the input clip LED on the front panel to indicate excessive voltage. Use the highest position that does not brightly flash the input clip LED with the source volume set to approximately ¾ of the source's full output volume.

Low pass Slope:

Selects between 12 or 24dB per octave slopes for the low pass output. The 24dB position will automatically sum the signal to monaural.

Low pass Boost:

Selects between 0 or 10dB of signal gain for the low pass output. The 10dB-gain position is useful when using very low crossover frequencies and extra signal voltage is needed to drive the subwoofer amplifier to the preferred level. **New to the SX-SLII** is a plug on the back plate for the bass boost. If you wish, you can add an external switch to control the bass boost. Simply switch the internal boost switch to 0, then attach an on/off switch to the plug provided. You will then be able to turn the boost on or off remotely.

X1 Range:

Chooses between one of the two available ranges for the X1 crossover. Either the 40Hz to 800Hz range or the 400Hz to 8KHz (times ten) range can be selected. This switch does not affect the X2 crossover.

Output 1 & 2 Configuration Switches:

These 3 position switches can choose between 3 different modes. It is important to note that Output 1 does not necessarily have to be connected to the X1 Crossover. Output 1 can be connected to the X1 or X2 Crossovers (or both) depending on the switch settings. This also applies equally to Output 2.

The three positions are:

1. **Full Range position** - Bypasses both the X1 and X2 crossovers.
2. **X1 position** - Selects X1's high pass output. This position also gives access to X1's 12 or 18dB slope option.
3. **X2 position** - This position accesses the X2 output, and can actually be a band pass, a separate (independent from X1) 12dB high pass, or a 30dB per octave high pass - depending on the position of the **X2 Mode Switch**.

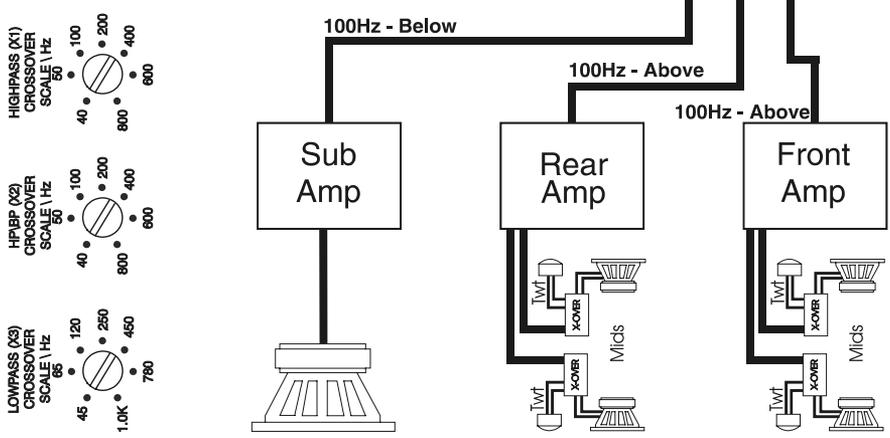
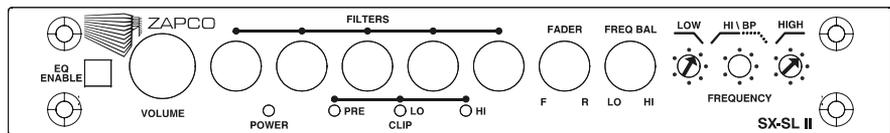
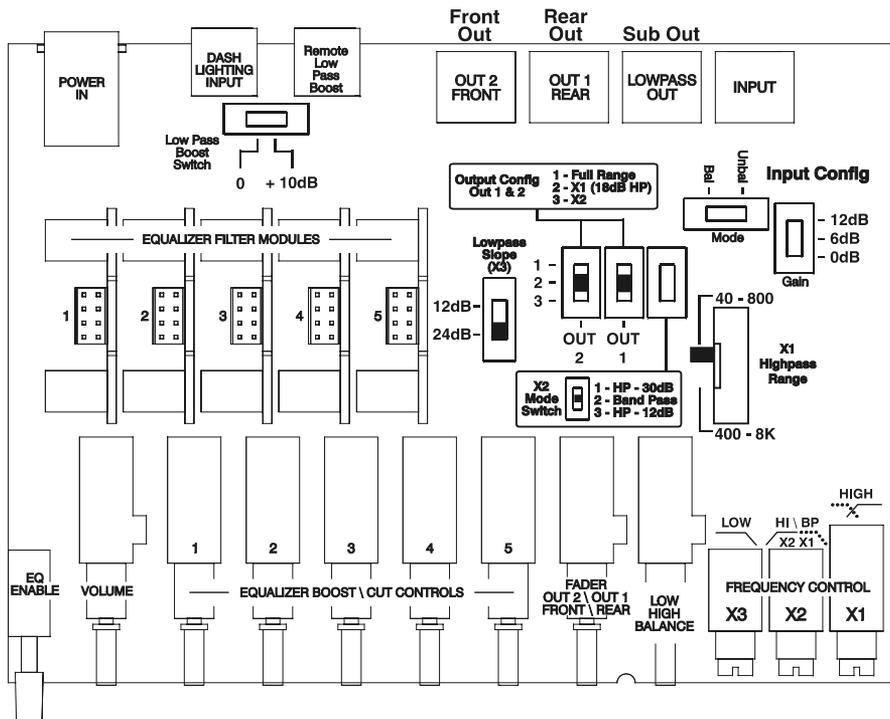
X2 Mode Switch:

If the X2 Mode Switch is in the High Pass position, the X2 crossover's output is a simple 12dB high pass. If the switch is in the Band Pass position, the X2 output will be a band pass - with X2 determining the bottom end (high pass) and X1 determining the top end (low pass) of the band pass. If the switch is in the 30dB High Pass position, the X1 and X2 crossovers are cascaded, and when set to the same frequency; a 30dB slope will be achieved.

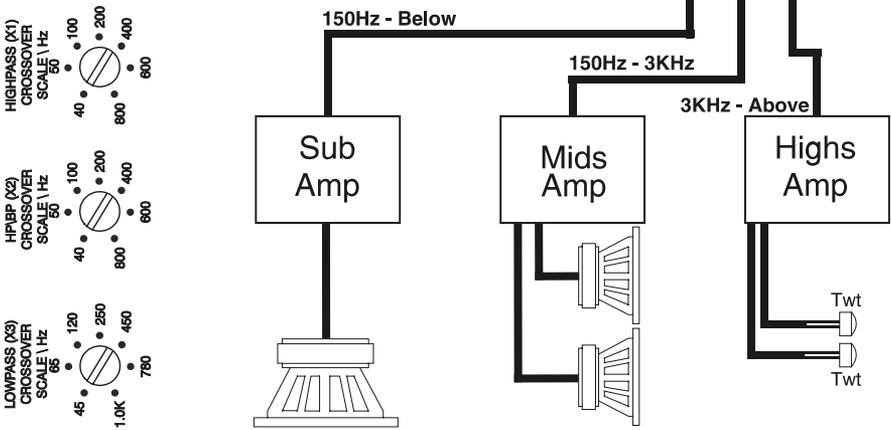
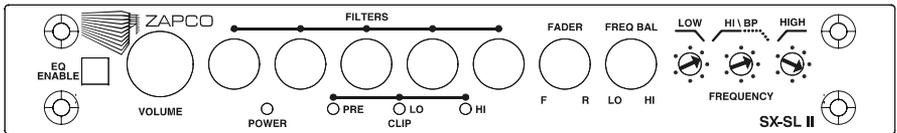
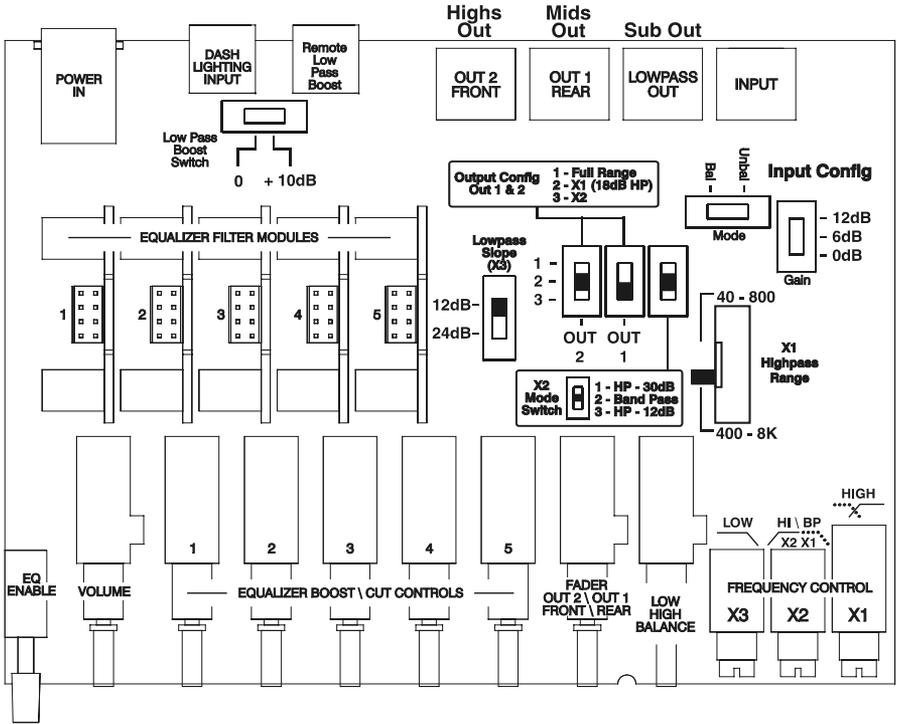
Sample Configurations

On the following pages we present a number of sample systems and the switch settings involved. Switches not addressed in a diagram (i.e. gain, bass boost) are not related to the configuration settings, and will be set according to equipment requirements or personal preferences.

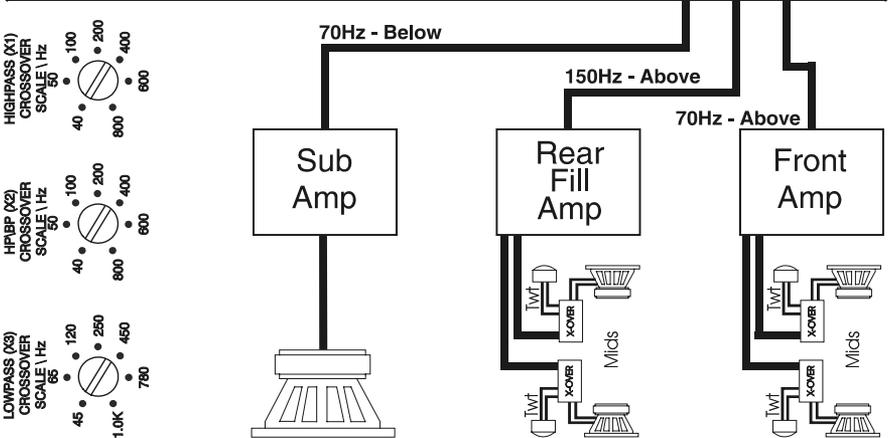
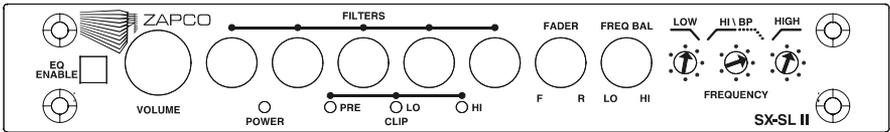
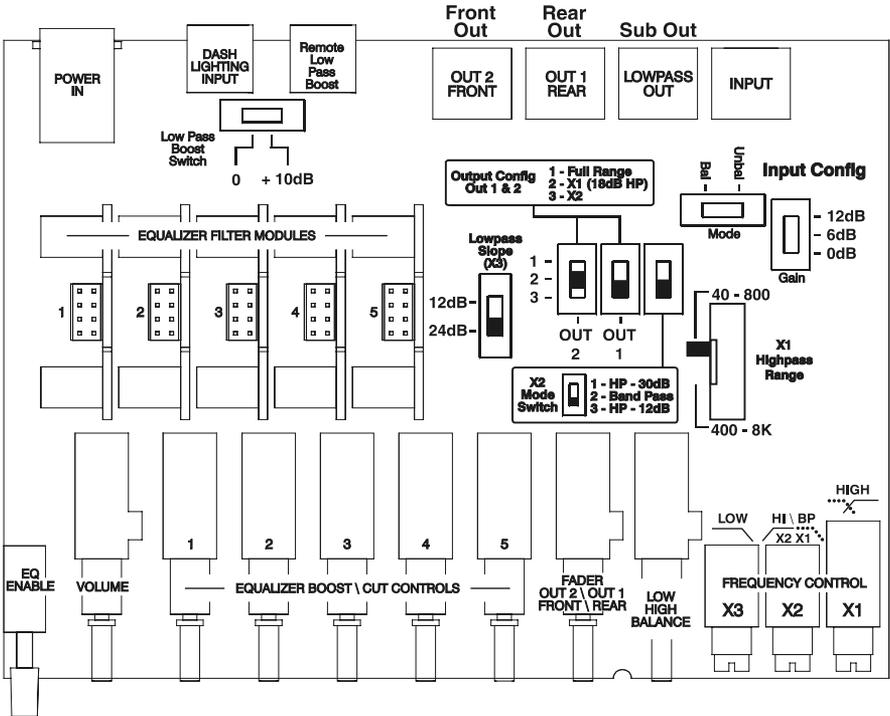
Basic Front / Rear + Bass



