24XS Specifications

All specifications are measured at 14.4 VDC (standard automotive voltage)

Frequency response	10-20 kHz ±1dB
Total harmonic distortion	0.007%
Signal to Noise ratio	120dB
Maximum output level	9.5 Vrms
Crossover Slope	24dB/Octave
Crossover type	2 Way Linkwitz-Riley
Programmable Crossover frequency	Shipped @ 90 Hz (Programmable)
PFM filter slope	18dB/Octave
PFM filter frequency	Shipped @ 33Hz (Programmable)
Power supply	Optically isolated PWM DC/DC converter
Power draw	250mA
Recommended fuse rating	1 Amp
Size	1.2"h x 8"w x 5.7" d
Weight	3lbs
Balanced in	Yes
Output ground isolation jumpers	Yes
Country of origin	USA

This manual was written, designed, printed and stuffed into a neat box with a really neat product on a grey, misty day; considering where we live.

AudioControl®

making good stereo sound better®

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24XS[tm]

Concert Series

Crossover with Speaker Wave Alignment Technology

Owner's Manual

Congratulations!

You have purchased one of the most innovative autosound products available- The AudioControl 24XS. The 24XS will help you make your stereo system sound its best. Please take a moment to kick back, reflect on things and read this manual.

Features of the 24XS

- Sharp two way 24dB/octave electronic crossover
- Linkwitz-Riley alignment for minimum lobing error
- Speaker Wave Alignment Technology
- Programmable Frequency Match Filter
- Optimum output indicator LEDs
- Selectable power supply ground isolation
- Made in America

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The Most Important Instruction of all

FILL OUT AND SEND IN YOUR WARRANTY CARD!

Also, save your invoice or sales slip as proof of purchase. These actions will protect your investment and help prove that you really owned such a great piece of audio gear in case somebody takes a liking to it while you're tanning in Cabo.

Important

For the best product performance and the lowest use of Tylenol, nothing is better than a professional system installation. Your AudioControl dealer has the training and equipment to take care of the job quickly and to get the best sound out of your system. If you are a solid do-it-yourselfer then this manual should give you all the information you need to successfully make music with the 24XS. Happy Listening.

Features

Programmable 24dB/Octave 2-way Crossover

With module programmability, the two way electronic crossover in the 24XS can be matched up to any stereo system. By simply changing a resistor module, you can select almost any crossover frequency imaginable. The 24dB/Octave Linkwitz-Riley (a couple of real nice audio engineers) design is normally reserved for the best home and professional systems, but now this state of the art crossover is yours also.

Programmable Frequency Match (PFM) Filter

This module programmable low cut filter allows the system designer to custom tune the bass response of the speaker system. Smaller woofers can be protected against the voice-coil-charring bass they are too small to reproduce. Tuned (Ported) subwoofer enclosures benefit by having the frequencies below their tuning cut off to reduce distortion and save system power.

Speaker Wave Alignment Technology (SWAT)

Speakers in a car stereo system have a lot to put up with; different types of cars, different placement of speakers, different brands of speakers. All of these things add up to a difficult time for any installation. The Speaker Wave Alignment control takes care of one of the most annoying (and hardest to fix) problems with a turn of a knob: sound cancellation between speakers at the crossover point. By allowing you to move the cancellations away from the listener, the frequency response is smoothed out without wasting a huge amount of the system's power trying to fill an acoustical black hole.

A BRIEF TOUR OF THE 24XS

The Outside

OUTPUT LEVELS CONTROLS- These variable gain controls adjust the high pass and low pass output levels independently.

WAVE ALIGNMENT CONTROL- This control adjusts how much the sound of a speaker is shifted. The internal switches select whether this leans toward the high pass or low pass.

OUTPUT STATUS LEDS-

POWER: Shows when the 24XS is turned on (need we say more?)

INPUT MAXIMIZED: Shows when the input levels are within 3dB of clipping,

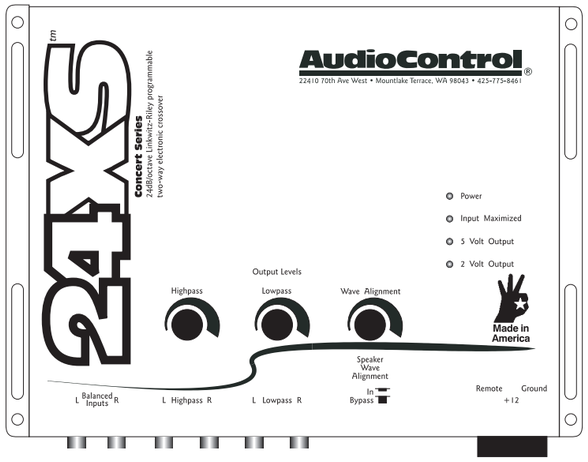
5 VOLT: Shows when the output levels are at five volts (make certain your amplifier can handle this much input)

