

HPX[™] **In-Dash**

In-Dash Processor and Crossover
Owner's Enjoyment Manual

AudioControl®

making good stereo sound better®

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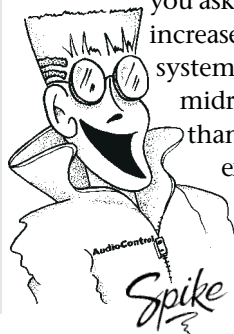
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Introduction

Congratulations on your purchase of the AudioControl HPX, the world's first in-dash processor/crossover with High Definition Expansion (HDE), a special circuit to increase the perceptual size on any audio system. This makes the HPX an ideal product for any system that uses compression technology or perceptual coding software, like MP3 or MiniDisc. The HDE circuit is also a great answer for cars with less than ideal speaker locations (which pretty much means ... ALL OF THEM). Combined with an audiophile-quality 24 dB/octave crossover and a high voltage line driver, the rainforest dwellers of AudioControl have created an ultimate "one box" solution in the HPX.

What can you expect Big sound! What more could you ask for? The HDE circuit within the HPX helps increase the size of any performance autosound system. The dynamics of the bass, midbass, midrange, and high frequencies are all enhanced thanks to the HDE circuit, providing a sonic experience like no other. Now that we have your curiosity tingling, it is time to sit back, pour yourself a cold one and peruse through this Owners Enjoyment Manual for the HPX in-dash processor/crossover.



Features of the HPX:

- High Definition Expansion (HDE)
- 24 dB/Octave Linkwitz Riley crossover
- Pre-amp gain of 20 dB
- Line driver: 13 volts peak output
- Balanced differential inputs
- Subwoofer level control
- Signal-sensing display
- High headroom PWM switching power supply
- Switchable backlighting (amber/green)
- Master volume and fader control
- Selectable ground isolation
- Optimum-voltage LED
- Speaker-level inputs
- Stereo 1/8" jack input

QUICK INSTALLATION INFO

For those of you who are short on time and high on confidence (or caffeine, for that matter), refer to pages 8-12 (Figures 6-10). As a matter of reference, the HPX is shipped in the following configuration:

	<u>Shipped</u>	<u>Option</u>	<u>Page #</u>
Illumination	Green	Amber	7
Inputs	Balanced	Unbalanced	6
Ground isolation	Isolated	200 ohm or Ground	7
Input Gain	Unity	0 to +20 dB	6
Crossover	Engaged	Disengaged	7
Crossover frequency	90 Hz	30 Hz - 3500 Hz	7

It is important to know that we recommend that you allow your authorized AudioControl dealer to install your HPX. If he or she installs your HPX, we will warranty your HPX for an unbelievable 5 years parts and labor. Should you opt to install the HPX on your own, we will warranty it for 1 year.

FEATURES AND HIGHLIGHTS

The following section will tell you about all of the nifty features of your HPX. Knowing these features will help you maximize the performance of your HPX in-dash processor/crossover. It will also make you the envy of all of your fellow autosound dudes and dudettes.

High Definition Expansion (HDE): The HDE circuit is the heart and soul of the HPX in-dash processor/crossover. Whether you are using music recorded using perceptual coding, some form of compression technology like MP3 or MiniDisc, or just have less than desirable speaker locations, the HDE circuit will truly enhance the size of your performance autosound system.

Portable Audio Input: The HPX provides a conveniently located stereo 1/8" jack on the faceplate to allow you to easily plug in an MP3 player, Discman, or other portable audio player. How convenient!!

Signal-sensing Display: The stylish blue and red display senses the enhancements created by the HDE circuit and turns them into an awesome light show. What's even

better is the fact that you can customize the lens pattern that the lights display through. What's sound without the light?

24dB/Octave Linkwitz Riley Crossover: What is the benefit of fine tuning your system if you cannot accurately route the proper frequencies to the proper amplifier channels? The programmable audiophile-caliber crossover in the HPX is the same crossover in many other award winning AudioControl components and is a far cry from the wimpy crossovers that find their way into many amplifiers these days.

Pre-Amp Line Driver: Talk about your ironies. Amplifiers require a high voltage input signal (generally 2 to 5 volts) to operate with maximum dynamic range and the best signal-to-noise ratio. On the other hand, typical source units only put out 1 to 2 volts, if you're lucky. In a system where the source unit is located in the front of the car and the amplifier(s) are located in the rear, the length of the connecting cables can have a negative impact on the strength of the signal.