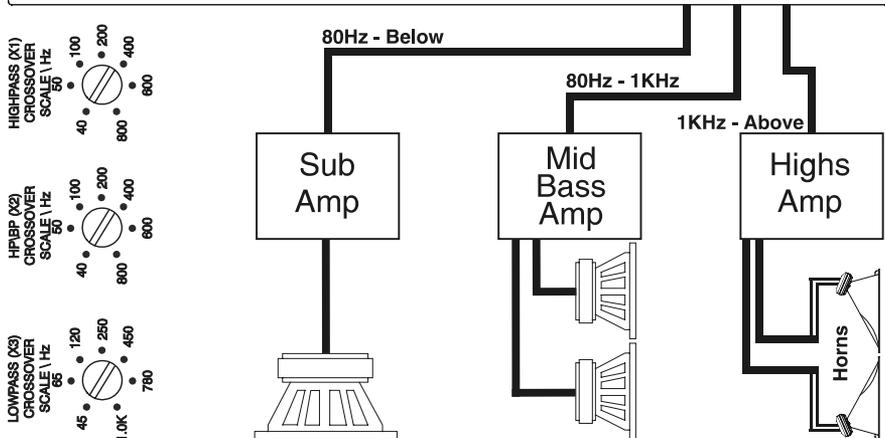
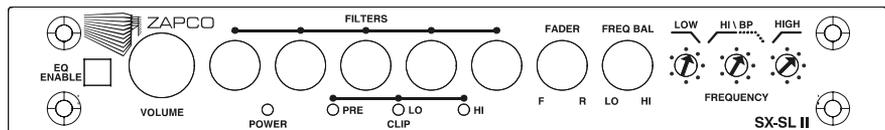
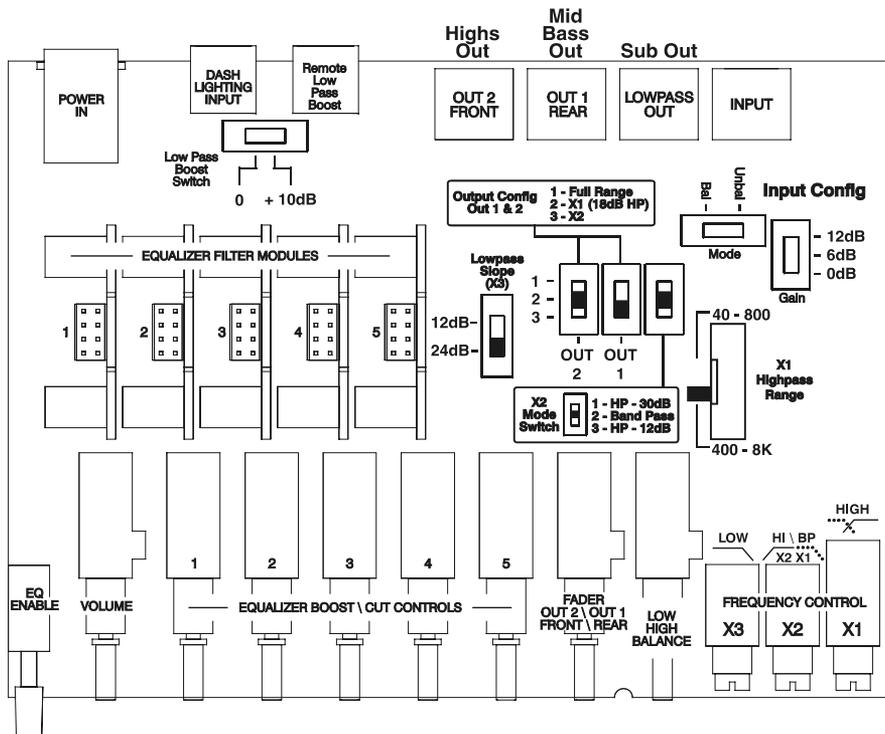
Basic Three Way



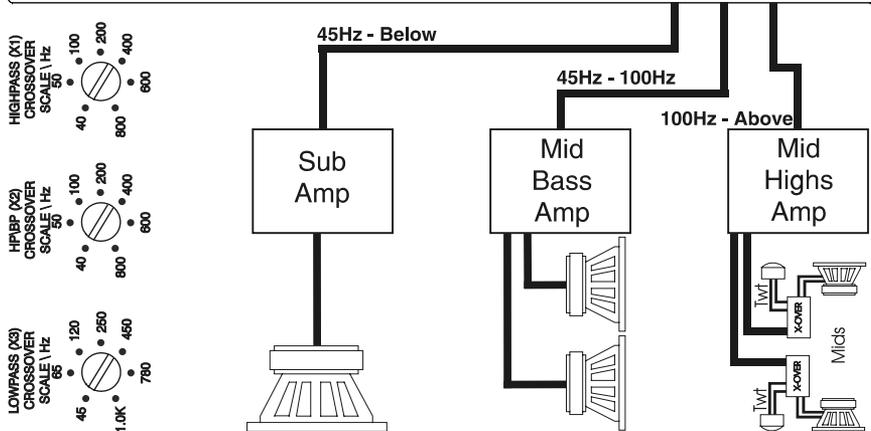
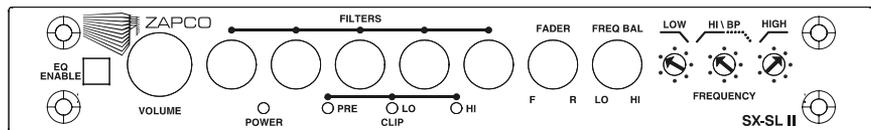
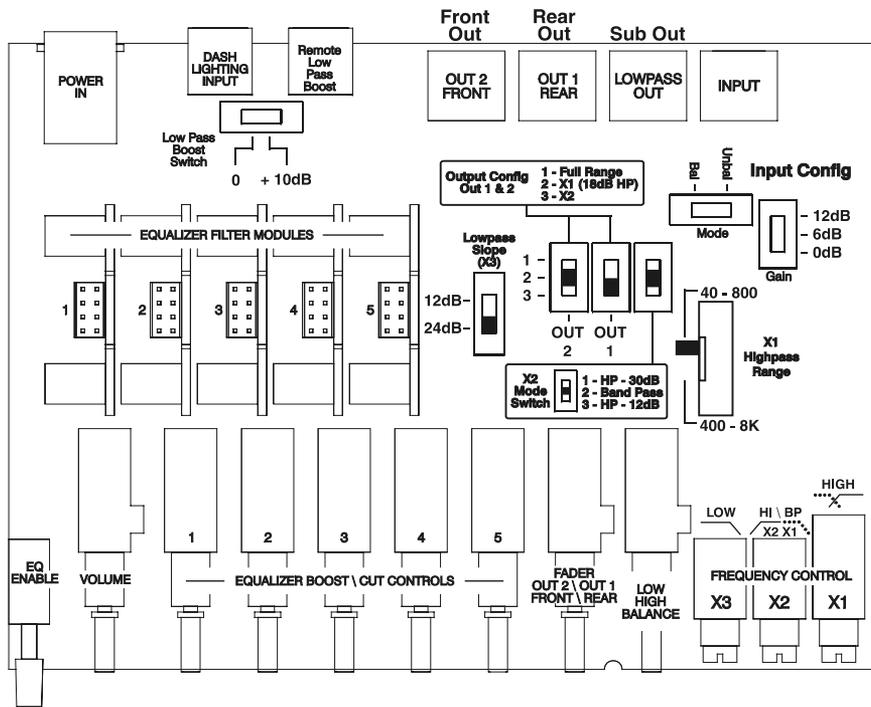
Dual 2 Way 18dB Front 12 dB Rear + 24 dB Bass



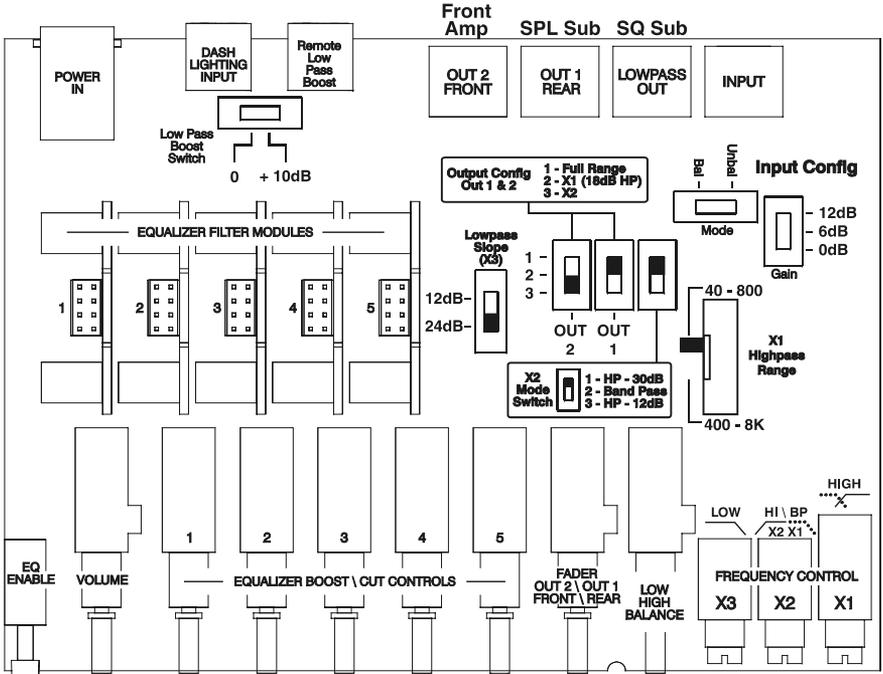
3 Way with Horns



3 Way Bass / Mid-Bass and Separates

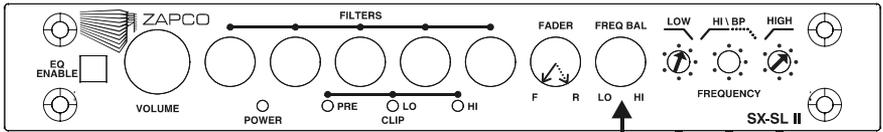


USACi Competition System

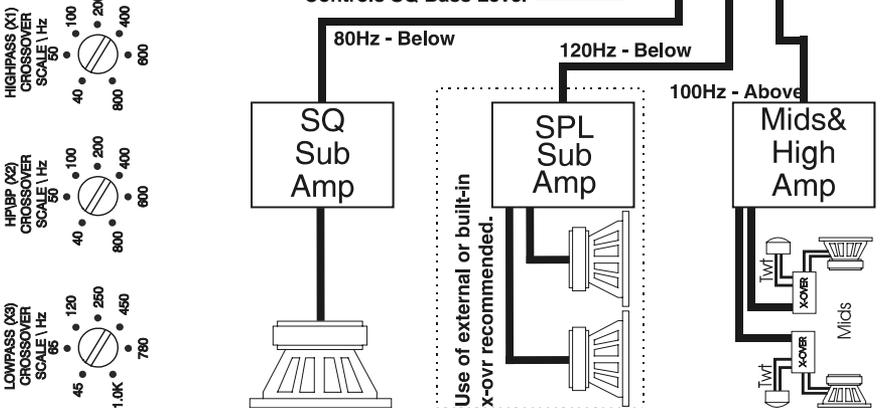


The SX-SL can control two competition systems
 Turn the fader knob clockwise to listen to the "SQ"
 system. When doing "SPL", turn the fader knob counterclockwise.

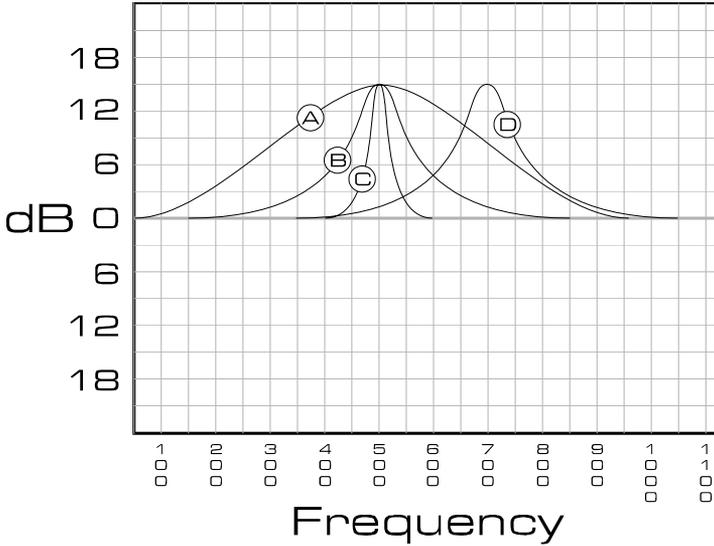
→ SQ Setting
 → SPL Setting



Controls SQ Bass Level

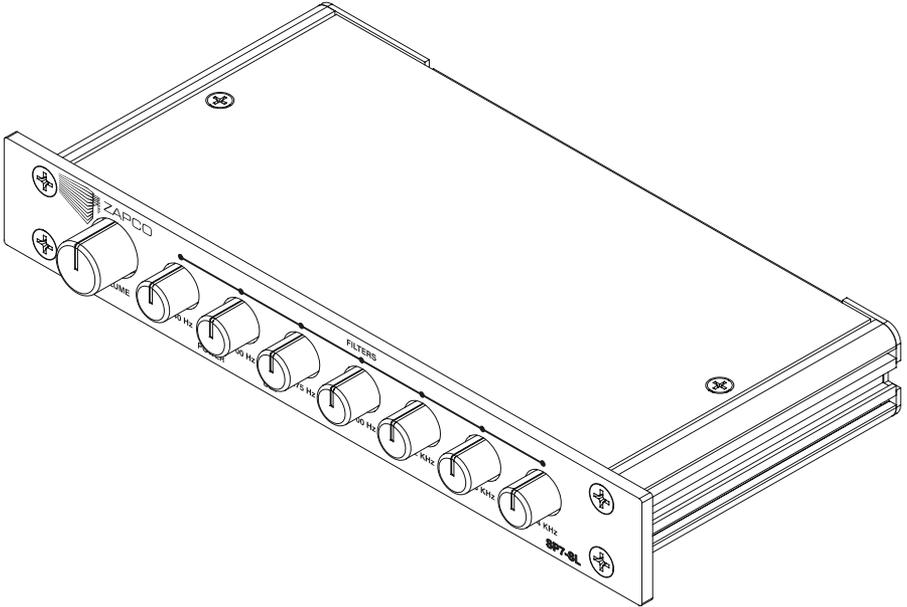


Paragraphic Equalization and "Q"



In the above diagram, we have shown how different equalization modules look when displayed on a graph. Each equalization filter or "band" has three main parameters. They are: boost and cut, center frequency, and Q. Boost or cut refers to an increase or decrease of volume level (in dB), at the center frequency of the filter. The center frequency is the center point of the range that the filter itself affects. Curves B and D above have the same boost and Q but have different center frequencies. On our graph, filters A, B, and C all show 15dB of boost and a center frequency of 500Hz, yet they all show different response curves. This difference is due to the filter "Q". Curve A is an example of a wide Q filter affecting a wide frequency range. Wide Q filters create an easily audible difference, but may be too wide to correct specific problems. A wide Q filter is identified by a low number such as .5, .8, 1.2 etc. A medium Q filter tends to be the type most widely used since it tends to make a noticeable sonic difference while being narrow enough to help correct specific problems. These types of filters have Q numbers in the 1.5 to 3.0 range. A narrow Q filter like curve C affects a small range of frequencies and is identified by a relatively high Q number such as 5.2, 7.0, 8.5, and sometimes up to 13 or higher. The more bands an equalizer has, the narrower the Q of each filter. There are over 120 different optional modules available for the SX-SLII. If you wish to make custom modules, you have the opportunity to create any center frequency and Q that you want. Optional or custom modules may be ordered through an authorized Zapco dealer. Zapco also offers a computer program called Audio 5.0, which aids in the design of custom modules. This program may be downloaded from the Zapco home page at www.zapco.com.

