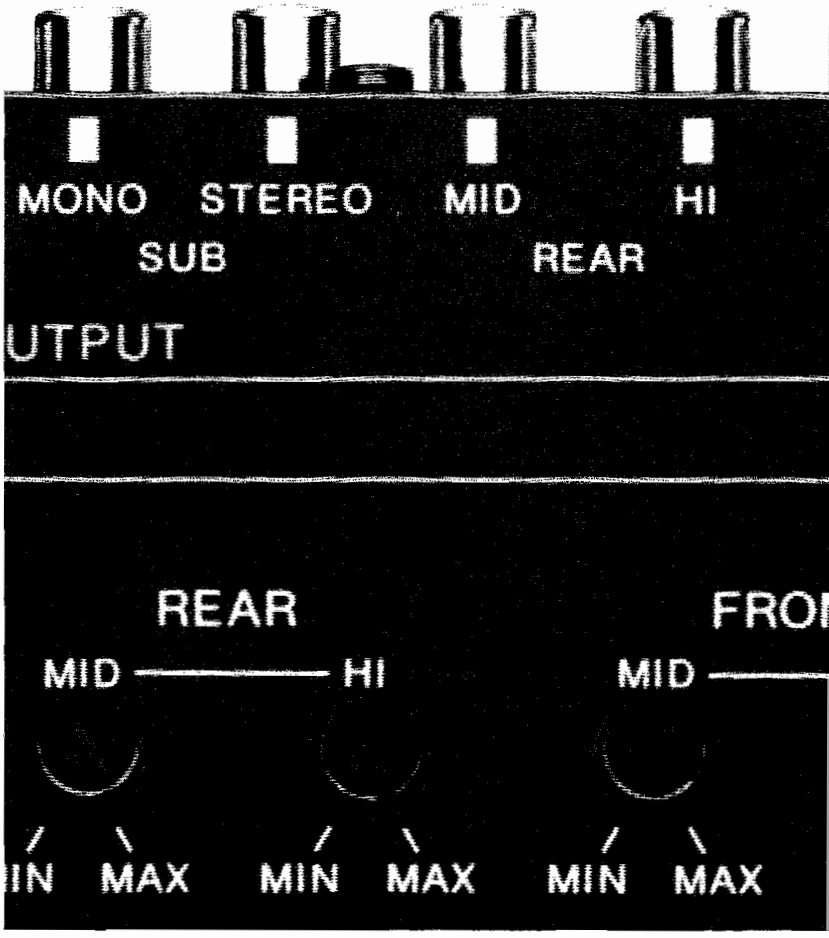
CX0-1



Active Crossover/System Controller
Instruction Manual

harman/kardon

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Printed in Japan

I N T R O D U C T I O N

Congratulations on purchasing one of the most sophisticated and versatile electronic crossover systems ever offered for car stereo applications. The Harman Kardon CXO-1 is designed to provide maximum flexibility in a wide range of multi-amp autosound system configurations. Used in conjunction with high quality speakers and power amplifiers, it can help realize the potential for audiophile quality sound in a mobile environment.

Because there are so many ways to incorporate the CXO-1 into your new system, it is important to read the next four sections of this manual carefully before beginning installation. If you're completely familiar with the theory of electronic crossovers, you can, however, skip directly to Section II.

SECTION I: ELECTRONIC CROSSOVERS AND MULTIPLE AMPLIFIERS

Passive vs. Active Crossovers

First, for comparison, let's consider what happens to the full-range musical signal from your home stereo amplifier when it reaches your loudspeakers. Each element in a speaker system (woofer, midrange and tweeter) "specializes" in a specific range of the sound spectrum. Thus only certain frequencies should reach each driver. The job of splitting up the full-range musical spectrum into highs, mids and lows is handled by a *passive crossover* inside the speaker cabinet. It is referred to as "passive" because it does not contain powered electronics: It simply splits up signals which enter it and routes them to various speaker components.

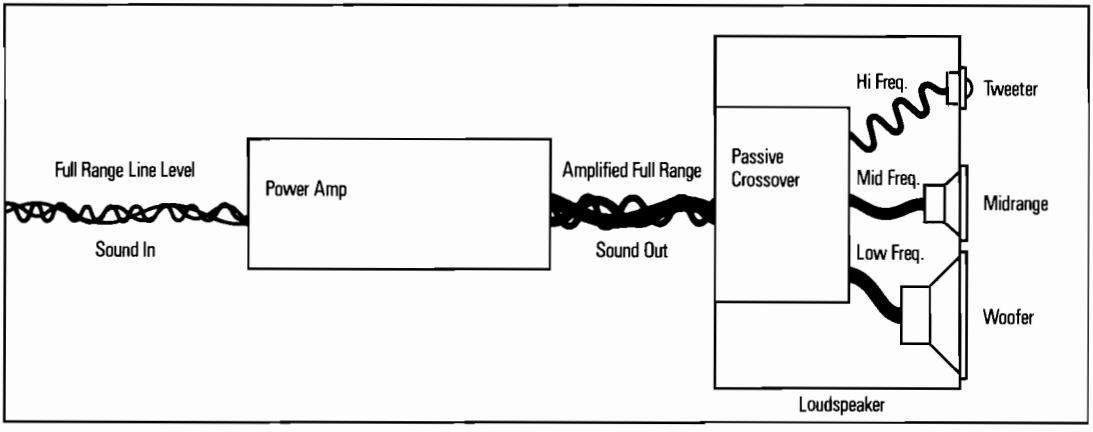


Fig. 1. A passive crossover

This is also how the simplest of car stereo systems work. A single 2-channel amplifier sends full-range signals to a pair of passive crossovers (often right inside each coaxial or triaxial speaker) which split up the sound, sending highs to the tweeter and the rest of the frequency spectrum to the larger driver.

Passive crossovers, however, have several drawbacks. First, you're limited to using one amplifier for your whole system, limiting the overall available power. When you turn your system up past a certain point, the power amplifier cannot send enough power to the woofers (bass speakers). It "clips," sending nasty high frequency distortion out as part of the full range signal. A passive crossover dutifully routes these additional high frequency impulses to the tweeter which audibly distorts and can eventually burn out. While having enough power to prevent this isn't as much of a problem in a home system (where super-high-wattage amps are readily available), it *is* a problem in autosound applications.