The HPX includes a line driver that takes the weak output voltage of a head unit and increases it 20 dB (up to 13 volts peak) and then delivers it downstream to the amplifier inputs.

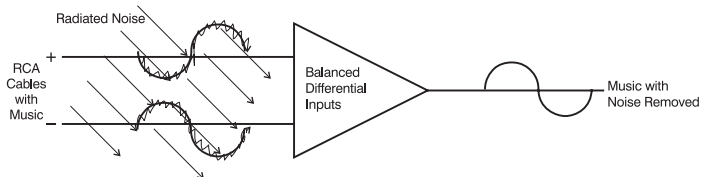


Figure 1: *Balanced Inputs*

Balanced Inputs: The HPX uses a balanced-differential input circuit that helps cancel any noise that radiates into the signal path between the source unit and your HPX.

Speaker-level Inputs: If you are like most people and like the look and features of your factory-installed source unit, but feel it's lacking on the performance side, good news. The HPX has speaker-level inputs that will interface with most factory-installed source units (even Bose) and let you add amplifiers and speakers to your heart's content.

Subwoofer Level Control: Need a little more bass to impress your buddies? Or maybe you want to tone it down to not scare off your date. Whatever the case, the HPX has a subwoofer output level control that allows you to balance the amount of signal that goes to your subwoofer outputs.

Master Volume: The HPX has a big ol' hunking master volume KNOB (no annoying up and down switches for us) to

control the signal output to the amplifiers. Raise the volume level on your source unit to its maximum setting (or just before clipping) and you will never need to touch them again.

Fader Control: The HPX has a fader control to allow for easy balancing between the front and rear speakers.

The Most Important Feature Of All: Reliability. That's right, your AudioControl HPX comes with a full 5-year parts and labor warranty when it is installed by an authorized United States AudioControl dealer. These seasoned pros have the training and the equipment to take care of the job quickly and not leave your dashboard looking like Swiss cheese. Keep in mind that if you or your friends who "have an awesome set of tools" choose to install it, your HPX still has a 1 year parts and labor warranty.

To activate your warranty, you need to FILL OUT AND SEND IN YOUR WARRANTY CARD! Also, save your invoice or sales slip as proof of purchase. Not only are these necessary for warranty purposes, they are also important if the unforeseen disappearance of your HPX should happen while you are socializing at the local espresso and salmon bar. Insurance companies have very little imagination.



A GUIDED TOUR OF THE HPX

1. Volume: Because the HPX is a pre-amp unit, it serves as the main control unit in the audio system. It has a master volume control that controls the output to all of your amplifiers. You can crank up the volume control of your source and deliver maximum signal to noise and voltage to the HPX, then use the HPX as your daily volume control.

2. Fader: When amplifier channels are connected to the front and rear outputs, the fader control will allow you to fade the signal level back and forth. This also means you can have front and rear fading even though your source unit only has 2-channel outputs.

3. Subwoofer Level Control: Exactly what it says it is. Controls the amount of signal that goes out to the subwoofer output of your HPX.

4. Expansion: This knob controls the amount of HDE (High Definition Expansion). A little twist will awaken any system whereas a 360 degree whirl can make the sound of your system expand beyond the pillars of the windshield.

5. Signal Sensing Display: The signal sensing display is connected to the HDE such that it flashes with the music when the circuit is engaged. The lens on the display is something we thought looked cool, but if it is not to your fancy, don't worry. You have the ability to create your own pattern and replace ours. See page 15 for more information.

6. Portable Audio Input: This input accepts an 1/8" stereo audio signal, most commonly found on portable audio devices like MP3 players and DiscMan. To utilize this input, you must engage the "Source" input switch.