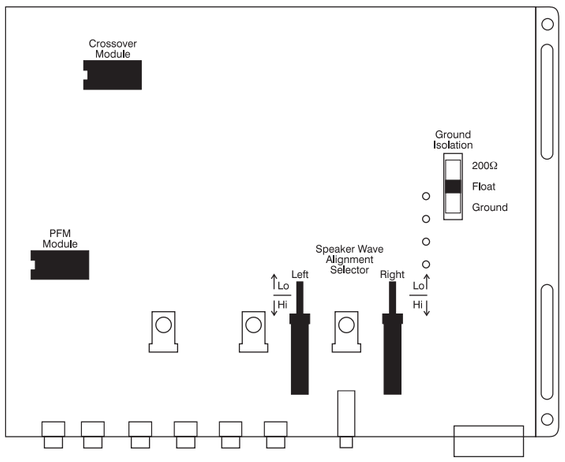
2 VOLTS: Shows when the output levels are at two volts (this is a common input level for most amplifier manufacturers. Don't guess on this, check your amp's owners manual to be certain.)

SPEAKER WAVE ALIGNMENT BUTTON-

Bypasses the speaker wave alignment circuitry for simple comparison of with versus without.

POWER CONNECTOR- A wonderful, removable connector that allows you to hook up all the power wires in the convenience of daylight and then plug them into the 24XS in the dark recesses of your trunk.





The Inside

PROGRAMMABLE CROSSOVER MODULE-

This 16 pin resistor module controls the crossover frequency. It is set from the factory at 90Hz. Different modules may be obtained from your dealer or custom built yourself. See the section on Making Your Own Modules for instructions. Note: The 24dB crossover module is different than the 18dB PFM frequency module.

PROGRAMMABLE FREQUENCY MATCH (PFM) FILTER MODULE-

This 14 pin Module controls the cutoff frequency for the PFM Filter. The PFM is the bottom limit for the low pass output. It is set from the factory at 33 Hz.

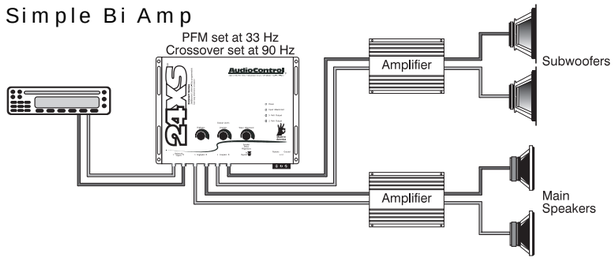
SPEAKER WAVE ALIGNMENT SELECTOR SWITCHES-

This pair of switches select whether the SWAT control moves the nulls in your speaker response towards the outputs on the high pass side or the outputs on the lowpass side. NOTE: Both of these switches MUST be in the same position (i.e. both in Hi or both in Low)

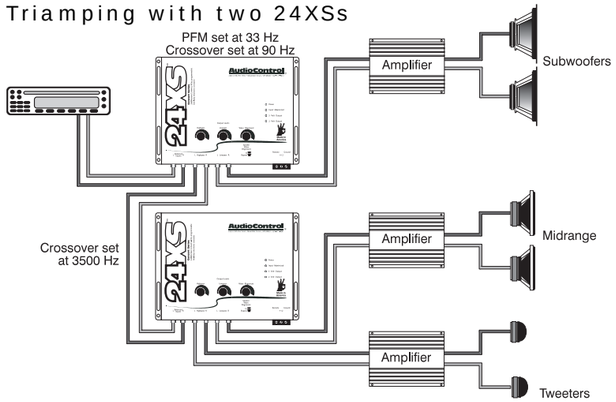
GROUND ISOLATION SELECTOR-Allows the installer to change the power supply ground isolation for different systems. This is shipped in the fully isolated position from the factory. The other selections can help if you have a ground loop noise in the system that doesn't seem to want to go away.