Especially when you consider drawback two: Passive crossovers are relatively inefficient. That is, they don't pass all the signal that goes into them, dissipating some of your valuable amp power into heat instead of sound.

Third, because of the high power amplifier voltages they must deal with, passive crossovers suffer from inaccuracy and distortion unless they are elaborately designed—which takes up more valuable space in an autosound installation and may require even more power.

And finally, passive crossovers can tend to make bass mushier than if the amplifier is connected directly to the woofer.

Electronic, or *active* crossovers solve all of these problems. Which is why they are used in large concert PA systems, recording studio monitors and many high-end audiophile home systems.

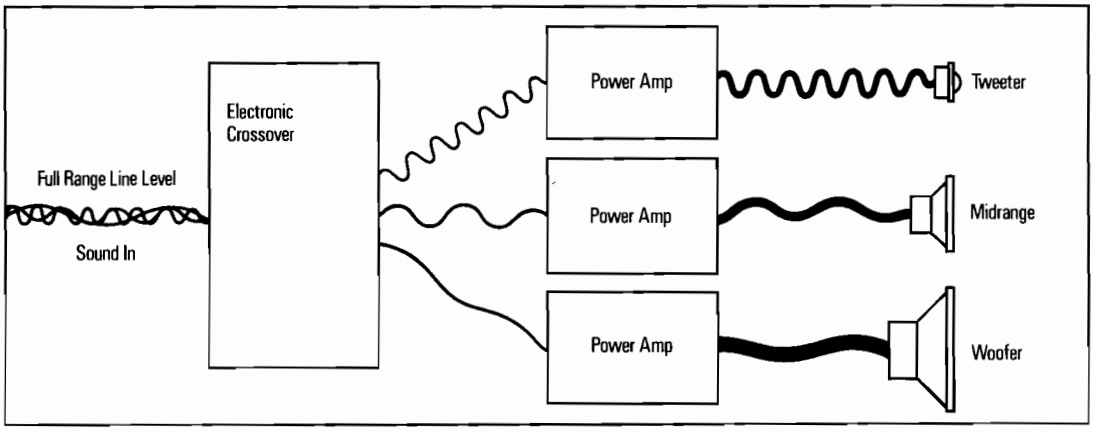


Fig. 2. An active crossover

Instead of trying to split up the high-powered output of an amplifier, active electronic crossovers do their work on the low, line level signal, BEFORE the signal is amplified.

This offers many advantages in a car stereo system. You can use multiple power amplifiers with wattages tailored to the specific speaker (lots of power for a subwoofer, less power for tweeters, etc.). An active crossover provides cleaner, less distorted sound, thanks to its elaborate, powered circuitry. And, should you turn up the overall system volume to the point where the bass power amplifier clips, no distortion (or damaging high frequency spikes) will reach your midrange and treble speakers. Bass is tighter and faster, since the woofer or subwoofer is connected directly to the power amplifier without intervening coils or capacitors of a passive crossover.

Putting an Electronic Crossover to Work in Your Car Stereo System

In practice, an electronic crossover like the Harman Kardon CXO-1 is placed between the signal source (your cassette/receiver or cassette/tuner) and two or more power amplifiers. Section IV discusses three examples, ranging from a simple two-amp system to an elaborate five-amplifier audiophile's dream set-up.

In general, the more speakers and amplifiers, the cleaner (and louder) your system will be. If you are installing a system in a vehicle such as a van with a large internal space, more overall cone area, especially in the bass region is necessary for good sound.

Along with your budget and type of vehicle, there are two other major considerations as to how you use the Harman Kardon CXO-1: What type of signal source you're using, and how many outputs it has.

Head-end units come in two types. Cassette/*receivers* have built-in low-power amplifiers which you may want to take advantage of, even when adding extra power amplifiers. Cassette/*tuners* do not incorporate a power amplifier. The other consideration is how many *pre-amp out* connections are provided on the head unit. Good quality cassette/receivers and all cassette/tuners have at least one. If your particular unit has *two* pre-amp out connections, you can make good use of them with the Harman Kardon CXO-1 by using it to drive the real channel and a subwoofer. If the unit has three pre-amp outs, you can drive the front, rear and subwoofer channels independently. We'll discuss this in detail farther on.

SECTION II: HOW THE HARMAN KARDON CXO-1 WORKS

The Harman Kardon CXO-1 incorporates unique circuit features which make it different (and more useful) from any other autosound electronic crossover. In order to make full use of these special features, you should become familiar with the CXO-1's operation by tracing the signal path through one channel in the following block diagram.