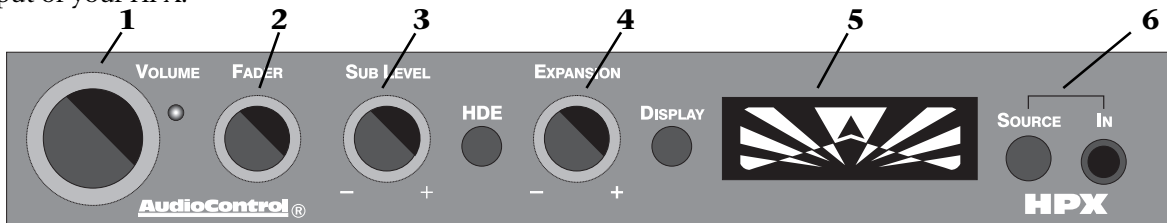


Figure 2: Front View of HPX

7. Power Connections: This nifty connector is a god-send to anyone who has tried to wire up their gear with their head crammed under the dash. You can wire up the power, ground, remote turn-on, and illumination from the convenience of the driver's seat and then casually plug it in the back of your HPX.

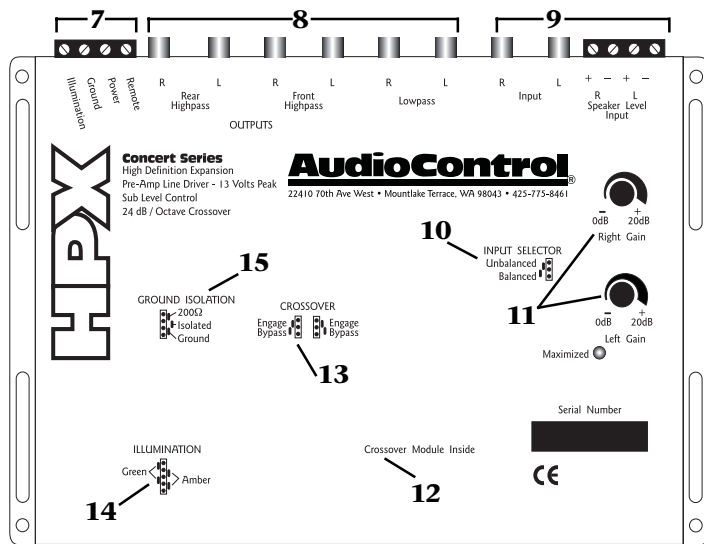


Figure 3: Top View of HPX

8. Output Jacks: Next to the inputs are the outputs which should be connected to the front, rear and subwoofer amplifiers, if applicable. Note: Depending upon your system application, you have the ability to have the highpass outputs play full range by changing the CROSSOVER jumpers under the chassis top.

9. Inputs: The HPX has 2 sets of inputs, MAIN and SPEAKER LEVEL. These inputs should get their signals from the main source unit/head unit and should attach to either RCA jacks or speaker leads that are coming out of your source unit.

10. Balanced Input Selector: Located under the cover and behind the input connectors are jumpers that allow you to utilize or bypass the balanced input circuitry. Although it is shipped in the balanced mode, which is best, it may be necessary to change this depending upon the configuration of the components you use. To change this, move the appropriate jumper on the 3-pin header.

11. Input Gain Control: These potentiometers (AKA "pots") are used to increase the amount of signal voltage to your power amplifiers. With these controls, you can provide

up to 13 volts (peak) to your amplifier's inputs. Check with your amplifier manufacturer to determine exactly how much voltage they can really handle. More info on this in the section on "Level Matching", page 13.

12. Crossover Frequency Selection: Under the top cover of your HPX lies a plug-in module that controls the crossover functions. This module selects the frequency that the front and rear outputs of your HPX will play down to as well as determining where your sub-woofer will begin playing. Shipped from the factory, the crossover is set at 90 Hz.

13. Crossover Bypass: To crossover or not crossover... that is the question. With the HPX, it does not matter what your answer is because we give you the ability to do both. Changing these jumpers allow you to run the HPX front and rear outputs in either full-range or high-pass mode depending upon your system requirements.

14. Illumination Selection: These jumpers let you change the backlight illumination to green or amber. Given our devotion to protect the rainforest, we have shipped the HPX in the green mode.

15. Ground Isolation Selector: This feature allows you to change the power, supply ground for different systems. When the HPX is shipped from the factory, the selector is in the fully isolated position (which is generally the best.) Alas, not every manufacturer (or installer) devotes much time into getting their grounds right. Therefore, we have provided other ground isolation options to help if you have a ground loop noise (alternator whine) in your system. Experiment with different settings if you run into this type of problem. To change the settings, make sure you turn the system off, carefully move the black jumper from the center two pins (Isolated) and move it to either the top two pins (200 ohms) or the bottom two pins (ground).