EXAMPLE SYSTEMS

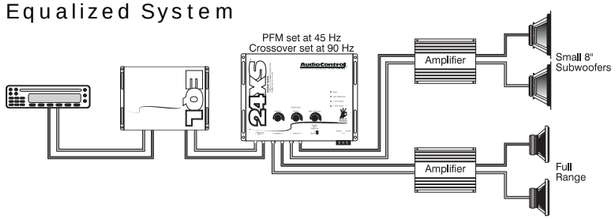
Simple Bi Amp



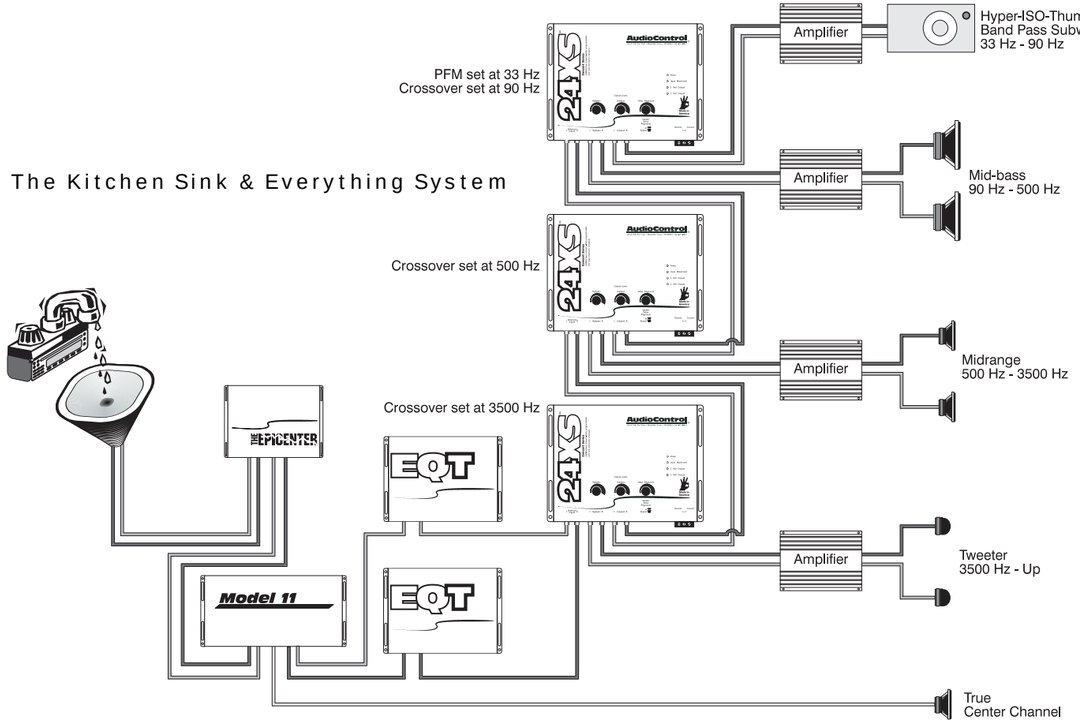
Triamping with two 24XSs



Equalized System



The Kitchen Sink & Everything System



INSTALLATION PRECAUTIONS

Do not mount the 24XS where it will be exposed to outside elements or extreme temperatures. Avoid areas of severe vibration or shock. The front bumper is out.

Use high quality, 100% shielded audio cables.

Plan on a single-point (star) grounding scheme so all components, including the head unit, connect to a common ground point. Use no less than 14 gauge wire for the ground connections.

Make certain that there are no fuel lines, brakes lines, electrical wires or anything else that you don't want to run a drill bit through. That includes things on the back side of that floor panel you're about to punch a hole in.

Make certain the 3XS is firmly mounted with screws so it won't come flying off the next time you blast over a speed bump.

A QUICK LESSON ON SOUND WAVES

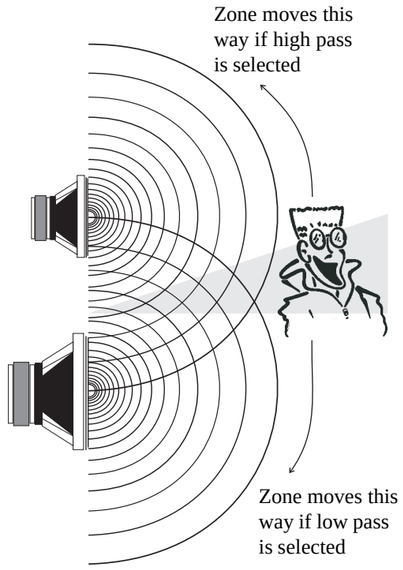
Waves are waves. It doesn't matter whether they are water splashes in the Saturday night bath tub or musical sounds bouncing around your car, all waves behave the same. If two positive going waves collide, they add up to one bigger wave. If a positive and a negative wave collide they will cancel each other out. Try it out in your bath tub (it gives you a good excuse to splash.)

Around the crossover frequencies in a multiple speaker stereo system, at least two speakers are trying to reproduce sound at the same time. Since these drivers are not coincidental (i.e. the same point in space) the sound waves from each speaker run into each other slightly out of sync. This causes hot spots in the sound dispersion pattern where waves of similar polarity meet and dead spots where waves of opposite polarity hit. That's why sometimes you have dropouts in the frequency response around crossover points.