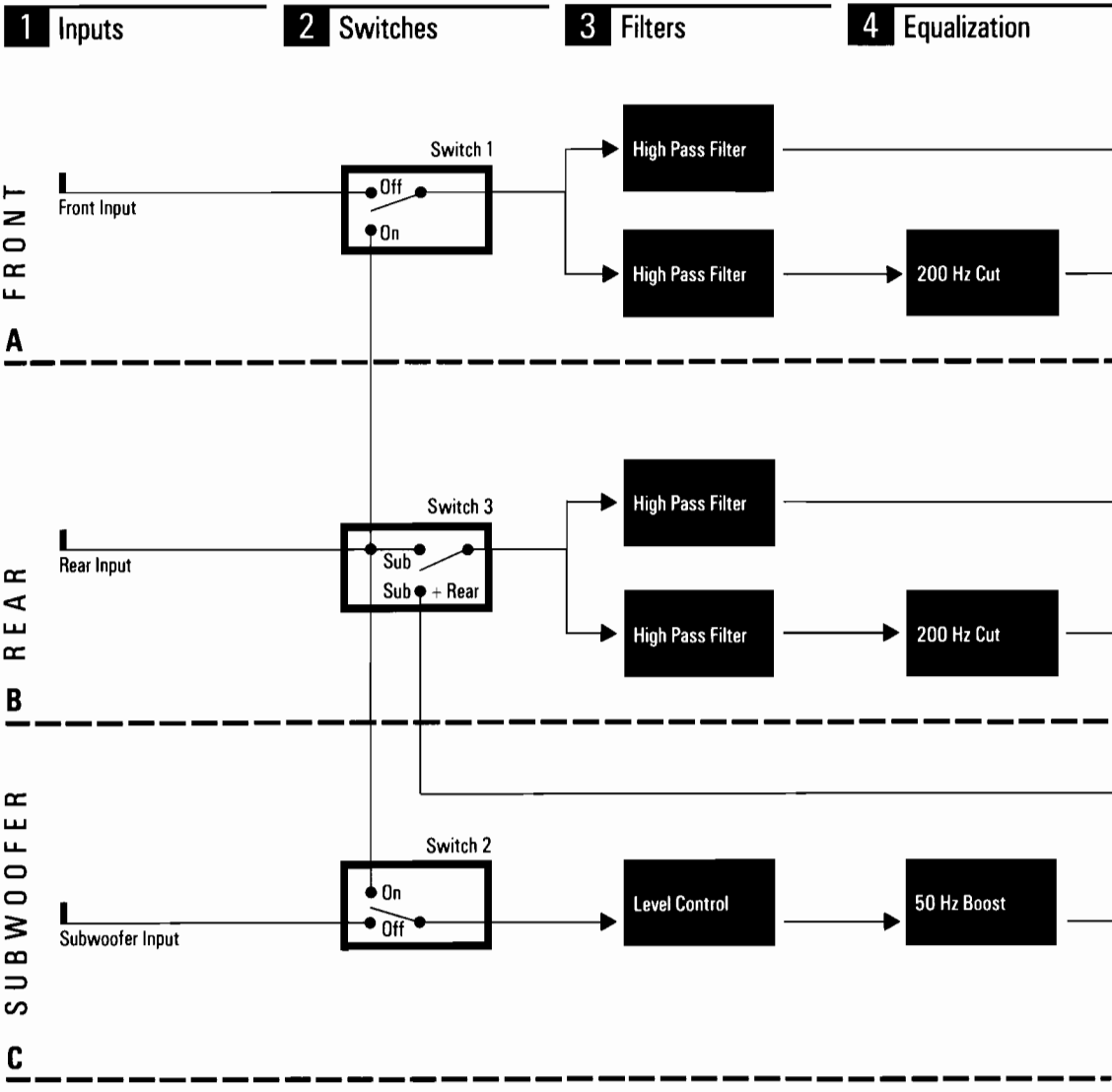
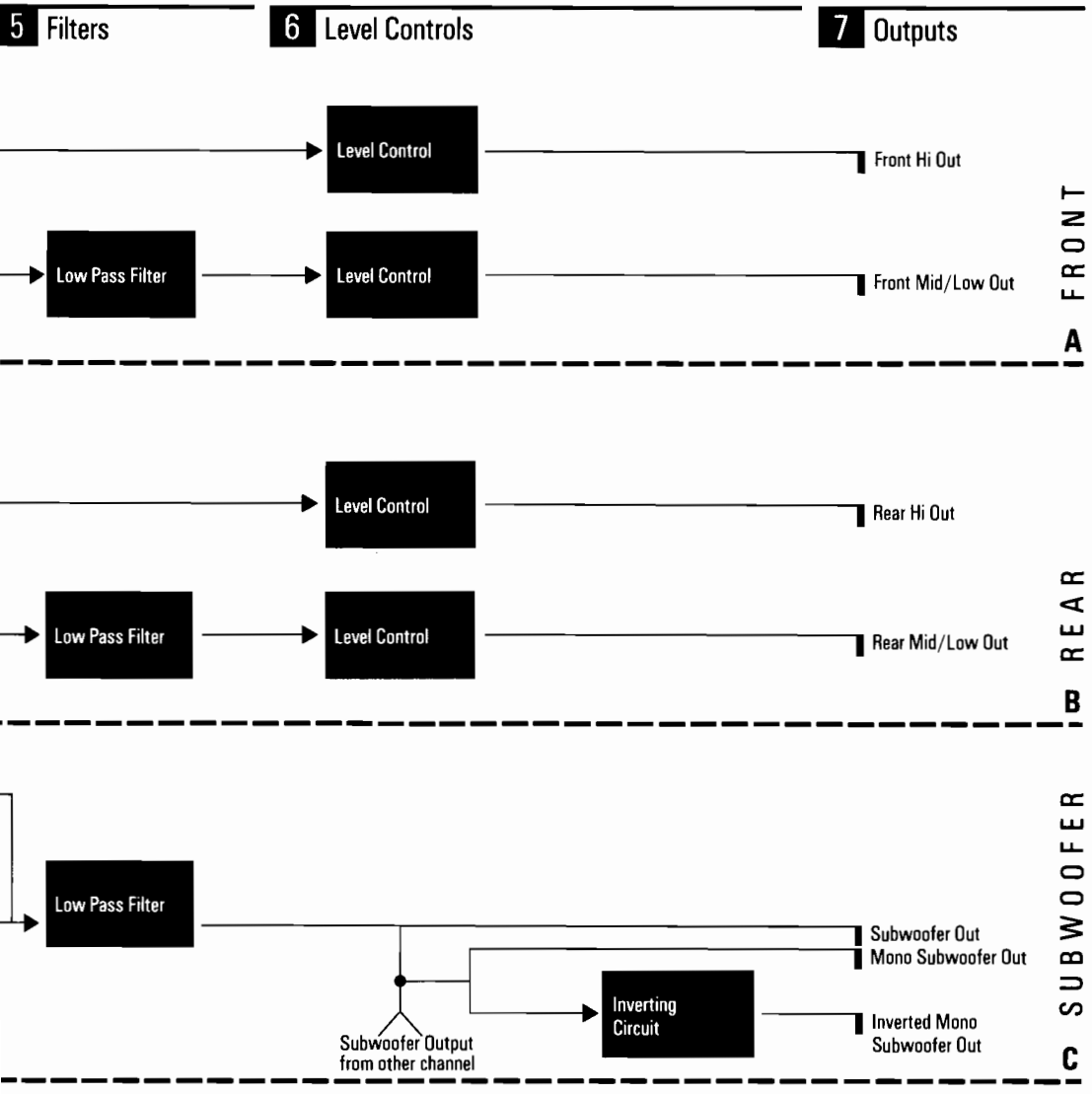


Fig. 3. Harman Kardon CXO-1 block diagram

Don't be daunted by all the boxes and dotted lines. The signal path is relatively simple. You're really looking at three different electronic components: One each for front, rear and subwoofer speakers (labeled A,B, and C in the block diagram). Each of these sections have many functions in common. These are labeled Parts 1-7.