SP7-SL



Specifications

Maximum output level	
Balanced	16 volts, RMS
Unbalanced	8 volts, RMS
Maximum input level	8 volts, RMS
Input Impedance	10k Ohms
Minimum Output Impedance	600 Ohms
Frequency Response	$\pm .3$ dB 20 to 20 kHz
S/N Ratio	> 100dB
Transient Distortion	< .002%
Harmonic Distortion	< .005%
Separation @ 1 kHz, "A" weighted	> 80dB
Input Sensitivity (in three ranges)	.5 - 8 volts
Current Requirements	.5 ampere @ 12 VDC
Dimensions	.95" x 3" x 6.25"

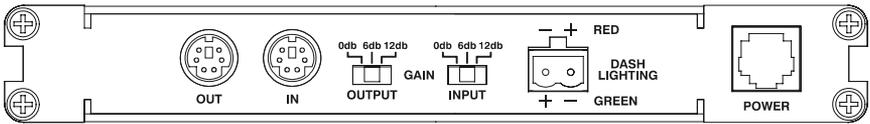
What is the SP7-SL?

The SP7-SL is a straightforward seven band graphic equalizer for use when no other processing (i.e. crossovers) is required. The SP7-SL has fully balanced input and output connectors that eliminate induced noise and distortion. The SP7-SL can be powered by either a separate PSI power supply or by a Zapco SymbiLink™ balanced amplifier. The very best low noise components are used throughout for unmatched sound quality.

Key Features

- SymbiLink™ Balanced Signal Technology
- Pro audio balanced differential inputs
- Very low noise and distortion
- ½ DIN size
- Separate gain switches for both input and output
- High quality PC board
- Surface Mount Technology
- Can drive 600 ohm loads
- Clipping LEDs monitor all 28 op-amps
- Seven 1.25 octaves of Equalization @ ± 18dB
Freq: 40Hz 100Hz 275Hz 700Hz 2KHz 5KHz 14KHz
(Q): 1.13 1.36 1.42 1.4 1.36 1.29 1.06
- Can accommodate 7 volt (14 balanced) input / output signal levels
- Very high quality, long life, low noise potentiometers
- Three year warranty (dealer installed)
- Designed and manufactured in the USA

Rear Panel Connections and Switches



Output Connector:

The output of the SP7-SL will connect directly to any Zapco amplifier or any down stream SymbiLink™ processor. A SymbiLink™ to RCA adapter may be used with an unbalanced RCA input amplifier.

Input Connector:

The SP7-SL can receive a fully balanced SymbiLink™ input signal of up to 8 volts. It may also be used with an Unbalanced RCA signal if combined with an RCA to SymbiLink™ adapter.

Output Gain Switch:

This allows up to 12dB gain to be added to the SP7-SL output, to assure that the amp will receive its maximum usable input signal.

Input Gain Switch:

This allows up to 12dB gain to be added to the SP7-SL input, to assure that the EQ has its maximum input before clipping. If the clipping light on the faceplate lights, you should reduce this setting until the light goes out.

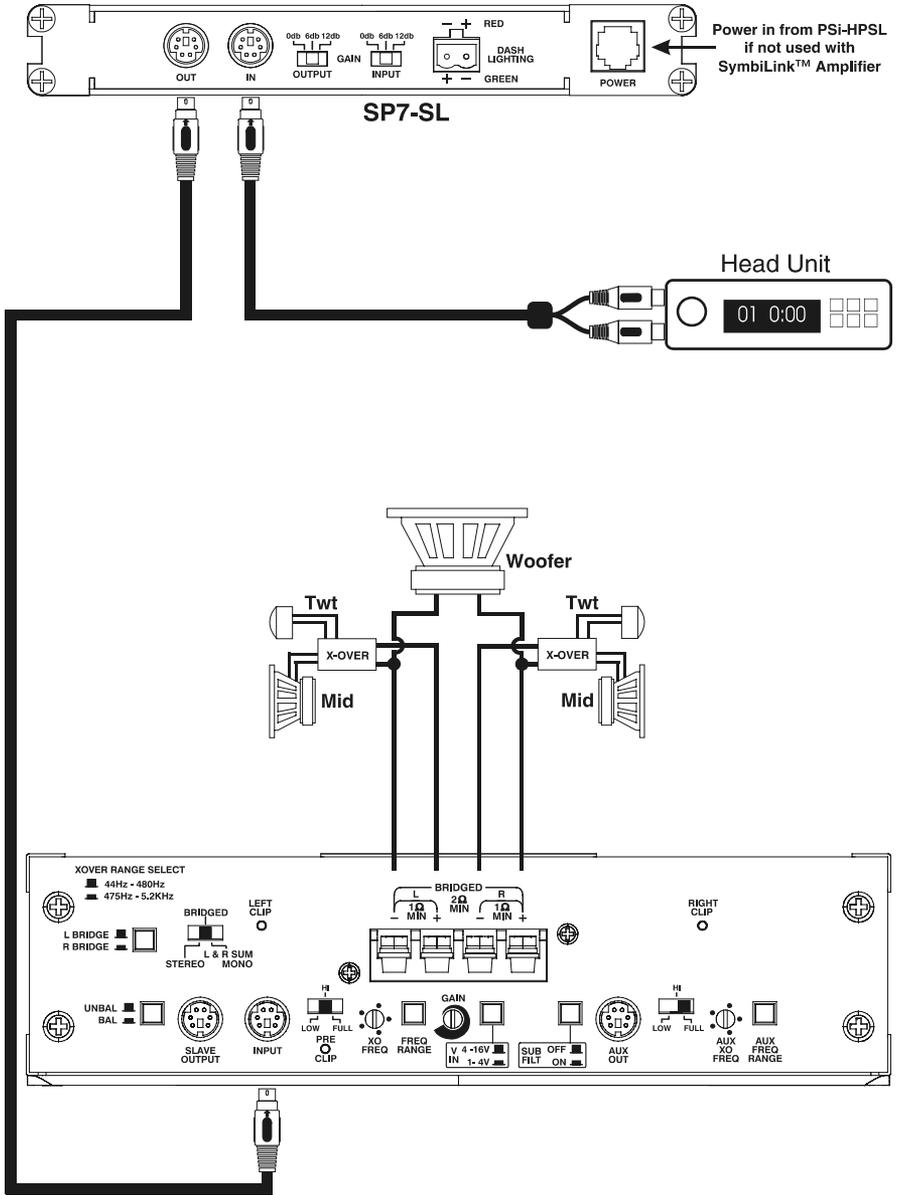
Dash Lighting:

Using the supplied plug, attaching one wire to ground and one wire to 12V as indicated will back light the controls. Reversing the polarity of the wires will change the color from red to green, as indicated.

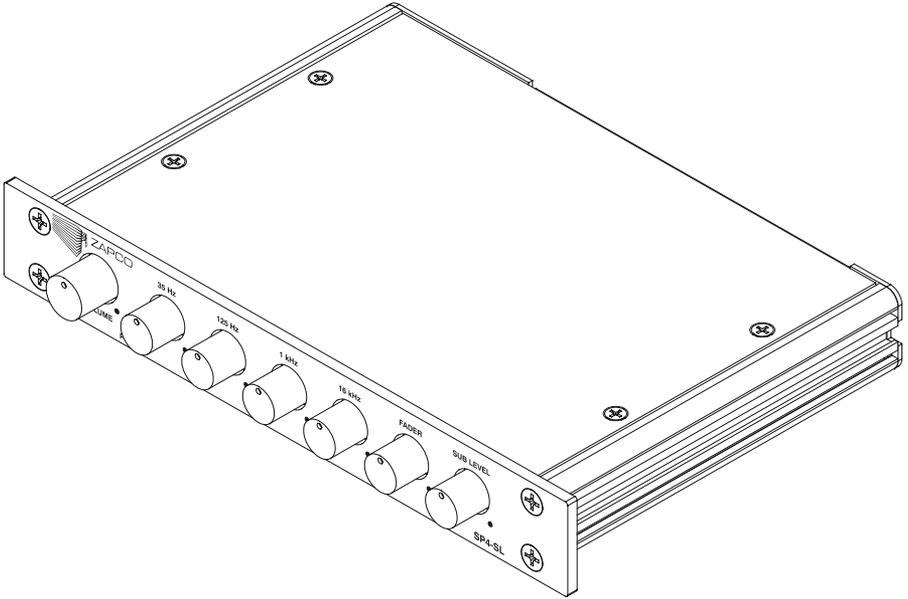
Power Connector:

The SP7-SL will power up directly from the SymbiLink™ cable when used with any Zapco SymbiLink™ amplifier. A power connector is provided to accept the output of a PSI-HPSL, if the SP7-SL is used with a Non-SymbiLink™ system.

SP7-SL Diagram



SP4-SL



Specifications

Maximum output level	8 Volts, RMS
Maximum input level	5 Volts, RMS
Input Impedance	47k Ohms
Output Impedance	100 Ohms
Frequency Response	$\pm .3$ dB 20 to 20 kHz
S/N Ratio	> 100dB
Transient Distortion	< .002%
THD + N	< .0035%
Separation @ 1 kHz, "A" weighted	> 80dB
Input Sensitivity (in three ranges)	1.25 - 5 volts
Current Requirements	250 milliamps
Dimensions	L=4.8", W=6.9", H=1"

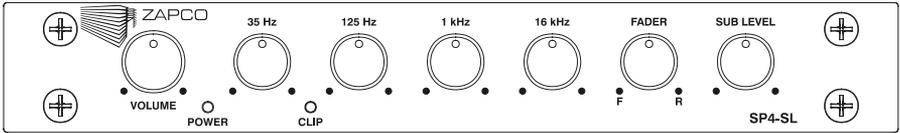
What is the SP4-SL?

The **SP4-SL** is a full-featured preamp/equalizer with a built in power supply and subwoofer crossover, plus a built in balanced line transformer. It will convert any decks unbalanced RCA output to a true SymbiLink™ balanced output for maximum audio performance.

Key Features

- Four, 18dB, Boost/Cut Equalizer filters centered at frequencies chosen specifically for the automotive environment
Freq: 40Hz 125Hz 1KHz 12KHz
(Q): 1.76 2.15 .74 1.43
- Unbalanced RCA inputs to SymbiLink™ balanced output
- 24dB variable, low pass, subwoofer crossover, adjustable from 30Hz to 300Hz
- Subwoofer amplifier gain control
- Front to rear fader control
- Overall system volume control
- Input gain control switchable to 0, +6, or +12 dB
- Front panel power and clipping indicators
- User Selectable red or green illumination
- Quality Zapco Construction

Front Panel Layout



Volume:

Controls over-all system volume.

LED lights:

Power LED indicates power on condition.

Clip LED indicates signal clipping at any stage within the EQ.

Frequency controls:

Four rotary controls operate at 35Hz, 125Hz, 1kHz, and 16kHz to allow custom equalization of your sound system.

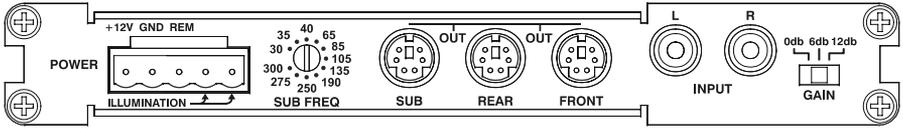
Fader:

Front to Rear fader allows speaker balancing independent of bass setting.

Bass Control:

Allows independent control of sub woofer output, to balance Bass level with Mid-High levels *before* overall volume control.

Back Panel Layout



Power connections:

The power plug is provided for +12V, ground, and, remote turn on.

NOTE: if you are using Zapco amplifiers, you will not need these connections. The SP4-SL will power up directly from the SymbiLink™ connection to the amp. The last two connections on the power plug are +12V and -12V for illumination. Reversing the polarity of these connections will change the light color from red to green.

Sub Freq:

Subwoofer crossover adjustment.

Outputs:

SymbiLink™ balanced outputs for Sub Woofer amp, Rear amp, and Front amp.

Input:

Right and Left, RCA, unbalanced inputs. (Internal balanced line transformer will provide high voltage SymbiLink™ outputs).