At this point, you have to ask yourself, "Do I feel lucky... or do I know what the heck I am doing?" If the answer is "No", then you need to drive to your nearest authorized AudioControl dealer before you get in over your head. Make the right choice while you can!

INSTALLING YOUR HPX IN-DASH PROCESSOR/CROSSOVER

Having absorbed everything in the manual up to this point, then you probably know we endorse having an authorized AudioControl dealer install your HPX as it would be in your best interest. Above and beyond having all of the appropriate technical know-how and experience, they have lots of cool tools.

If you are still with us and are feeling confident, than read on...

A. Placement and Mounting the HPX

Placement: By definition, the HPX in-dash processor/crossover was designed to be installed on or near the dashboard of most cars. However, if you are a building a real trick system, like with a separate audio system in the front and a separate one in the rear of a vehicle, the HPX is an ideal pre-amp control that can mounted in the front and/or the rear of the vehicle.

Mounting: The HPX is flexible enough to mount almost anywhere, although somewhere on the dash or in a center console is the most logical. You will want to be able to



Figure 4: HPX with mounting brackets

access it while you are sitting in the driver's seat of your vehicle. The HPX is designed to be mounted almost anywhere in a vehicle, although it is recommended to avoid hot spots like the firewall, engine compartment, or tail pipe. The mounting location must also be safe from water seepage or areas with bad seals (rubber gaskets, not sleek furry mammals who eat salmon). If there are old (or new) water stains, stay away.

We have provided brackets to assist you in mounting the HPX chassis under the dashboard or glovebox. The screw holes on the HPX chassis also allow for easy installation underneath a radio or with a dash kit. It is of utmost importance to mount the HPX securely to avoid any undue stress or breakage from over acceleration or braking.

B. HPX Power Wiring

• **ENLIGHTENING INFO** • Disconnect the negative terminal of your car's battery before working on any electrical connections. Failure to do so could lead to a dramatic spark in your life.

Remote Turn-On: Connect a 22 to 18 gauge wire from the head-unit's remote turn-on to the "Remote" connector on the HPX.

Positive (+12 V) Connection: Insert an 18 gauge or larger wire into the connector labeled "Power" on the nifty connector of your HPX. Connect it to a good, fused (1 ampere), constant source of 12 volts (we suggest the battery.)

Ground Connection: Use the same gauge wire as you did for the positive connector, and run it from the "Ground" connector on the HPX to the negative terminal of the battery, a ground buss, or a verified ground location. The factory head unit ground is **NOT** recommended.

Illumination: The connector labeled "Illumination" on your HPX controls the backlighting of your unit. If you run a wire from this connector to a switched 12-volt source, such as the "Remote" turn on wire on your source unit, you light up the backlighting on the HPX. A really cool idea is to connect the illumination wire to a factory dash light dimmer and you now have the ability to dim the backlighting of the HPX with your dash lights.

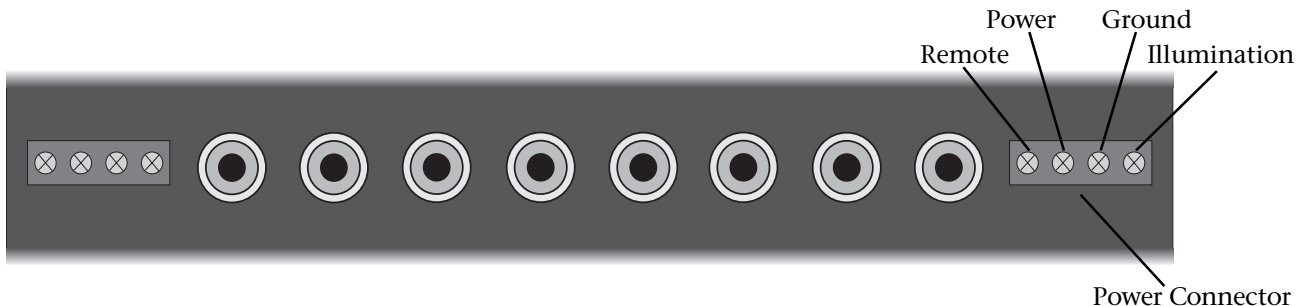


Figure 5: Rear View of the HPX

C. HPX Audio Wiring

Planning: As you may already have guessed, there are numerous ways to configure the HPX in your audio system. Spend a little quality time planning out your system and even sketching it out on paper if you can. The following diagrams are just a few of the possibilities.