The CXO-1 Section by Section

Let's start with Part 1, **Inputs**. Each channel of the Harman Kardon CXO-1 has inputs for front and rear speakers as well as a low bass subwoofer. Now, very few head end units have three sets of pre-amp outputs. How do you take advantage of the circuitry in all three Harman Kardon CXO-1 inputs?

By using Part 2, **Switches**. The two switches located between the CXO-1's input jacks allow you to route one or two inputs from the head unit to two or three sections of the CXO-1.

Switch 1 (located between FRONT INPUT and REAR INPUT) lets you send input only to the front speakers, or share the one input with front *and* rear speakers.

Switch 2 (located between REAR INPUT and SUB INPUT) routes input exclusively to the rear channel or share the one input with rear speakers *and* subwoofer.

Switch 3 (labeled SUB ONLY/SUB + REAR) will be covered farther on.

While they may seem complicated now when discussed in the abstract, you will soon see that these switches give you extreme flexibility, as well as the ability to easily add extra amps and speakers later on. Charts of switch settings are included in the next major section of this manual in conjunction with sample hook-ups.

Parts 3A and 3B, **High Pass Filters**, are circuits which cut low frequencies and "pass" only high frequencies. Along with Parts 5A, B and C, **Low Pass Filters**, they comprise the actual crossover portion of the Harman Kardon CXO-1. The exact crossover frequencies you will use are determined by another set of switches on the top of the unit.

In-between the high and low pass filters are three circuits which add greatly to the usefulness of the CXO-1. Part 4, **Equalization**, gives you the ability to solve two common equalization problems found in car stereo acoustic environments without adding extra add-on graphic equalizers. Because of the relatively small interior volume of most cars, frequencies around 200Hz are unnaturally boosted, causing a "boomy" sound. The CXO-1 lets you soften (reduce) the octave centered at 200Hz variably from 0dB to − 8dB. The only time you don't need at least a small amount of this 200Hz notch filter reduction is if you are installing the CXO-1 in a van, where the larger acoustic volume causes a boost at lower frequencies, or in a convertible where the boost is not created in the first place.

The CXO-1's 50Hz boost circuit lets you enhance low bass output of rear speakers when you're not using an additional subwoofer. Depending on how much low bass you like, it can also be used with a subwoofer to enhance lower octave bass which is reduced in cassette tapes, FM broadcasts and even many Compact Discs. Unlike the bass tone control on your head unit, the 50Hz boost circuit allows precise enhancement of just the lowest octaves instead of higher bass bands, too.

Part 6 (and 3C), **Level Controls** are used to adjust the relative volumes of front, rear and subwoofer speakers to achieve a natural sound balance.

Line level outputs to your power amplifiers are represented in Part 7, **Outputs**. Remember that because of the CX0-1's switching system, you won't necessarily need to use all five outputs to get all their benefits, although they're there if you want to take advantage of them.

Exploring the CXO-1's Switches and Controls

Exterior Connections. Across the top of the CXO-1 are the labels for the inputs, outputs and power connections on the side of the unit. Each is discussed further on.

Output Level. These rotary controls determine the relative levels of front, rear and subwoofer sections. You will adjust them by ear (with a screwdriver) as the final operation during installation.

50Hz Equalizer Section includes a rotary control for varying the amount of boost, and the SUB ONLY/SUB + REAR switch (Switch 3) which determines which channels receive the equalization.

High and Low Limit Switches. Next are the actual crossover controls which determine what frequencies are passed to each speaker. **Low Limit** determines the lowest frequency which the midranges and tweeters will reproduce. **High Limit** sets maximum frequency which will be sent to the midrange and subwoofer. By setting these switches, you effectively set the upper and lower frequency limits for each speaker. Since crossover points are determined by the specific speakers you have chosen to use, you should consult with your Harman Kardon dealer, or the specifications of the speakers to determine each High and Low Limit switch setting.

200Hz Notch Filters. Two rotary controls are provided to vary the amount of cut you wish to apply at 200Hz. They should be set flat during initial crossover level adjustments and then applied by ear in the final stage of installation.

Putting the CXO-1's Flexibility to Work for You

Because of the Harman Kardon CXO-1's unique input/output switching ability, you can make use of its features in many different ways. For example:

- Want to be able to control the amount of ultra-low subwoofer bass from a head unit with just 2 pre-amp outputs and fader/balance control? Connect one pre-amp output to the front channel input of the CXO-1 and the other to its subwoofer input. Switch 1 then lets you route the same front channel input to the rear channel, too. Adjusting the head unit's control lets you balance the subwoofer vs. front-and-rear speakers.
- Want front-to-back fader control on a 2 pre-amp output head unit? Connect one pre-amp output to the CXO-1's front input and one pre-amp output to the rear input. Switch 2 is then used to route rear input to the subwoofer section, too. Adjusting the head unit fader/balance control now controls the amount of front vs. rear-and-subwoofer output.
- But what if you want to use a subwoofer with a head unit that has only one pre-amp output? Connect it to the CXO-1's rear input and close Switches 1 and 2. Now you can connect amps to the front, rear *and* subwoofer outputs.

- How about a simpler system with just front and rear speaker systems? In this case, the rear speakers will be doing the work of a subwoofer, so that 50Hz boost circuit would be especially helpful. Just close Switches 2 and 3. The signal is first routed through the 50Hz boost circuit, then enters the rear channel circuits.

The next section will elaborate on these and other possibilities.

Subwoofer Outputs

A subwoofer is a special bass speaker specifically designed to handle ultra-low bass. It is driven by its own power amplifier and is usually crossed over at 200Hz or lower. While only rarely found in home systems, subwoofers are a common and very effective way to generate bone-crushingly realistic bass in a car.

Note that there are three subwoofer outputs on the Harman Kardon CXO-1 instead of one. These allow great flexibility in type of subwoofer and amplifier employed.

The **Subwoofer** output lets you send separate left and right low bass channels to a stereo power amplifier. At that point you can either connect the amp's output to left and right subwoofers, or connect both amp channels to a single subwoofer speaker which has dual voice coils.

The **Mono Subwoofer** output is designed for mono power amplifiers. A stereo subwoofer is not absolutely necessary since there is less differing left and right information below 100Hz.