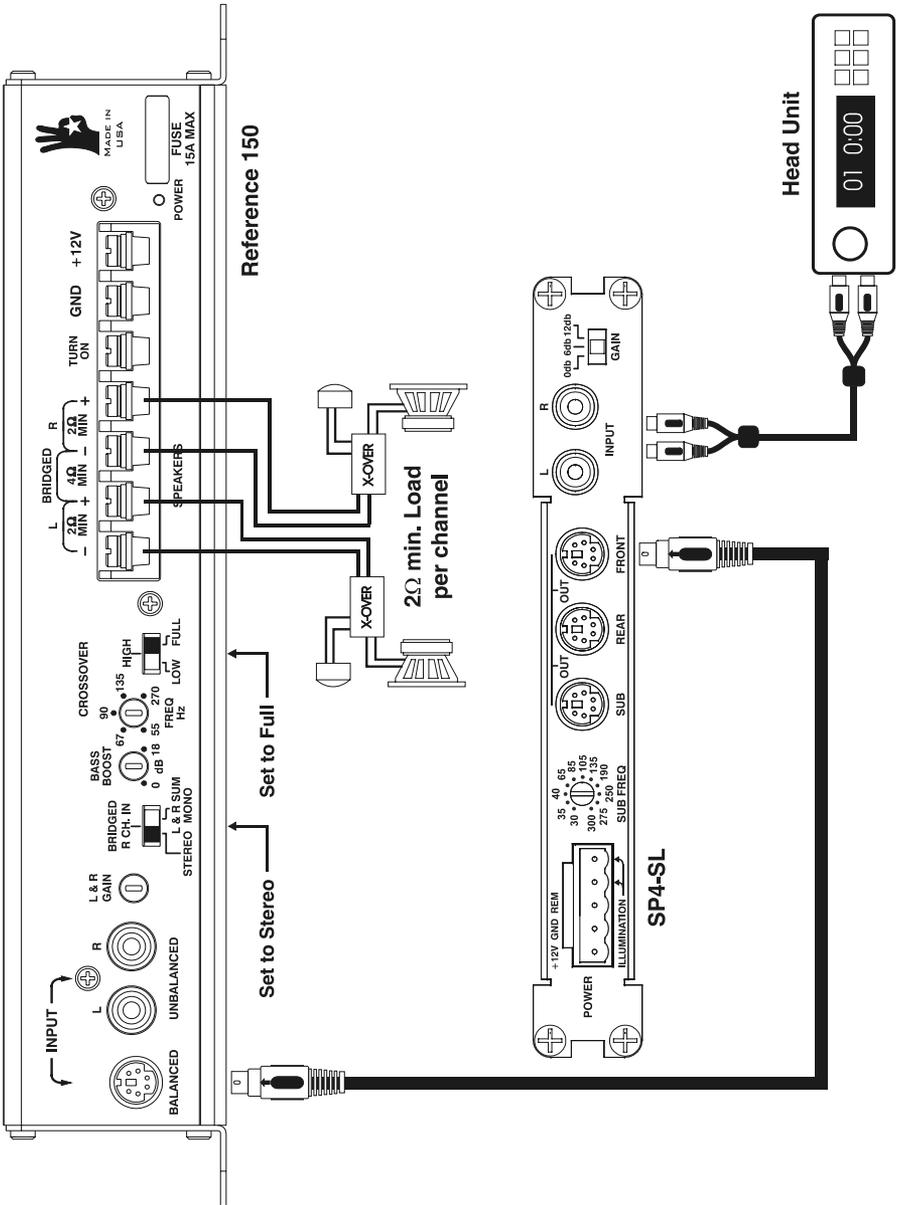
Gain:

Gain setting will provide up to 12dB gain on the input.

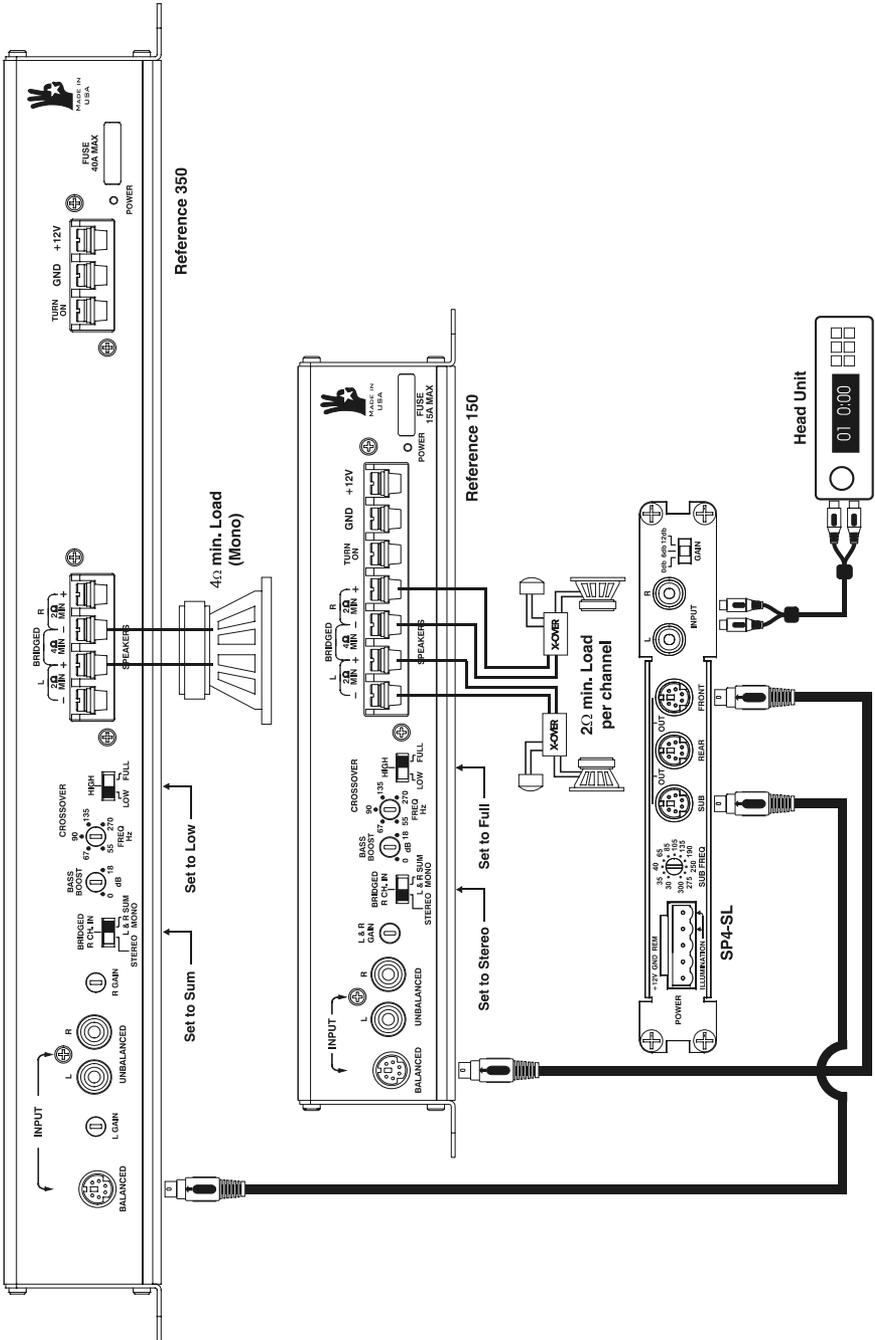
SP4-SL Setup

1. Set the SP4-SL's volume to fully counterclockwise.
2. Set all amplifier gains to minimum (Counterclockwise).
3. Set the SP4-SL's gain to 0dB.
4. Set the head unit to $\frac{1}{2}$ to $\frac{3}{4}$ volume while playing music with a heavy beat.
5. If the clipping indicators on the SP4-SL are lit or blinking, then turn the volume down on the head unit until the indicators are off or there is a very minimum of blinking. Go to step 7.
6. Set the SP4-SL's gain to the next highest setting and then go back to step 5.
7. Increase the SP4-SL's volume to normal listening levels.
8. The SP4-SL's clipping indicators should **never** be fully on and shouldn't light up for more than a split second!
9. Use amplifier gain only if you still desire more amplitude in your music volume.

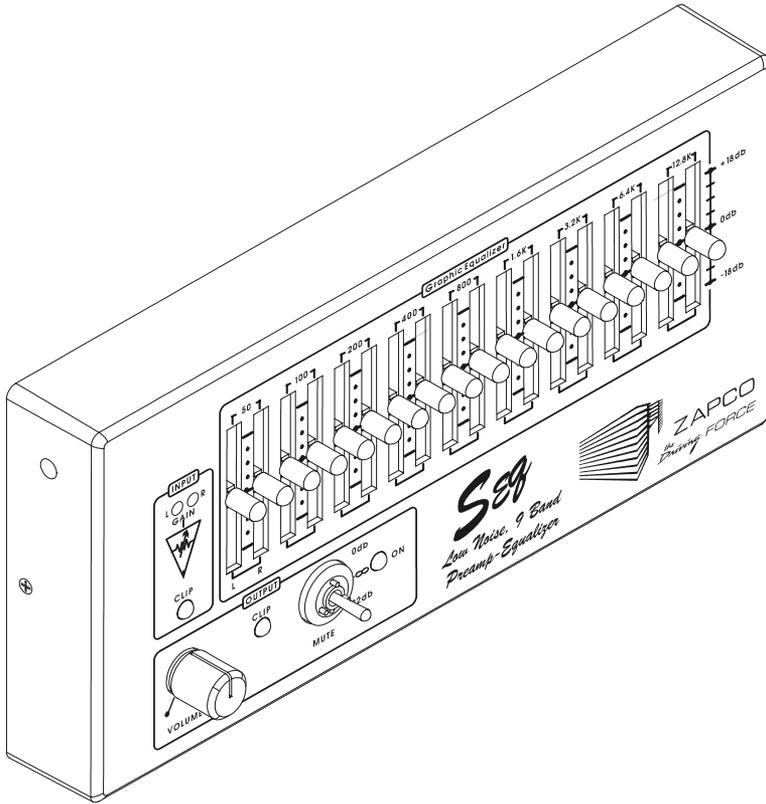
Full Range System



Basic 2 Way with Sub



SEQ



In 1977 Zapco created a signal processing legend with the full-scale production of the PEQ Preamp-Equalizer. The PEQ was the world's first audiophile preamp for the car. The PEQ provided dual 9 band EQ's with 18 slide pots for ease of operation. It was also the first 12-volt preamp to offer THD and noise specifications worthy of high quality home gear, and the first to offer high voltage/low impedance outputs, to avoid signal loss in long cable runs.

The PEQ, which had come to be known as the "ZAP Board", was updated in the early 90's to provide even better performance, with improved op-amps, and even lower noise components.

The new model received a new name and became the SEQ, but it retained all the looks and features and die cast body that built the legend, and it's popularity continued to grow.

The SEQ remains a top seller, after 25 years in the lineup.

Key Features

- 18 dB boost / cut range on eq bands
- Custom slide pot taper for smooth gain change and better resolution
- Master volume control using high-quality conductive plastic potentiometers with superior L / R tracking and very low noise
- Input and output LED overload indicators, accurate to within 1 dB of clipping
- On-off 22 dB cut switch with de-thumping circuitry
- Variable-gain input preamplifier with 6 to 26 dB adjustable gain for matching to low or high output level decks
- Signal to noise >98 dB
- Low impedance output drives long cables

Installation Instructions

The cable supplied with your SEQ is comprised of seven wires. These seven wires are terminated on one end in a connector designed to be inserted into the back of the SEQ. The other wire ends have been left unterminated.

The following are instructions on proper connection of the seven unterminated wire ends and additional wiring to ensure proper system grounding.

WIRES INSIDE SHIELDED CABLE:

Five wires are contained within the gray jacketed, shielded cable.

Signal inputs (to SEQ), outputs (from SEQ), & signal ground are all contained within the shielded cable. Function & connection of these wires are as follows unless otherwise indicated on a tag attached to the cable:

- Green - Right Channel Input
(to SEQ from right channel output of source unit)
- White - Left Channel Input
(to SEQ from left channel output of source unit)
- Red - Right Channel Output
(from SEQ to right channel input of amplifier)
- Black - Left Channel Output
(from SEQ to left channel input of amplifier)
- Bare - Signal Ground
(from shielded cable to case of source unit)*

WIRES EXTERNAL TO SHIELDED CABLE:

Two wires are external to the gray jacketed, shielded cable.

Power Input & Power Ground connections are external to the shielded cable. Function & connection of these wires are as follows:

- Red - Power Input to SEQ
(connect to constant, 'unswitched', 12V source - fused)**
- Black - Power Ground
(connect to case of source unit)*

ADDITIONAL GROUND CONNECTIONS:

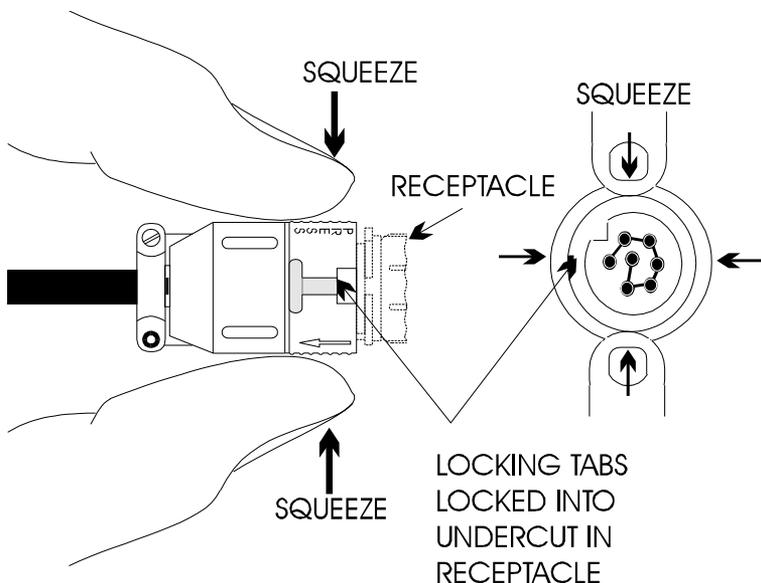
To ensure proper system grounding the following additional connections must be made. RCA Shields & SEQ case must be connected to case of source unit.