Front, rear and subwoofer amplifier

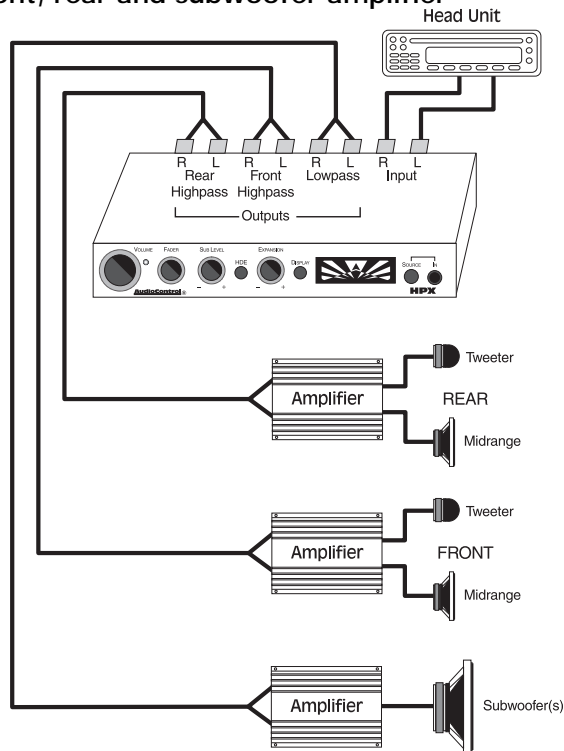
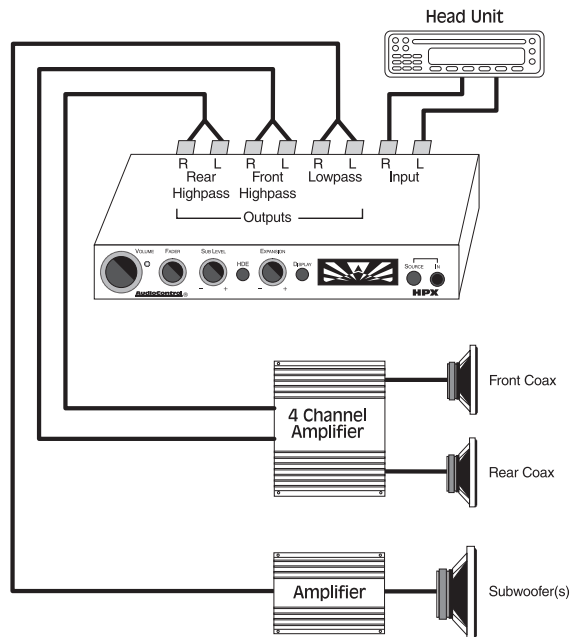


Figure 6: HPX with source unit and three amplifiers

Four channel and subwoofer amplifiers



Using portable audio source unit

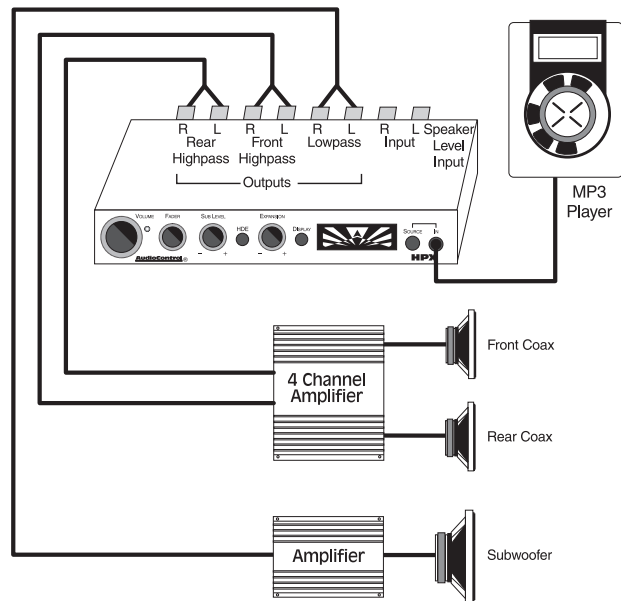
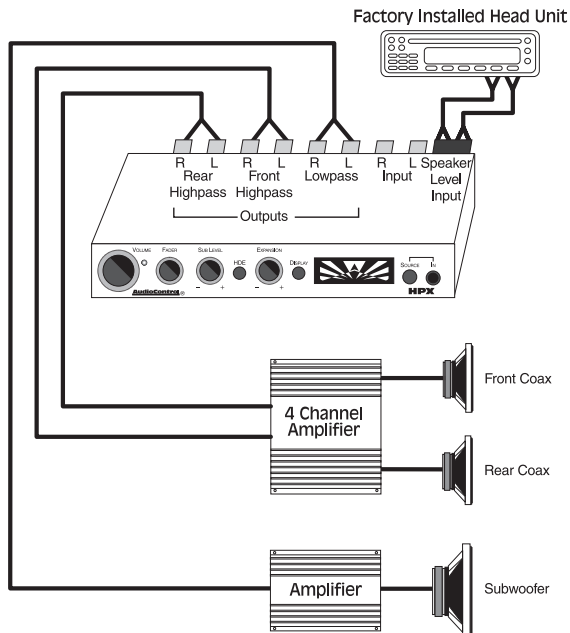