The **Inverted Mono Subwoofer** output lets you use a stereo power amplifier as a mono unit to drive a single subwoofer. This is called "bridging" or "strapping" and combines both channels of the stereo amp into a single output. IMPORTANT: Some stereo amplifiers are not designed for bridging and can be damaged by doing so. Consult the stereo power amplifier's manual to determine if the unit can be bridged for mono output before connecting the CXO-1's Inverted Mono Subwoofer outputs. Also, some stereo power amplifiers have built-in "bridged mono" capability. In this case, the inverted mono output needn't be used.

SECTION III: SYSTEM DESIGN USING THE CXO-1

We have provided three different sample systems using the CXO-1 with various combinations of amplifiers and speakers. Also included is a sample hook-up which makes use of the existing power amplifier in a cassette receiver. Needless to say, these are just starting points for a wide range of system configurations. Consult with your Harman Kardon dealer for specific recommendations on power amplifiers and individual speaker components.

An Elaborate System

This system has separate midranges and tweeters in both front and back plus stereo subwoofers. Each pair of speakers has its own dedicated power amplifier. The CXO-1 controls the crossover frequency between midrange and tweeters independently, and also controls their respective output levels. It also controls crossover point and level for the subwoofers. 200Hz equalization cut is applied to midrange drivers and a 50Hz bass boost is added to the subwoofers.

Note that three head unit pre-amp outputs are shown. If your particular cassette/receiver or cassette/tuner only has two inputs, you can still use this configuration by closing Switch 2 on the CXO-1.

Recommended speakers/amps: Front and rear tweeter, JBL TO5's with Harman Kardon CA-215 amplifiers; Front and Rear Midrange, JBL T50's or T60's with HK CA240's; Subwoofers, JBL T80's or T100's with HK CA260.

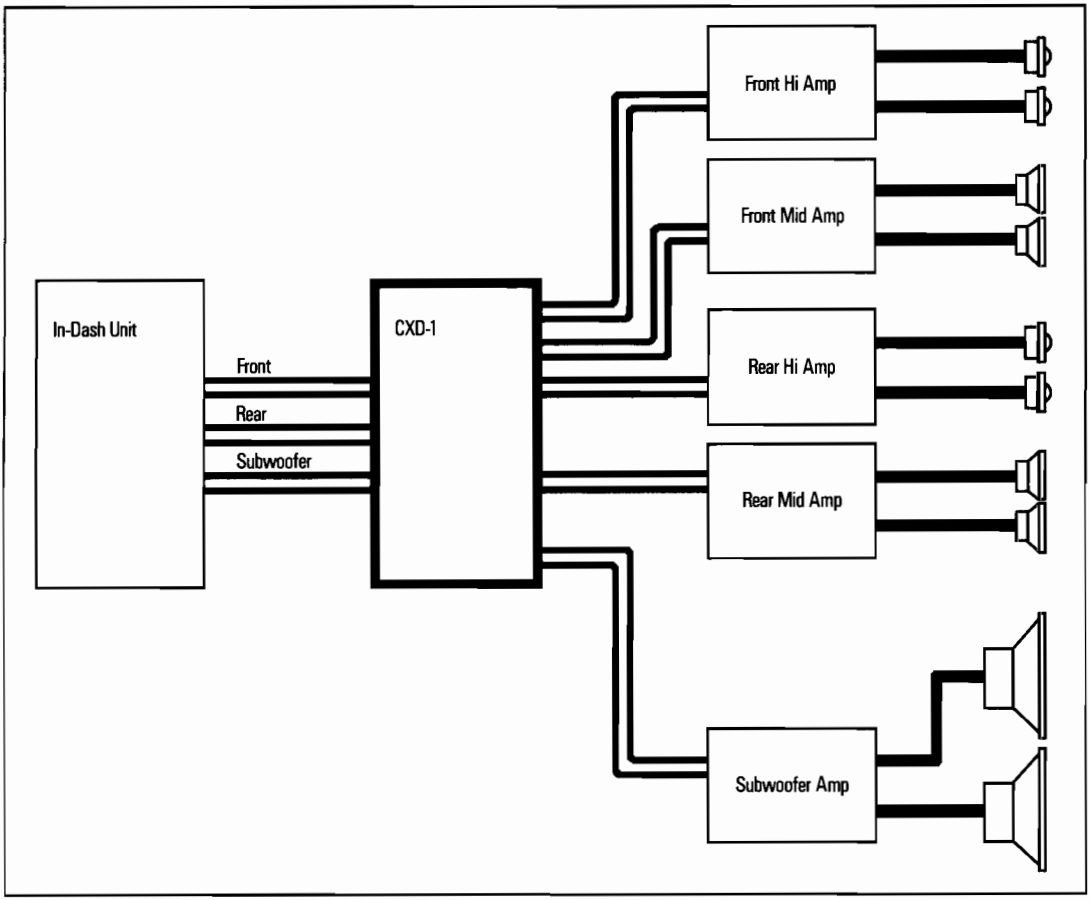


Fig. 4. "An elaborate CXO-1 system"

"ELABORATE" SYSTEM WITH THREE HEAD-END OUTPUTS AND FIVE POWER AMPLIFIERS

Inputs Used	Switches	Outputs Used
Front	1 — Off	Front hi, front mid
Rear	2 — Off	Rear hi, rear mid
Subwoofer	3 — Sub	Subwoofer

"ELABORATE" SYSTEM WITH TWO HEAD-END OUTPUTS AND FIVE POWER AMPLIFIERS

Inputs Used	Switches	Outputs Used
Front	1 — Off	Front
Rear	2 — On	Rear
	3 — Sub	Subwoofer

A Moderate System

Maybe moderate isn't the right word. This configuration provides superb frequency response using two sets of speakers and a subwoofer with three power amplifiers. The CXO-1 is used to roll off front speakers' output below 200Hz and rear speakers below 125Hz or 80Hz. In addition, the 200Hz equalization cut is used on both front and rear speakers. A single subwoofer is mounted in the middle of the rear deck and equalized with the 50Hz boost control.

Recommended speakers and amplifiers: Front, JBL TL500's, TL600's, T55's or T65's with Harman Kardon CA240 amplifier; Rear, JBL T95 or TL900's with HK CA260; Subwoofer, JBL T80 or T100 with HK CA240 or CA260 in mono mode.