- RCA Shields - Signal Ground from amplifier inputs (connect wire from RCA Shields @ amplifier input to case of source unit)*
- SEQ Case - Case Ground from SEQ
(Connect wire from SEQ case to case of source unit)*

* Four separate wires should terminate under the same screw at the case of the source unit.
 ** Preferably, this connection is made through a 1/4 amp, fast blow, fuse directly to the car battery.

Connecting the SEQ

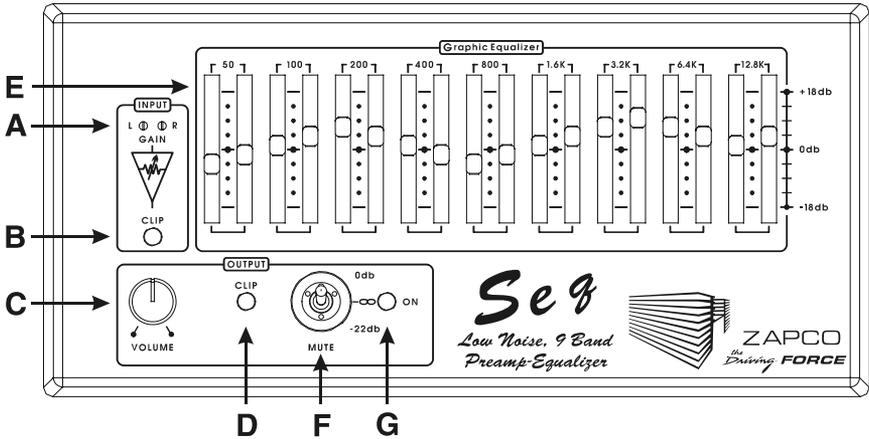
The SEQ has a special miniature circular 7 pin connector with gold plated pins. The connector snaps into place like other high quality connectors. To remove it, squeeze and then pull as shown:



Don't turn - Don't twist - Don't use hand tools!

1. Squeeze finger grips to flex plastic coupling area. The locking tabs will deflect outward and unlock.
2. Pull plug from receptacle.

Operation and Calibration



- A. Input gain controls provide adjustable gain of 6dB to 26dB.
- B. Input clipping detector flashes whenever input signal is within +/- 1dB of clipping (super-bright LED).
- C. Volume control: high-quality conductive plastic potentiometer.
- D. Output clipping detector: indicates the onset of output clipping.
- E. Equalizer boost/cut controls.
- F. On/off/mute switch, full output in up position, off in center, mute (-22dB) in down position, (instrumentation type toggle switch.)
- G. "On": indicator LED.

Input Gain Control

Calibration/Adjustment: The pre-amp circuit built into the SEQ is capable of 26dB of gain. Separate left and right channel input gain and adjustments are made via two access holes in the front cover. Adjustment to the input gain may be necessary to match the source (tape deck, tuner or CD) output level to the input sensitivity of the system amplifiers. If this adjustment is set too low, the source may distort before the system is able to achieve full power. If the input gain adjustment is set too high, the internal circuitry of the SEQ and/or system amplifiers may distort.

There are two clipping indicators, one for input stage clipping and one for output clipping.

Insert a tape or compact disc recorded at high level into the source unit. If the source unit has a balance control, ensure that it is set to center. Set the SEQ filter controls flat (0dB). Using the small plastic screwdriver included with the SEQ, adjust the input gain trim pots fully counterclockwise. The trimpots are 20-turn pots. Turning each pot more than 20 full turns counterclockwise will ensure that left & right channels are matched before the gain adjustment procedure begins. If the source has a volume control, set it from approximately 1/2 to 3/4 full output. With the SEQ volume control rotated completely counterclockwise, begin by turning one input gain pot clockwise (count the number of turns) until the red input clip indicator flashes. Rotate the other input gain trimpot the same number of turns as the first. Minor input gain adjustments may be necessary to achieve left/right balance or for higher level tapes or compact discs. Setting filter controls at a high boost position may also cause the preamp output indicator to flash, requiring a reduction in input gain.

Mounting Method

Bracket Method

Attach bracket to mounting surface placing no. 10 sheet metal or machine screws through the bracket slots. Attach the bracket to the equalizer using the enclosed 1/4" socket-head screws and nylon shoulder washers. Once the equalizer is swiveled to the desired angle (the SEQ may be mounted with the bracket either above or below it) tighten the socket-head screws using a 3/16" Allen wrench.

Warning: *Using screws that are too long will seriously damage components on the circuit board and will void the warranty!*

Low Profile Mounting Method

Low profile mounting provides 1-5/8" maximum height above the mounting surface. The SEQ has two holes in the back for low-profile mounting. The connector sticks out of the back therefore, three holes must be drilled, two for mounting screws (13/64" or 7/32") and one for the connector (at least 5/8" in diameter).

If the installer has access, one simple way of low profile mounting, is to use 10-32 machine screws (included) threaded into the SEQ from the rear. (Screws should not be extended into the SEQ further than 1") (see fig. 2). The mounting surface with the 13/64" or 7/32" holes will clear a 10-32 screw. Drill 5/8" or larger for the connector.

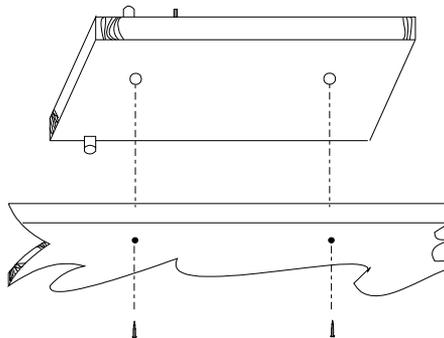
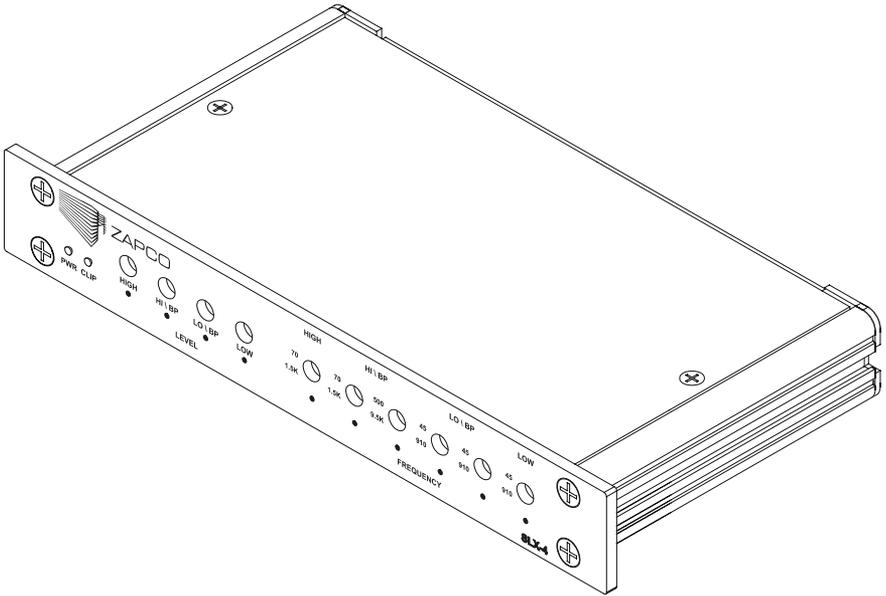


Figure 2

SLX-4



Specifications

T.H.D. + Noise	<.002%
S/N Ratio	>105dB @ 1kHz
Separation	>80dB
Input type	Fully Balanced - SymbiLink™
Maximum Output Level	15V RMS balanced, 7.5V unbalanced
Input Impedance	4.75K ohms
Output Impedance	680 ohms
Power Requirements	600mA @ +/- 15V
Dimensions	7/8"H x 6 7/8W x 3 3/4" D (1/2 DIN)

What is the SLX-4?

The SLX-4 is a six-way four output electronic crossover. An unprecedented amount of flexibility has been designed into this unit allowing configuration for practically any system. Featuring SymbiLink™ balanced inputs and outputs, the SLX-4 embodies the total dedication to sonic fidelity that has made ZAPCO famous around the world.

The SLX-4 has four main outputs that can be configured as follows:

X1 output:

High pass output. This output can also tie into the X3 crossover for use in high frequency applications.

X2/X3 output:

High pass or band pass output. A circuit board mounted switch selects between the two modes.

X4/X5 output:

Low pass or band pass output. This output also has the mode switch.

X6 output:

Low pass output for the woofer. The low pass out may be set to stereo or to sum-mono. It may also be set to either 12dB/octave or 24dB/octave.

Any output can be fed from either the front or the rear input. This option allows front/rear fading or daisy-chaining capability.

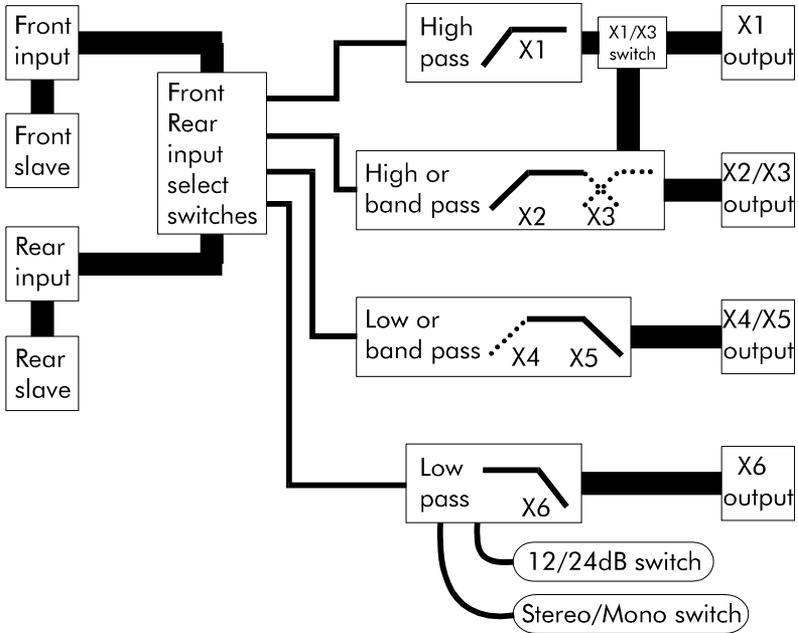
“Slave” outputs supply the same signal that is fed into the input. The front input feeds the front slave output and the rear input feeds the rear slave output.

If the SLX-4 that you have purchased is to be used in a system in which no Zapco SymbiLink™ amplifiers are to be used, a Zapco PSI-HPSL will need to be used to power the SLX-4.

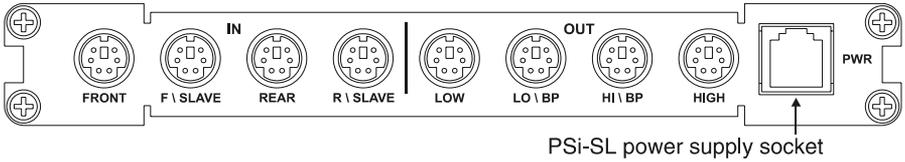
Key Features

- SymbiLink™ balanced inputs and outputs
- Individual variable crossover points
- Dual input capability
- Slave outputs for easy system expansion
- 12/24dB per octave options for low pass
- No external power wiring necessary when used with a SymbiLink™ amplifier
- High signal voltage capability
- LED clipping indicator
- Dashboard or trunk mountable
- Gold plated signal connectors
- Available in white or black
- Quality ZAPCO construction
- Designed and manufactured in the U.S.A

SLX-4 Functional Diagram



Wiring Guidelines



As a SymbiLink™ Balanced Signal System component, your SLX-4 does not need any external power wiring when used in conjunction with a ZAPCO SymbiLink™ amplifier. Simply connect the SLX-4 to a SymbiLink™ amplifier using a SymbiLink™ cable. The amplifier will send the necessary power through the cable. This connection method eliminates any concern of ground looping problems associated with multiple power supplies throughout the vehicle. The fully balanced architecture used in all ZAPCO SymbiLink™ components reduces distortion and achieves the ultimate in noise rejection.

The SLX-4 can be used in systems where a SymbiLink™ amplifier is not present. In these circumstances, a PSI-SL power supply is necessary to power this and any other SymbiLink™ components. A PSI-SL socket is located on the back panel of this unit for this situation. Follow the directions included with the power supply, use the cable it is supplied with and connect it to this socket.

Take care to avoid making any sharp bends in the SymbiLink™ cable near the connector. This can cause intermittent or broken connections in the cables causing erratic operation. If you experience any problems, substitute cables individually with cables that are known to be good before suspecting the component itself.

Configuring the SLX-4

Input Selector Switches:

Any of the four output sections can be fed by either the front or the rear input. If you are using a single input these switches should be set in the same position (i.e. front). A variety of configurations are possible using different combinations of these switch settings.

HP/BP Switch:

This switch disengages X3 from the HP/BP output. In the HP position the output is high pass and in the BP position the output is band pass.

LO/BP Switch:

This switch disengages X4 from the LO/BP output. In the LO position the output is low pass and in the BP position the output is band pass.

Stereo/Mono Switch:

Selects between normal stereo operation and summed mono for the low pass output. In the stereo position, signal will be supplied by the input designated by the input selector switch. In the summed mono mode, the signal for the low pass is derived from both the front and rear outputs.