The Speaker Wave Alignment Technology (SWAT) in your 24XS shifts the output of the crossover slightly so you can move the dead zones in the sound pattern away from the listener's ears. This tilting will always go towards the output that you have selected with the internal switches on the 24XS. See the next section on adjusting the Speaker Wave Alignment control for more information.

ADJUSTING THE SPEAKER WAVE ALIGNMENT CONTROL

The easiest method of setting the SWAT control is with a one-third octave audio analyzer such as the AudioControl SA-3055 real-time analyzer. With the analyzer, simply play the pink noise test sound through your system. Make certain that you have the microphone of the analyzer at ear level in the driver's seat for an accurate reading. Look at the frequency response around the crossover frequency where the 24XS is set. Now adjust the Wave Alignment control until the dropout goes away. You may need to change the internal switch settings on the 24XS to move the SWAT to the other outputs. If the High output is selected the dead zone will move up towards the tweeter as you adjust the wave alignment control towards max. If the switch is in the opposite position the dead zone will move in the opposite direction.



If you are adjusting the SWAT controls by ear, pink noise is still your best bet for a test source. A good piece of acoustic music that covers the sound spectrum will also work. Listen to the sound of the system while you adjust the Wave Alignment knob. You will be able to hear part of the music fade out as the control is moved from MIN to MAX. Pick the point where it sounds the best to you. Now sit back and enjoy your new stereo for a bit while you finish your espresso.

Making Your Own Modules

Additional crossover and PFM filter modules are available from your authorized AudioControl dealer, or you can create custom modules by using the following formula:

$$\frac{7200}{\text{Frequency (Hz)}} = \text{Resistor Value (in Kilohms)}$$

Example- For a 2500 Hz module, the formula yields a resistor value of: 7200÷ 2500 = 2.88 K

The 24 dB crossover module requires eight of this resistor value; the 18 dB PFM module needs six.

Note: Use ¼ watt carbon or metal film resistors of a 5% tolerance or better.

and now a word from the legal department...

24XS Limited Warranty

People are scared of warranties. Lots of fine print, lots of noncooperation, months of waiting around.

Well, don't be scared of this warranty. It's designed to make you rave about us to your friends. It's a warranty that looks out for you and helps you resist the temptation to have your friend "Who's good with electronics", try to repair your AudioControl 24XS. So go ahead and read through this warranty, then enjoy your new component for a few days before sending in the warranty card and comments.

"Conditional" doesn't mean anything ominous. The Federal Trade Commission tells all manufacturers to use the term to indicate certain conditions have to be met before they'll honor the warranty. If you honor these conditions, we will warrant all materials and workmanship on your 24XS for FIVE YEARS from the date you bought it if installed by an authorized AudioControl dealer. We will fix or replace it, at our option, during that time. If you are a "do-it-yourselfer" we will offer the same warranty for a period of ONE YEAR.

Here are the conditions that make this warranty conditional:

1. You have to fill out the warranty card and send it to us within 15 days after you purchased your 24XS.

2. You must keep your sales slip or receipt so you have proof when and from whom you bought your 24XS. We're not the only company to require this, so it's a good habit to be in with any stereo equipment purchase.

3. Your 24XS has to have been originally purchased from an authorized AudioControl dealer. You do not have to be the original owner to take advantage of the five year warranty, but the date of the purchase is still important so be sure to get a copy of the sales slip from the original owner.

4. You cannot let anybody who isn't (a) The AudioControl Factory; (b) An authorized service center; or (c) Someone authorized in writing by AudioControl to service your 24XS. If anyone other than (a), (b), or (c) messes with your 24XS, that voids the warranty.

5. The warranty is also void if the serial number has been altered or removed, or if the AudioControl 24XS is used improperly. Now that sounds like a big loophole, but here is all we mean by it. Unwarranted abuse is; (a) Physical damage (our mobile products are not meant to be used as jack stands for your car); (b) Improper connection. We have done the best we can to protect the inputs, however, 120 volts into the jacks can fry the innards of the poor beasty. (c) Sadistic things. This is the best mobile product we know how to manufacture, but if you use it for the front bumper of your Baja bug and get it full of water, things will go wrong.

Assuming you conform to numbers 1-5, and it isn't all that hard to do, we get the option of deciding whether to fix your old unit or replace it with a new one.

Legalese Section

This is the only warranty given by AudioControl. This warranty gives you specific legal rights that vary form state to state. Promises of how well your 24XS will work are not implied by this warranty. Other than what we've covered in the warranty, we have no obligation, express or implied. Also, we will not be obligated for direct or indirect damages to your system caused by hooking up the AudioControl 24XS.

Failure to send in a properly completed warranty card negates any service claims.