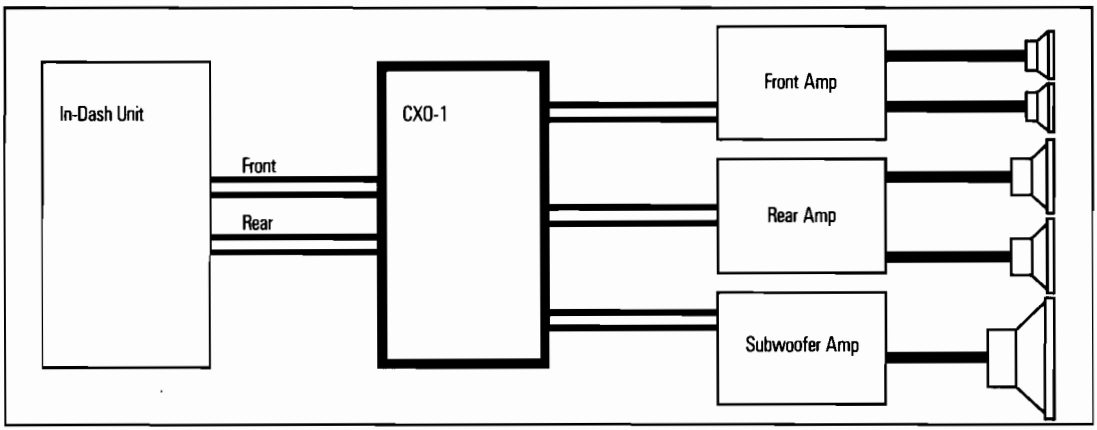


Fig. 5. "Moderate CXO-1 system"

MODERATE SYSTEM USING TWO PRE-AMP OUTPUTS AND THREE POWER AMPLIFIERS FRONT + REAR/SUBWOOFER FADER

Inputs Used	Switches	Outputs Used
Front	1 — Off	Front mid
	2 — On	Rear mid
Rear	3 — Sub	Subwoofer

MODERATE SYSTEM USING TWO PRE-AMP OUTPUTS AND THREE POWER AMPLIFIERS FRONT/REAR + SUBWOOFER FADER

Inputs Used	Switches	Outputs Used
Rear	1 — On	Front mid
	2 — Off	Rear mid
Sub	3 — Sub	Subwoofer

MODERATE SYSTEM USING SINGLE PRE-AMP OUTPUT AND THREE POWER AMPLIFIERS

Inputs Used	Switches	Outputs Used
	1 — On	Front mid
Rear	2 — On	Rear mid
	3 — Sub	Subwoofer

Modest Systems

Adding just two extra power amplifiers will still give you a system with far better sound than can be achieved with just the amplifier found in a cassette/receiver.

This system employs one pair of small speakers mounted in the dash and rolled-off at 200Hz, and larger, high quality co-axials, tri-axials or plate speakers mounted on the rear deck. The CXO-1 increases the dynamic power handling of the front speakers by removing the task of reproducing bass below 200Hz. The rear channels take advantage of the CXO-1's 50Hz bass boost. Both front and rear channels also receive equalization cut at 200Hz to flatten acoustic response within the car.

Note that it would take at least two graphic equalizers costing as much or more than the CXO-1 and adding extra noise and distortion to do the same job.

Recommended speakers and amplifiers: Front, JBL T50/T05's with Harman Kardon CA215 Amplifier; Rear, JBL T95, TL900 or TL600's with CA240 amplifier.

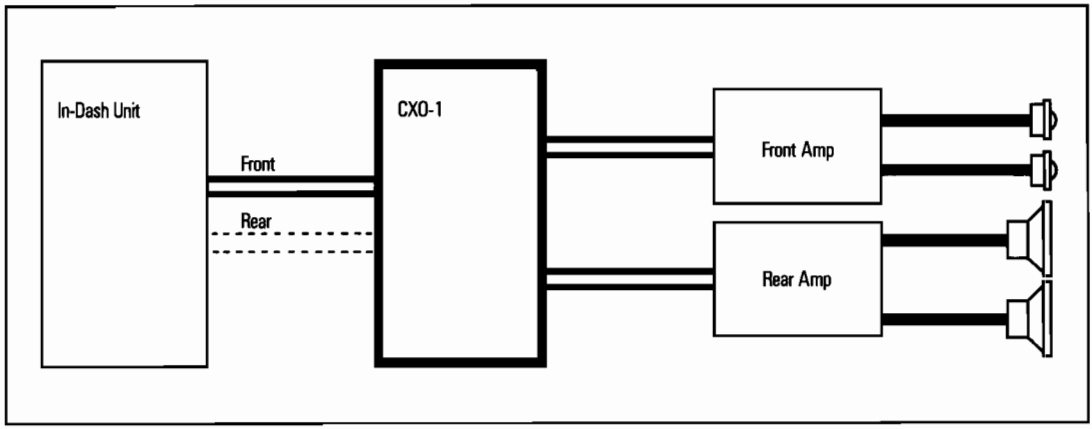


Fig. 6. "Modest front and rear system"

MODEST SYSTEM USING TWO PRE-AMP OUTPUTS AND TWO AMPLIFIERS ALLOWING FRONT-TO-REAR FADING AND 50Hz BASS BOOST

Inputs Used	Switches	Outputs Used
Front	1 — Off	Front mid
Rear	2 — On	Rear mid
	3 — Sub + Rear	

MDDEST SYSTEM USING SINGLE PRE-AMP OUTPUT AND TWO AMPLIFIERS ALLOWING 50Hz BASS BOOST

Inputs Used	Switches	Outputs Used
	1 — On	Front mid
Rear	2 — On	Rear mid
	3 — Sub + Rear	

A variation on this system eliminates the 50Hz bass boost if it is not applicable to your rear speakers.

MODEST SYSTEM USING SINGLE PRE-AMP OUTPUT AND TWO AMPLIFIERS

Inputs Used	Switches	Outputs Used
	1 — On	Front mid
Rear	2 — On or Off	Rear mid
	3 — Sub	

If your vehicle is a two-seater car or a small truck, you may wish to use the CXO-1 to drive one set of speakers and a subwoofer. Simply connect a subwoofer (such as the JBL T80) instead of rear channel speakers and change the crossover settings appropriately.