Figure 7: HPX with source unit, 4 channel amp and sub amplifier

Figure 8: HPX with MP3 player, 4 channel and subwoofer amplifiers

Using a factory-installed source unit



Simple 2-way system

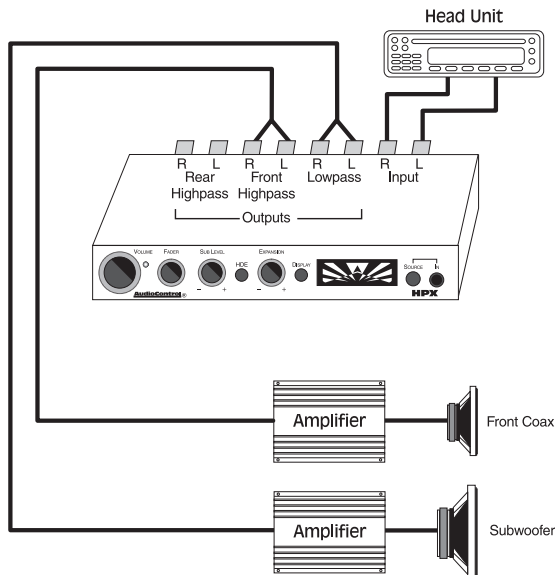


Figure 9: HPX using speaker level inputs, 4 channel amp and sub amplifier

Figure 10: HPX with source, front amp, and sub amp

D. Level Matching

Many manufacturers claim that their source units produce signal voltages in the area of 2 to 4 volts. However, what they neglect to mention is that you only achieve these incredible voltage levels when the volume is turned all the way up. Try listening to that all of the time. By following the level matching steps for the HPX you will be able to take full advantage of the high-voltage output of your head unit.

Step #1. Disconnect the RCA cables leading into your amplifiers, and make sure the only RCA cables between your head unit and the HPX's main inputs are attached. Turn the volume level knob on the HPX to maximum.

Step #2. Play a favorite tape or compact disc that contains consistent, dynamic music and turn the source unit's volume control up to its maximum level (NOTE: Some source units may produce distortion or "clipping" when their volume controls are turned all of the way up. If this happens, you will hear distortion even at low levels when you connect the rest of the system. If this is the case, lower the source unit's volume level until you no longer hear distortion.) The volume control on the HPX will now be the master volume control.

Step #3. Using a small screwdriver, adjust the "Input Gain" control on the top of the HPX until the yellow

"Overload" LED starts to flicker with the music.

Step #4. Turn off the entire system and attach the output RCAs from the HPX to the next component in line.

Step #5. Turn down the gain control on your amplifiers to the least sensitive setting (turning the gain control counter clockwise.) This will allow you to drive a hotter signal in to your amplifiers. For more info on this, download Tech Note 1006 from our Web page www.audiocontrol.com.

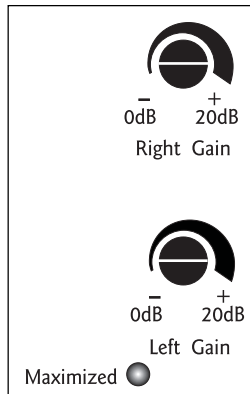


Figure 11: Input Gain Controls

• Important Tip •

If the OVERLOAD light does not come on because of the low output of the source unit, turn the Input Gain to maximum. Please refer to the manufacturers specifications on input voltage to determine whether you will need to decrease the "Input Gain" on the HPX to avoid clipping the next component in line. If the next component in line is an AudioControl component, there is no need to re-adjust the "Input Gains", because they can handle the hot signal voltage the HPX produces.