X1/X3:

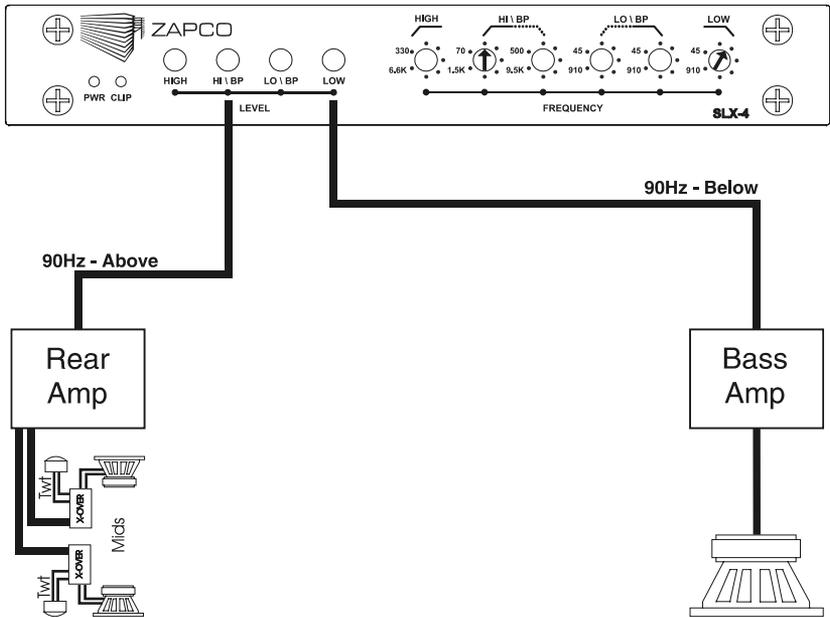
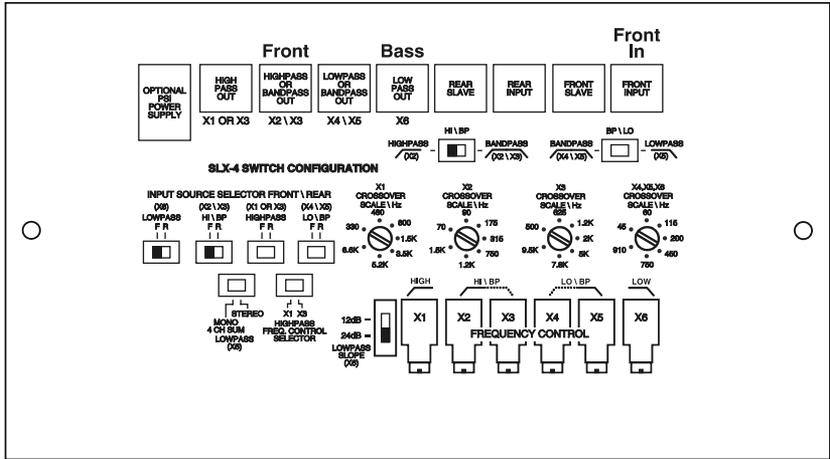
In the X1 mode, the high pass output has its normal frequency range and is fed by the input that is designated by the X1 input selector switch. In the X3 position, the high pass output ties off of the X3 crossover. The X3 frequency control will adjust both the top end of the X1/X3 band pass and the crossover point of the highpass output. The X1 frequency control will become invalid in this mode. This option will most often be used in four-way applications involving a band passed midrange and a tweeter with a high frequency crossover point.

12/24dB/Octave Switch:

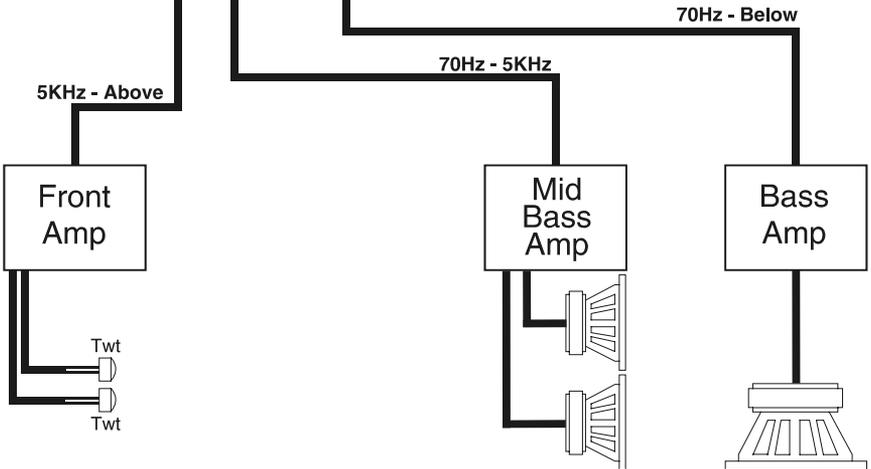
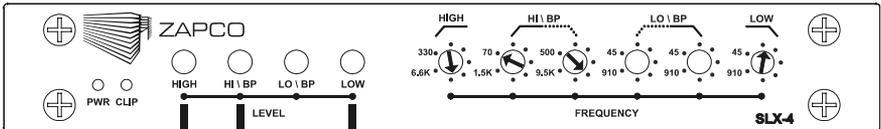
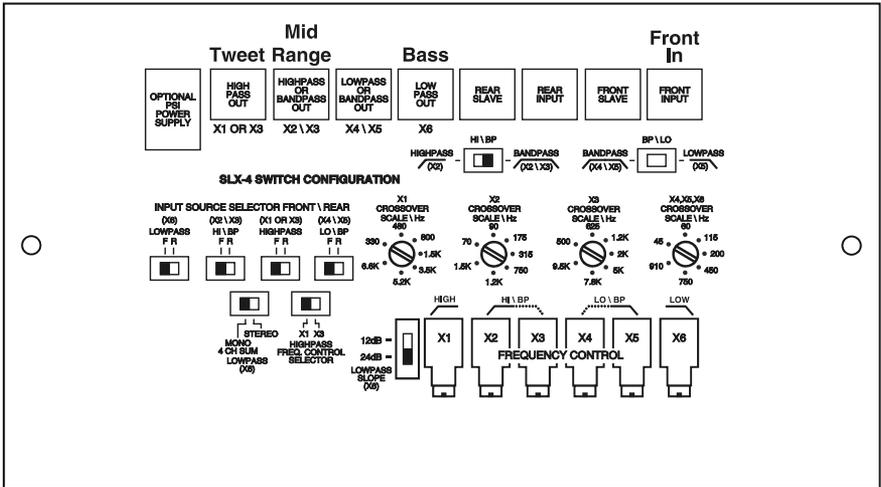
Selects between normal 12dB/octave slope or a steeper 24dB/octave slope for the low pass output only. When the 24dB/octave mode is engaged, the low pass output is automatically mono.

The following pages contain some sample configurations and their relative switch positions.

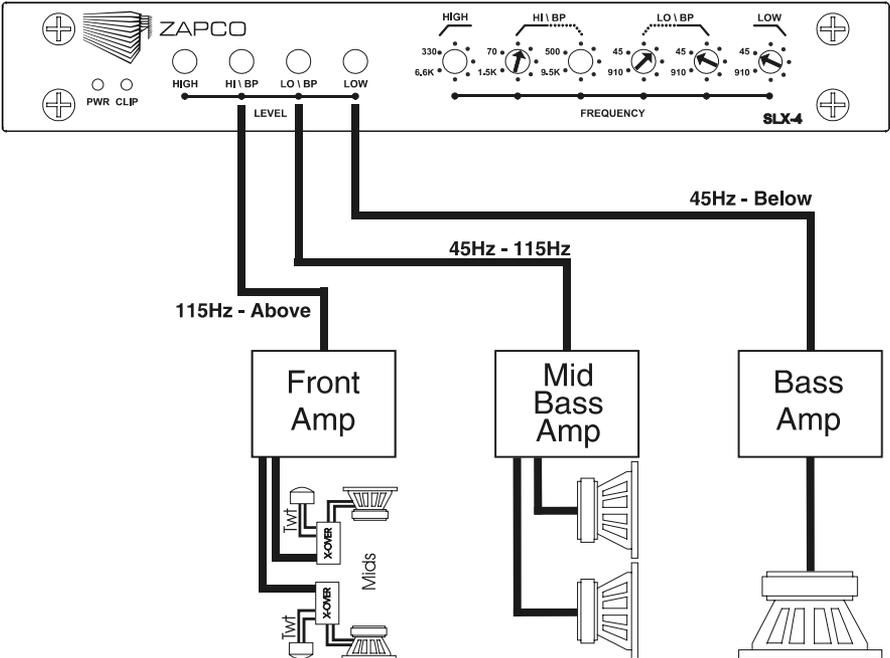
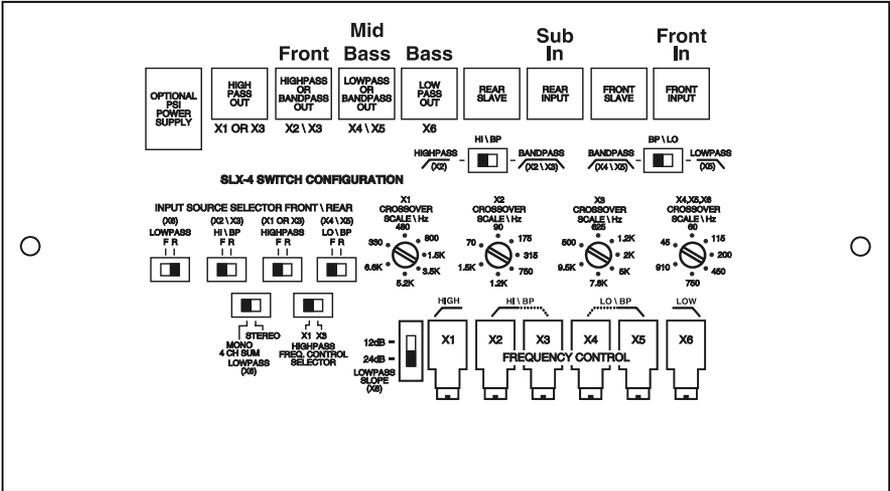
Basic 2 Way System



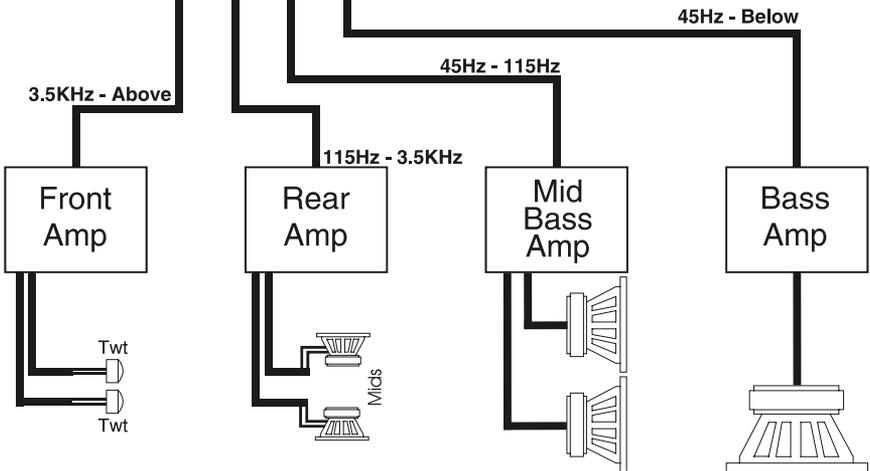
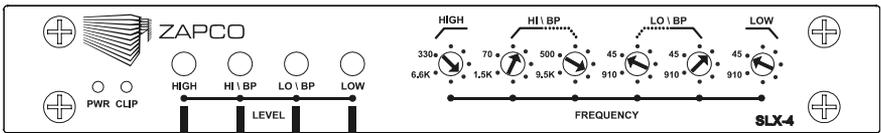
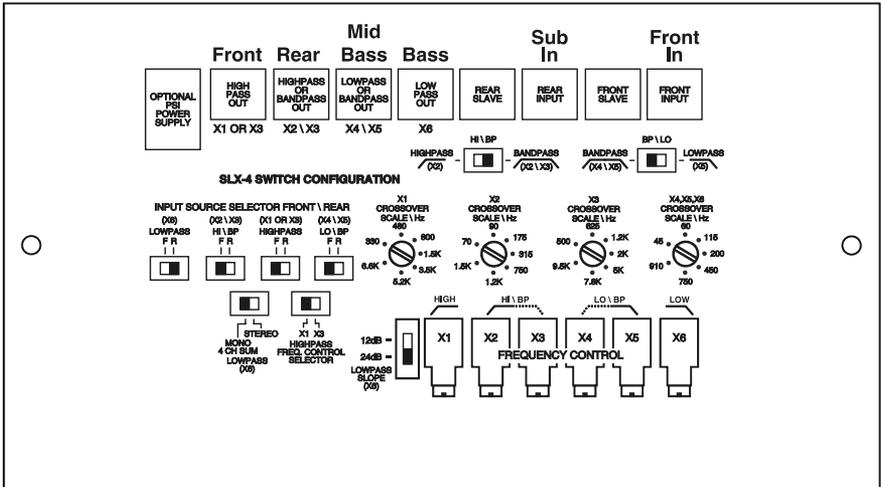
Basic 3 Way System