Making Use of the Amplifier in Your Cassette/ Receiver

While we do not recommend using the built-in amplifier in a head unit to drive power-hungry midranges or subwoofers, it can be incorporated with a passive high pass crossover (such as the JBL TN5) to power front dashboard tweeters (like the JBL T05's), which do not require much power. These additional tweeters can add considerable definition to music since they direct their output at ear-level, unlike car door speakers.

This system uses the same components as the system in Figure 6. Output of the front tweeters is controlled by using the front-to-back power fader found on cassette/ receivers.

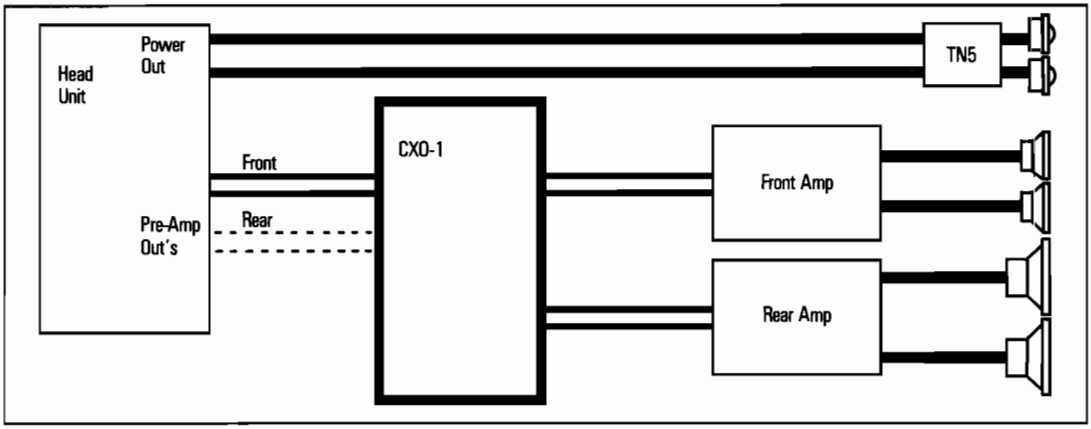


Fig. 7. "Modest system incorporating head-end amp"

SECTION IV: INSTALLING THE HARMAN KARDON CXO-1

Placement

The best place to mount the CXO-1 is near your power amplifiers. Alternatively, you can mount it under the dashboard although this is not recommended. In either case, remember that long runs of coaxial cable with low level signals, such as from dashboard to trunk can pick up noise from other electrical components in the car. So take special care to read the next section on wiring.

While the Harman Kardon CXO-1 is designed to withstand the normal rigors of an interior car environment, it is not designed for placement where it will be subjected to extreme heat or moisture. Avoid mounting it on the engine firewall, near trunk lid seals, leaky windows or anywhere else it may be subject to the exterior environment.

The CXO-1 should be securely mounted using the accessory sheet metal screws or bolts with nuts and lock washers.

Make sure that it is placed so that you have access to its top surface for level, equalization, crossover and switching adjustments.

Input and Output Connections

It is extremely important to use high quality co-axial stereo hook-up cables for the wiring between the head unit, the CXO-1 and the power amplifiers. Intense electro-magnetic fields are generated in an automobile which can be picked up by car stereo wiring. The increased low level wiring present when using an electronic crossover and multiple amplifiers increases the chances of creating an "antenna" which feeds this interference directly into the power amps. There it can be intensified into audible clicking, whining, ticking and buzzing.

Theoretically, all RCA-type co-ax cables (like the ones you use to hook up your home stereo) are shielded to prevent interference. Unfortunately, cheap cables skimp on external shielding, since interference is not a problem in most home hi-fi hook-ups. Avoid the temptation to simply use "that old set of patch cords that came with my receiver" or super-cheap cables sold as accessories in TV or hardware stores. Consult with your Harman Kardon dealer to obtain high quality, well-shielded cables with securely fitting male connectors on each end. For installations such as our "elaborate system" example, you might even consider use of special audiophile hook-up cables specially designed for high-end autosound use. Remember, it's better to invest in good cables *before* installation, rather than try to trace interference once inferior cables are buried deep in your car's interior.

Unlike speaker cables, which can be routed directly next to existing car wiring, we also recommend that you route line level (coaxial) wiring away from car wiring, amplifier power supply cables or speaker wires if possible. This will help avoid induction problems, especially when running cables from the head unit all the way back to the car's trunk.

Keep connections between the CXO-1 and power amplifiers as short as possible to further minimize noise problems.

Here is a sample hook-up based on our "moderate system." Remember that you will only be using one of the three possible sets of CXO-1 subwoofer outputs.

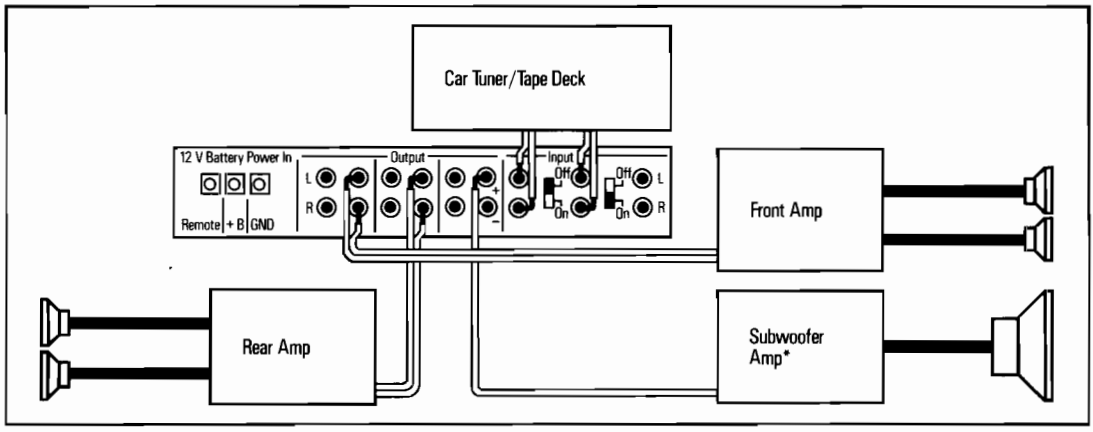


Fig. 8. Typical CXO-1 hook-up

*Note: This power amplifier is set in the "Bridged-Mono" operating mode.