E. Adjusting The High Definition Expansion (HDE) Circuitry

The “Expansion” knob controls the intensity or mix rate of the HDE circuit, which is conveniently located on the front of your HPX. By turning this knob clockwise it will increase the amount of the HDE that is mixed into the signals running inside the HPX. Turning it counterclockwise will minimize the effect. . . but you probably already guessed that. The actual setting of the HDE circuit is dependent on several things; the type of software you are using (compact disc, tape, MP3, etc.) and the location of the speakers in your system. However, what will really matter is what you like the best as there are no autosound police that will kick in your door and haul you away if you set it improperly.

Starting with the knob turned completely counterclockwise, start playing some music that you normally listen to and gradually increase the HDE circuit. What you should experience is the sound starting to rise and then expand outside your dash. The dynamics of bass, midrange, and high should also increase dramatically. At some point, you may encounter the effect becoming somewhat overpowering, which means you should decrease the HDE slightly. Now take a listen for a minute or so and then turn off the HDE effect by pushing in the button labeled “HDE”. Pretty amazing, eh!! Now rush out and tell three of your friends that they need an HPX for their cars.

F. Crossover Modules: Additional crossover modules for HPX are available from your authorized AudioControl dealer, or you can create custom modules by using the following formula:

$$\frac{7,200}{\text{Frequency (Hz)}} = \text{Resistor Value In Kilohms}$$

Example:

For a 2,500 Hz module - $7,200/2,500 = 2.88\text{K ohms}$

The 24 dB crossover module requires eight resistors of this value.

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

G. Bypassing The Crossover: Depending upon your system configuration, you may wish to not high-pass your front and rear speakers and instead let them play full range. Fortunately, the engineering gods at AudioControl have thought of everything and given you the ability to bypass the crossover. Just remove the chassis top and move the CROSSOVER jumper from “Engage” to “Bypass” and voilà - full-range front and rear outputs plus you get to keep your lowpassed subwoofer output.

H. Changing The Display Lens:

The artistic geniuses of AudioControl have chosen the design of the display lens on your HPX, however, that does not mean that you have to like it. In fact, you can customize your HPX display by creating your own lens on a piece of translucent paper and installing it by following these steps

1. Carefully remove the three no. 4 screws on the rear and remove the metal cover.
2. Remove the one top 4-40 screw that holds in the display bracket and carefully remove the bracket.
3. Replace the existing graphics with your “custom” graphics. Figure 12 shows the size your graphics will need to be.
4. Line up the clear lens over the new graphics, hold against the bracket, and reinstall in chassis using the 4-40 screw.
5. Replace the top cover and no. 4 screws.