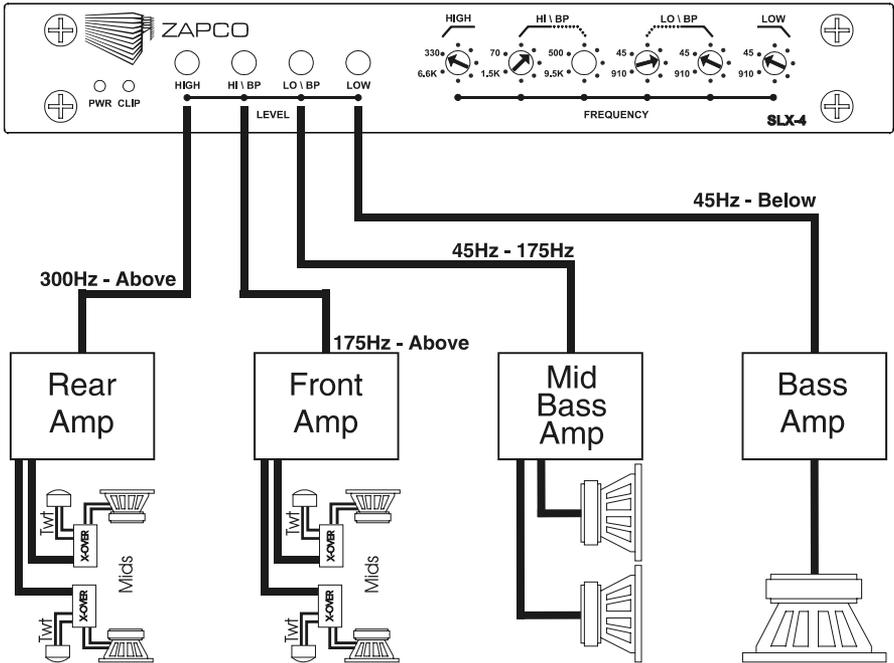
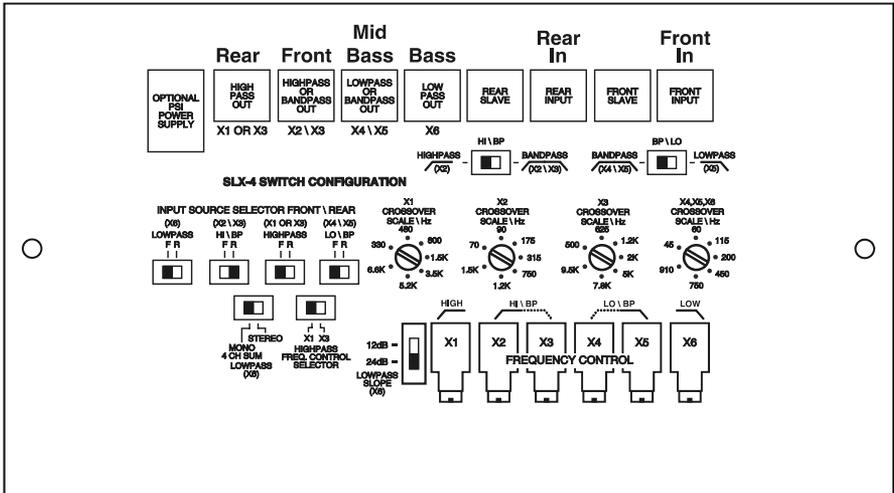
3 Way with Woofer Control



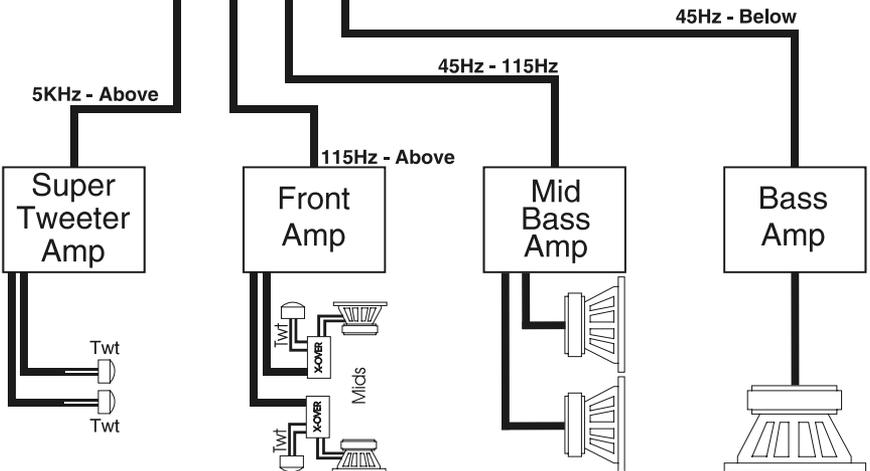
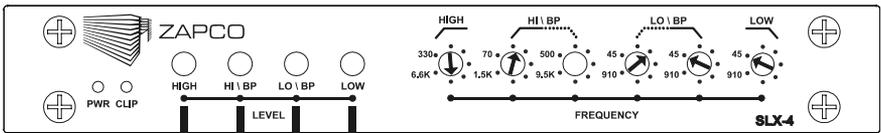
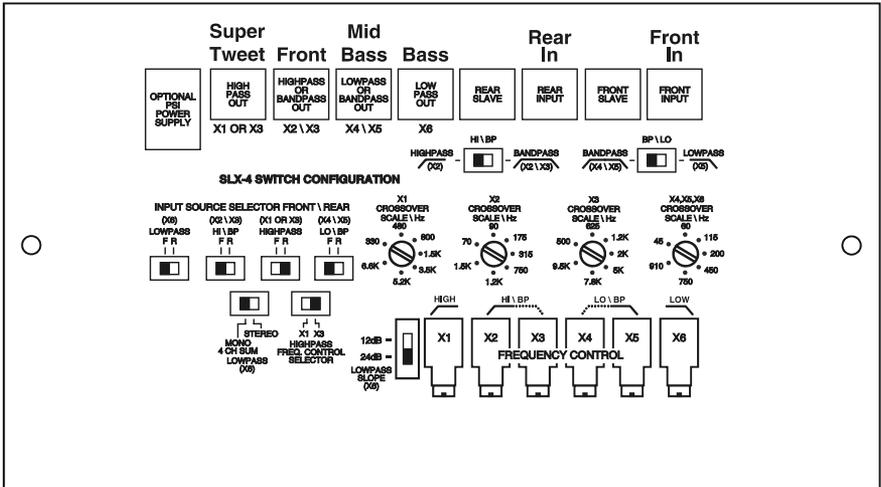
4 Way with Subwoofer Control



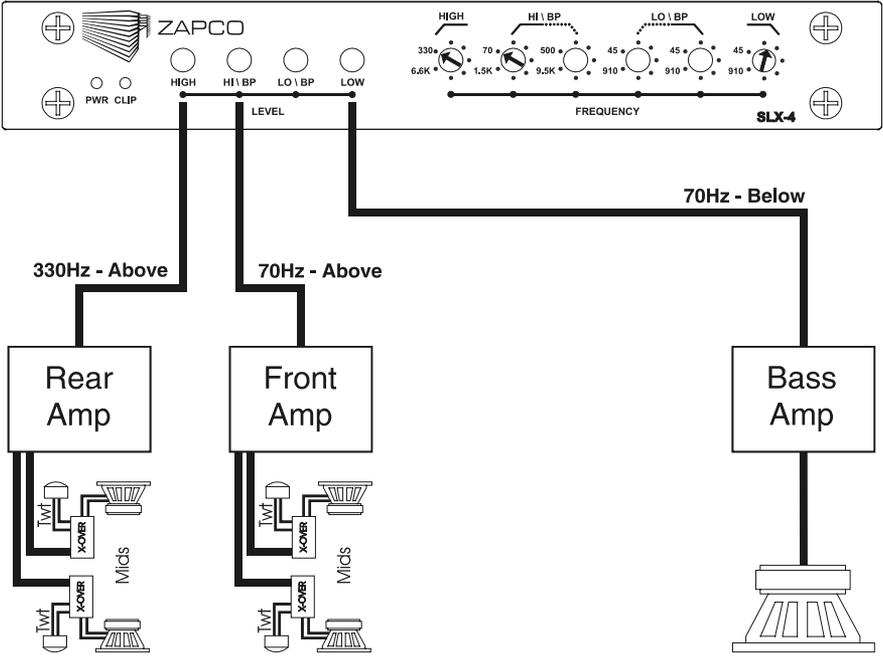
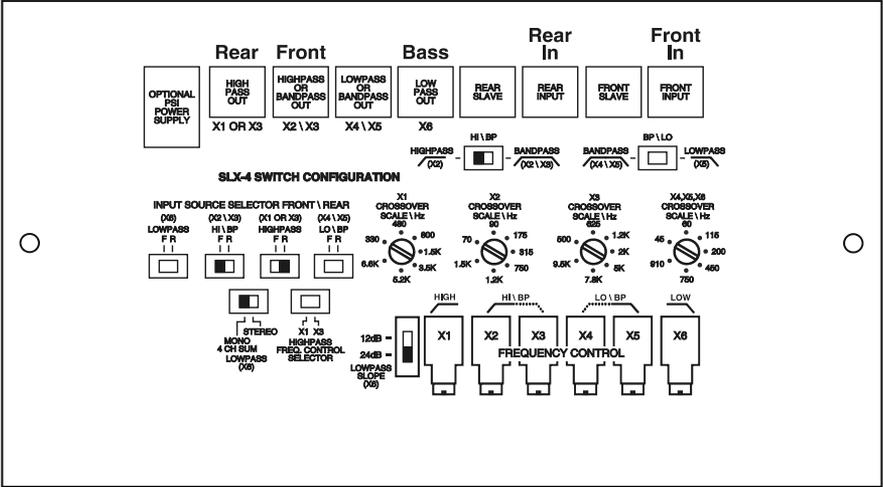
4 Way System with F-R Fader



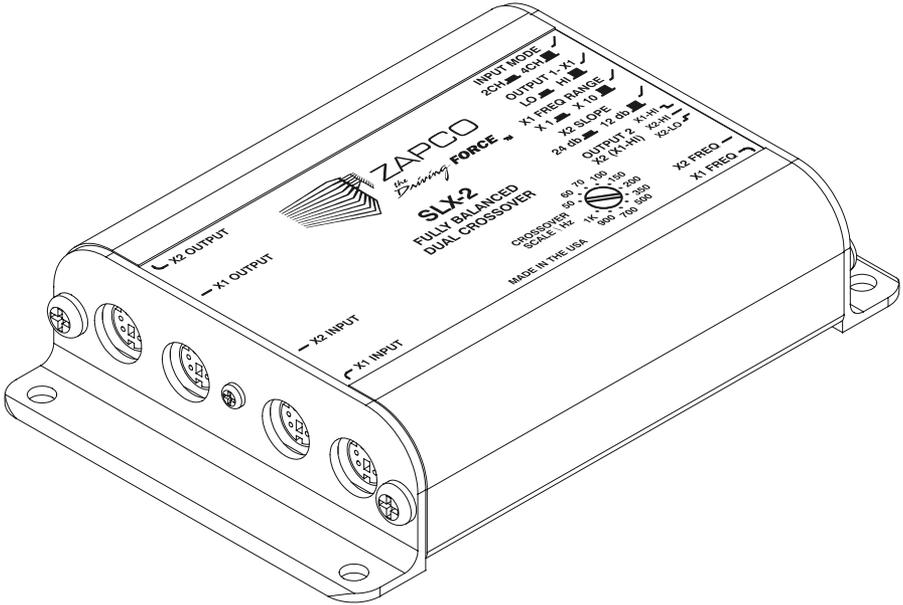
4 Way with Super Tweeter



Dual High Pass, Fader, with Constant Bass



SLX-2



Specifications

T.H.D. + Noise	<.005 20Hz - 20kHz @ 7.5 volts
S/N Ratio	>105dB
Stereo Separation	>85dB
Input/Output type	Fully Balanced - SymbiLink™
Maximum Input Level	15V RMS balanced, 7.5V RMS unbalanced
Maximum Output Level	15V RMS balanced, 7.5V RMS unbalanced
Input Impedance	4.75K ohms
Output Impedance	650 ohms
Crossover Frequency	X1 = 50Hz / X2 = 50Hz - 1kHz

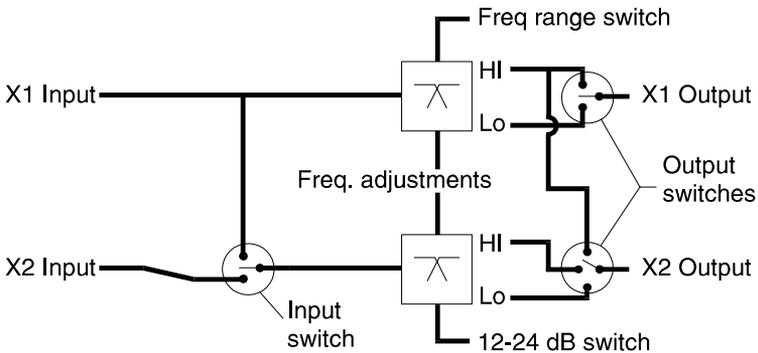
What is the SLX-2?

The SLX-2 is an extremely flexible dual output electronic crossover. As a member of the SymbiLink™ Balanced Signal System, the SLX-2 delivers audio performance without equal. Each output has its own crossover frequency adjustment and can be configured as a high or low pass filter. Both outputs can be fed individually or from a single input signal. There is no power supply wiring necessary; as the SLX-2 is powered via the SymbiLink™ balanced cable. For this reason, the SLX-2 usually requires a SymbiLink™ balanced input amplifier in the system.

Key Features

- Single or dual input capability
- Independently adjustable crossover points
- Selectable 12 or 24 dB slope for X2 when used as lowpass
- Dual Frequency range for X1 - 50Hz - 1kHz or 500Hz - 10kHz
- X2 frequency range - 50Hz - 1kHz
- Output 2 can access X1's highpass filter
- Quality ZAPCO construction
- Designed and manufactured in the U.S.A.