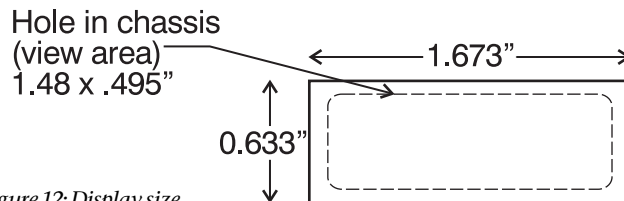


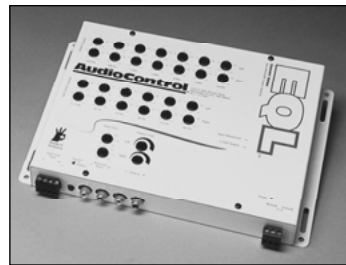
Figure 12: Display size

I. Troubleshooting

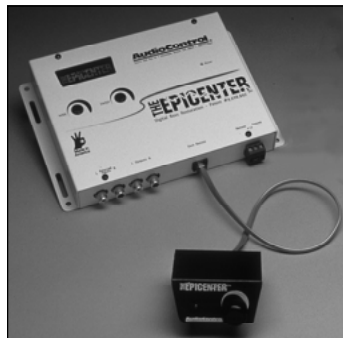
No sound	<ol style="list-style-type: none"> 1. Check "Power" and remote turn on for proper voltage. (Is power light on?) 2. Center the fader control. 3. Turn up "Input Gain" control. 4. Check ground connections. 5. Is the "Source" button in the wrong position? 6. Turn up the "Volume".
Hiss	<ol style="list-style-type: none"> 1. Turn down amp gains. 2. Turn down amp gains. 3. Turn down amp gains. 4. Adjust source unit output.
Distorting speakers	<ol style="list-style-type: none"> 1. Lower volume level of source unit or portable audio unit. 2. Adjust gain levels of HPX using "Maximized" LED .
Whine	<ol style="list-style-type: none"> 1. Check impedance of source grounds to amplifier grounds for resistance differences. 2. Change isolation selection of grounding jumpers. See page 7, #15
No HDE effect	<ol style="list-style-type: none"> 1. Check polarity on speakers and amplifiers. 2. Make sure source material is stereo. 3. Push in the "HDE" button
No display	<ol style="list-style-type: none"> 1. Push in "Display " button. 2. Check source unit output.

If You Like The HPX, You'll Love...

The EQL Concert Series is our award winning dual-bandwidth, trunk mount equalizer. Thirteen octave and half octave spaced bands help tame even the most wicked acoustical environment, your car.



The Epicenter Concert Series is our patented (U.S. Patent #4,698,842) bass restoration component, that puts the "woof" back into any woofer. You have to hear it to believe it.



And now a word from the legal department. . .

The WARRANTY

People are scared of warranties. Lots of fine print. Months of waiting around and leaving messages in some stranger's voice mail. Well, fear no more, this warranty is 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 product. So go ahead, read this warranty, then take a few days to enjoy your new HPX 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 that certain conditions have to be met before they'll honor the warranty. If you meet all of these conditions, we will warranty all materials and workmanship on the HPX for one year from the date you bought it (five years if it is installed by an authorized United States AudioControl dealer) We will fix or replace it, at our option, during that time.

Here are the conditional conditions:

1. You have to fill out the warranty card and send it to us within 15 days after purchasing the HPX.
2. You must keep your sales receipt for proof of purchase showing when and from whom the unit was bought. We're

not the only ones who require this, so it's a good habit to get into with any major purchase.

3. Your HPX must have originally been purchased from an authorized AudioControl dealer. You do not have to be the original owner, but you do need a copy of the original sales slip.

4. You cannot let anybody who isn't: (A) the AudioControl factory or (B) somebody authorized in writing by AudioControl to service your HPX. If anyone other than (A) or (B) messes with your HPX, that voids your warranty.

5. The warranty is also void if the serial number is altered or removed, or if the HPX has been used improperly. Now that sounds like a big loophole, but here is all we mean by it.

Unwarranted abuse is: (A) physical damage (don't use the HPX for a car jack); (B) improper connections (120 volts into the power jack can fry the poor thing); (C) sadistic things. This is the best mobile product we know how to build, but if you mount it to the front bumper of your car, something will go wrong.

6. If an authorized United States AudioControl dealer installs the HPX, the warranty is five years.

Assuming you conform to 1 through 6, and it really isn't all that hard to do, we get the option of fixing your old unit or replacing it with a new one.

Legalese Section

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

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

AudioControl, Making Good Stereo Sound Better, Performance Match, HPX, HDE, The Epicenter, EQL, EQX, FOUR.1, HPX, THREE.1, FOUR.1 and Para-BASS are all trademarks of Electronic Engineering and Manufacturing, Inc.

This manual was composed, drafted, and transcribed on a damp, grey, and blustery rain-drenched day at our home in the Pacific Northwest Rainforest. The coffee was hot.

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HPX SPECIFICATIONS

All specifications are measured at 14.4 V DC (standard automotive voltage) As technology advances, AudioControl reserves the right to continuously change our specifications, like our weather.

Maximum input/output level	9.5 Vrms/13 V peak
Frequency response	20 Hz-100k Hz; ±1 dB
Total harmonic distortion0005%
Signal to Noise ratio	-110 dB
Input Impedance	20K ohms
Output Impedance	150 ohms
Input gain	0- 20 dB
Crossover slope	24 dB/octave Linkwitz Riley
Factory crossover setting	90Hz
Power supply	High headroom PWM switching
Power draw	250 mA
Recommended fuse rating1 Amp
Illumination Color	switchable green or amber
Size	1" H x 6.75" W x 5" D
Weight	2 lbs