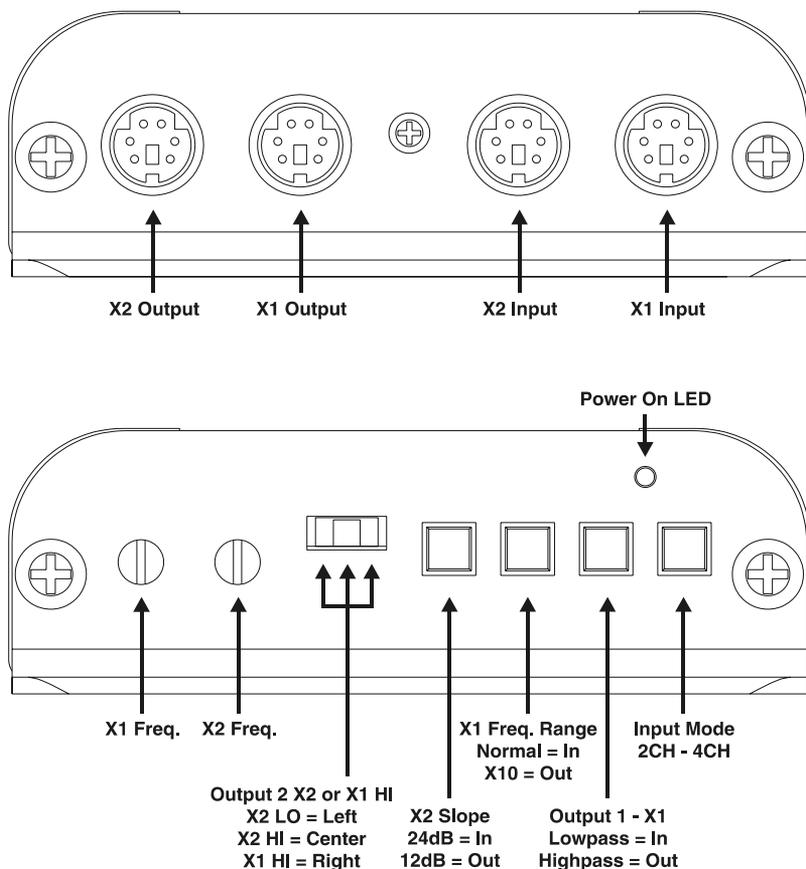
SLX-2 Functional Diagram



Notes:

- 24dB mode is only valid on X2's output - lowpass mode only. X2's output in this mode is automatically mono.
- Frequency range switch only effects X1's outputs - but can effect X2's output when output switch is set to "X1-HI".
- When X2 output is set to "X1-HI", the X1 FREQ control effects both outputs. The X2 FREQ control is deactivated in this mode.
- X2 input is not functional when the "Input Mode" switch is in the "2CH" position. X2 input only activated by engaging the "4CH" mode.
- Either output can be selected as highpass or lowpass. They can be set the same or opposite of each other.
- One output can be fed into the opposite input. When doing this, you must engage the 4CH input mode. This feature allows the capability of "1-way" 24 dB or bandpass configurations.

Controls



Control Summary

X1 Freq:

Controls crossover point of X1. It is a variable control with a range of 50Hz to 1kHz. When the X1 Freq. range switch is in the x10 mode (button in the out position) the range shifts from 500Hz to 10kHz. When the Output 2 switch is in the "X1-HI" position, this control sets the crossover frequency for both outputs.

X2 Freq:

Controls crossover point of X2. It is a variable control with a range of 50Hz to 1kHz. X2 is unaffected by X1's range switch. When the Output 2 switch is in the "X1-Hi" position, this control is not used.

Output 2 switch:

Selects the function of the “X2 Output”. It can be X2’s highpass or lowpass, or it can tie into X1’s highpass in order to make use the X1 Freq range switch. This feature is especially useful when a high frequency crossover is needed for the midrange-tweeter transition or any time you want the convenience and simplicity of a single frequency control for both outputs (see X1 Freq. above).

X2 Slope:

Selects either 12dB or 24dB per octave slope for X2’s low pass only. When engaging the 24dB mode, the output is automatically mono. If the Output 2 switch is selected as highpass, use the 12dB (switch out) mode.

X1 Freq Range:

Multiplies X1’s crossover frequency by ten (see X1 Freq above). This switch has the capability of both outputs (see Output 2 switch above).

Output 1-X1:

Selects whether the X1 Output is highpass or lowpass. This switch does not effect Output 2 in anyway. Either output can be configured as highpass or lowpass. They can both be the same or they can be opposite of each other.

Input Mode:

Selects between two-channel or four-channel input. The 2CH (in) position uses the X1 input to feed both crossover sections. In the 4CH (out) position, the X1 input only feeds the X1 crossover section and the X2 input feeds the X2 crossover section. This feature is useful if front/rear “fade through” capability is needed, or if you wish to create 24dB one-way or two-channel bandpass configurations.

Special Configurations

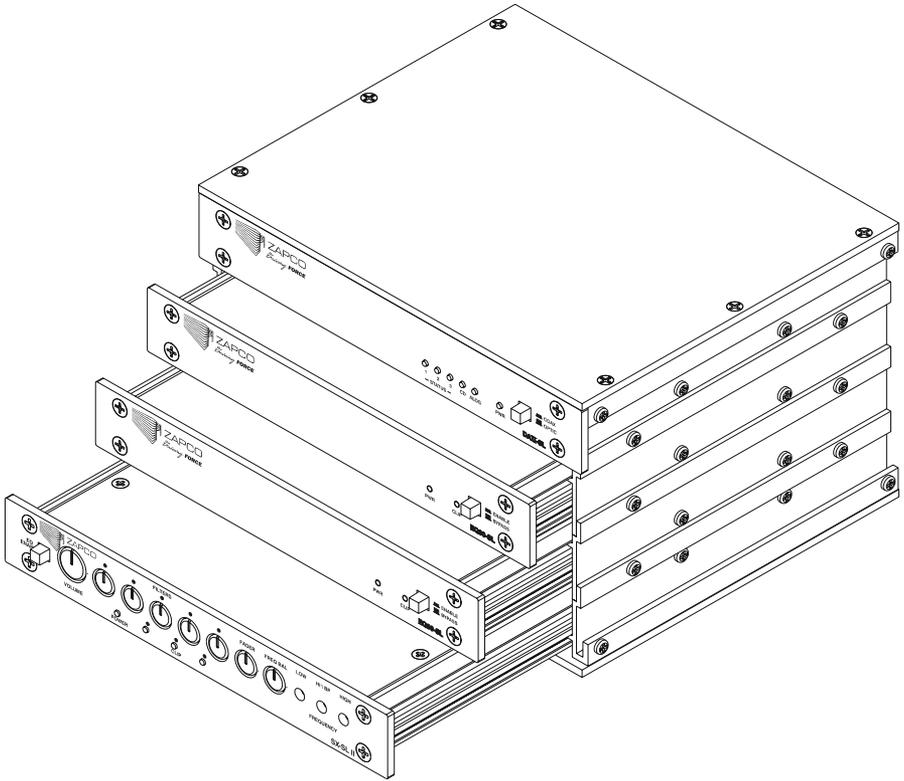
Creating a 24dB one-way filter:

Use the X1 input and set the input mode switch to 4CH (out). With a short SymbiLink™ cable, connect the X1 Output to the X2 Input. The X2 Output will be your output. In this configuration, X1 and X2 must both be matching as highpass or lowpass. The X1 Freq Range switch cannot be used (it must be in the "X1" or in position) and the "X1-HI" option on the Output 2 switch should not be used. Adjust the X1 Freq and X2 Freq to the same crossover frequency.

Creating a two-channel bandpass filter:

Configuration is the same as above with the following exceptions. X1 should be selected as lowpass and X2 should be highpass. The Freq Range switch may be used. Adjust the X1 Freq and X2 Freq controls to the desired individual crossover points.

The Zapco Processor Rack

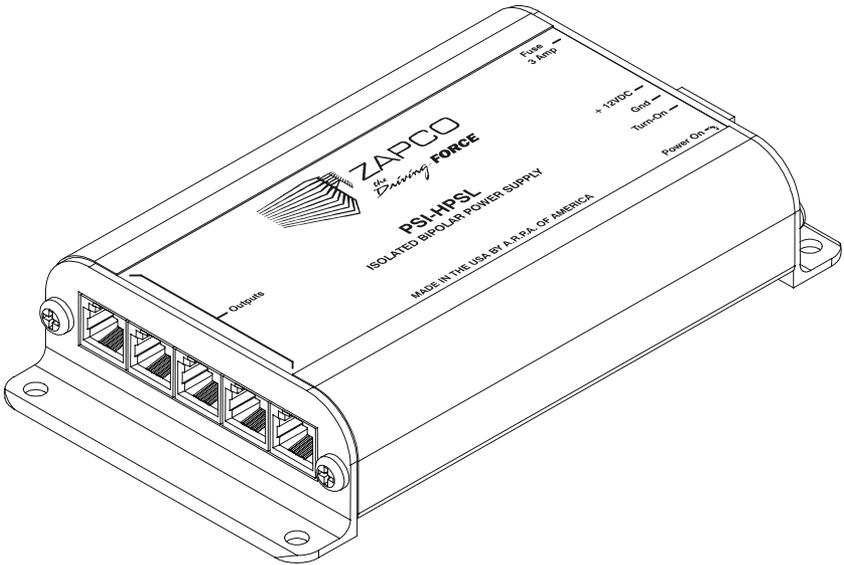


This is the perfect solution for mounting your Zapco processors. We have rack kits available for two, three, or four processor pieces, and we even have expansion kits available to add more pieces to your rack.

The rack can be custom mounted in-dash or mounted anywhere that fits your install. The Rack turns all your processors into a single, attractive, one-piece unit and even allows them to be pulled forward one at a time for adjustment.

This is truly the ultimate processor mounting system.

PSI-HPSL



Internal power supplies are by far the most common source of noise in signal processors. ARPA of America has eliminated this problem in its Zapco products by adapting the SymbiLink™ balanced line system. We use the $\pm 15\text{v}$ wire pair in the SymbiLink™ cable to provide “phantom” power for our signal processors. They draw their power directly from any SymbiLink™ equipped amplifier. With no internal power supply, the Zapco processors are the quietest on the market.

The PSI-HPSL is a 15V power supply used in system applications in which SymbiLink™ processors are being used with non- SymbiLink™ amplifiers. It is also used in systems in which Zapco EQ30-SL's and/or a DAIL-SL is used or in a system for which three or more SymbiLink™ processors are being used. A single power supply can power up to five SymbiLink™ processors and two SymbiLink™ receivers.

Installation of the PSI-HPSL requires providing 12V constant power, remote turn-on, and ground. A 3 amp fuse is used to protect the PSI-HPSL from being overloaded. If this fuse pops more than once, there may be too much of a load being placed on the PSI-HPSL.

A single PSI cable (PSI.CBL) is provided in the box with a new PSI-HPSL. Additional PSI.CBL's can be ordered through an authorized Zapco dealer.

Manufacturing

These processors are designed and manufactured in the USA. The following operations are ENTIRELY performed in our Modesto, California plant.

1. **All electronic, and mechanical, design and engineering.**
2. **PC board insertion:**
The components are inserted into raw circuit boards obtained from local sources.
3. **PC soldering:**
The printed circuit board assembly is wave soldered.
4. **Testing:**
The PC board is 100% tested to design specs.
5. **Extrusion machining:**
American made aluminum extrusion is cut and machined to precise tolerances.
6. **Assembly:**
The product is assembled.
7. **Final Test:**
Every product is tested with the highest quality audio test equipment to meet or exceed their published specifications.
7. **Inspection and final packaging.**

*Many companies claim that their products are built in the USA, when only final packaging is actually performed here.

Wire Size

Most people understand the importance of a clean signal source for good sound reproduction. But, what about your 12 volt power source? It's often surprising how many people (even professional car sound people) will obsess about signal wire but routinely provide the amp only a fraction of the current it needs to do its job. If your amplifier does not have sufficient power to do its job, it will draw down your entire electrical system. When this happens, every component in the system, including your processor will be starved for current and will go into distortion. The most common wire gauge used in car audio is 10 gauge. The most common location for amplifiers is in the trunk.

Take a look at the chart below. If you want to have any respectable amount of power for your amp, you need an 8 Gauge wire to the trunk as a **bare minimum**. If you want enough power to drive woofers, your going to need at least a 4 Gauge wire to the rear.

Current Demand	Length of Run							
	0- 4 Ft	4- 7 Ft	7- 10 Ft	10- 13 Ft	13- 16 Ft	16- 19 Ft	19- 22 Ft	22- 28 Ft
	0 - 20 amps	14	12	12	10	10	8	8
20 - 35 amps	12	10	8	8	6	6	6	4
35 - 50 amps	10	8	8	6	6	4	4	4
50 - 60 amps	8	8	6	4	4	4	4	2
65 - 85 amps	6	6	4	4	2	2	2	0
85 - 105 amps	6	6	4	2	2	2	2	0
105 - 125 amps	4	4	4	2	2	0	0	0
125 - 150 amps	2	2	2	2	0	0	0	0

It takes lots of current to make lots of power!

And remember! An electrical circuit is just that...a circuit. For current to travel, you must complete the circuit from the positive terminal to the negative terminal. Whatever you use for power (B+) you must also use for Ground (B-). 4 gauge power = 4 gauge ground!

So use this chart! Add up your fuses and choose your wire to match the total maximum current draw. And always use the same gauge for the main ground as you do for main power.

Technical Assistance

Should you experience a problem with your Processor, please contact the dealer that sold you this product. If your dealer is unable to solve your problem, you may contact the factory service department directly.

Phone: (209) 577-4268 Monday - Friday, 8AM - 5PM Pacific Time
FAX: (209) 577-8548

Also, check our web page, www.zapco.com, for tips. You can also e-mail technical help directly from our web page or engineer@zapco.com.

If you need to return this product for repair, please call the factory for a Return Materials Authorization (RMA) number. We will ask you for your name, return shipping address, daytime phone number, model and serial number, and a detailed description of your problem. A photocopy of your original purchase receipt is necessary to determine warranty status and should also be included. Once we issue you an RMA, please write it in a highly visible area on the package. Zapco will not accept any packages that do not have a valid RMA number clearly marked on the outside of the package.

Once you have a valid RMA number, send all repairs to:

A.R.P.A. of America Corp.
Attn.: Service Department
413 S. Riverside Drive
Suite D
Modesto, California, 95354

WWW.ZAPCO.COM

***A.R.P.A. of America Corp.
413 S. Riverside Drive, Suite D
Modesto, CA 95354
(209) 577-4268
Fax (209) 577-8548***

***Rev. A
05/02***