Note that optional signal processing devices such as dash-mounted graphic equalizers are placed BEFORE the CXO-1.

Finally, make sure that all cables are tightly plugged into the CXO-1's inputs and outputs so they cannot work loose from car vibration.

Power Connections

The Harman Kardon CXO-1 requires connection of 1) +12V (B+), 2) remote turn-on input from power amplifier 3) ground (negative battery terminal).

Ground Connection. The connection most open to interpretation and possible problems is the ground (negative) connection. Remember the lecture on using cables with good metal shielding so that they can protect your system from electro-magnetic interference? The metal enclosures on the wires connected to the CXO-1's inputs and outputs can act as a shield *only* when they are properly grounded. That means properly grounding the CXO-1 itself.

For best protection from noise, there should be one and *only* one ground path to the negative side of your vehicle's electrical system. That means connecting the ground (negative) terminals of the head unit, CXO-1, and power amplifiers *together* and routing that common heavy gauge ground wire to someplace you're SURE is actually part of the negative side of the car's electrical system. The nearest piece of bare metal isn't necessarily a true ground. If the CXO-1 is located near a properly-installed power amplifier, connect the CXO-1 ground to the power amp's ground terminator. If you're in doubt, connect the car stereo system's common ground directly to the battery's negative terminal or where the battery's negative grounding strap contacts the vehicle frame.

Remote Turn-on. The CXO-1 is turned on by a control signal from the in-dash unit. Locate the remote turn-on terminals on both the CXO-1 and one of your power amplifiers. Using the short wires provided, connect the CXO-1 to the power amplifier.

B+. It is not necessary to run a separate 12-volt power supply wire all the way from the front of the car. The CXO-1 may be connected in parallel with a +12V terminal on the nearest power amplifier. You do not need to use as heavy a gauge of wire, since the CXO-1 does not draw nearly as much current as do the power amps.

CXO-1 Switch and Crossover Settings

The settings of Switches 1, 2, and 3 and the high, high/mid and sub-woofer filters depend on the type of system you are installing and the specific speakers used. If you have any questions, consult the specifications which came with your speakers or check with your Harman Kardon dealer.

Final "Pre-flight" Check

Before proceeding to the next section check the following:

- Have all power connections (including remote turn-on) been made to the CXO-1 and power amplifiers?
- Have proper input and output connections been made at the CXO-1?
- Have all connections been made from power amplifiers to speakers?
- Have the proper switch and crossover settings been made on the CXO-1?

SECTION V: CXO-1 FINAL ADJUSTMENT

You are now ready to adjust the sound balance between the front, rear and subwoofer speakers. There is no magic formula for this. It depends on your ear and your own audio preferences. Some people like lots of low bass. Others are especially concerned with treble clarity, etc. In fact, one of the reasons for having a CXO-1 is the ability to tailor yet another facet of your car stereo system to your own tastes.

Final adjustment will require 1) A well-recorded tape with full-range sound (i.e. balanced amounts of bass, midrange and treble), 2) a small screw driver, 3) careful reading of the step-by-step instructions in this section of the manual, 4) an assistant (optional, but very helpful).

A. Head Unit Settings

1. Set the tone controls on your cassette/receiver or cassette/tuner to neutral, defeat any loudness circuits and make sure that noise reduction and tape settings are correct for the test tape you are using.
2. Defeat any graphic equalizers or other signal processing devices which are in the signal path to the CXO-1.
3. Set the head unit's balance controls to their center position.
4. If the head unit has a front-to-rear power fader, set it to full "forward"; if it has a pre-amp fader control, set it to the center position for equal balance between the two pre-amp outputs.

B. CXO-1 Settings

5. Set the 50Hz and 200Hz equalization controls on the CXO-1 to their FLAT position.
6. Set those output level controls *being used* to their full MAXIMUM settings (clockwise). Turn all *unused* output level controls completely OFF (fully counter-clockwise).

C. Listening

7. Enter the vehicle and close all doors and windows. This is very important to ensure the proper acoustic environment.
8. Take a deep breath and play your test tape at a comfortable listening level.
9. Confirm that all speakers are working properly.
10. Note which speakers, if any, are too loud in relation to the overall sound mix. Is bass too heavy? Is treble too shrill and fatiguing?

D. CXO-1 Level Adjustment

11. One at a time, reduce the CXO-1 level controls which correspond to the speakers which sound too loud. This should be done in several increments for each speaker, backing the controls off slowly. (Here is where an assistant and vigorous gesturing comes in handy, so that you don't have to make multiple trips back and forth from the trunk to the passenger compartment.)

    Remember that lowering the level of one control may cause a change in the overall tone balance that may necessitate other adjustments.

12. When you are satisfied with the sound, check the CXO-1's output level controls. AT LEAST ONE CONTROL *must* remain in the full-on position.

    If, in the heat of adjustment, all the controls in use got turned down various amounts, it will be necessary to raise each of them until one is at full output.

E. Aftermath

13. Adjust the CXO-1's 200Hz and 50Hz equalization controls as needed. You have now adjusted the *constant* level and tone components of your system. These settings will remain constant for the life of the system.
14. Re-engage any head unit or graphic equalizer tone controls. These can now be freely used to adjust the sound of individual program material such as tapes and FM.
15. Fill out the Harman Kardon CXO-1 warranty card and mail it back to us.
16. IMPORTANT: Save your sales slip and put it in a secure place. It will be necessary for warranty and insurance purposes, perish the thought.

You are now ready to enjoy the benefits of multiple amplifiers and the CXO-1 Active Crossover/System Controller. Once again, thank you for choosing Harman Kardon.

SECTION VI: SPECIFICATIONS

FILTERS	
Type	2nd Order Bessel (12dB/Octave)
Sub Channel	Low Pass—50Hz, 80Hz, 125Hz and 200Hz
Mid Channel	High Pass—Flat, 80Hz, 125Hz and 200Hz
Mid Channel	Low Pass—2.5kHz, 4.0kHz, 6.3kHz and flat
High Channel	High Pass—2.5kHz, 4.0kHz, and 6.3kHz

EQUALIZATION	
Low Frequency EQ	50Hz Center Frequency, 0 to +10dB Boost
Mid Frequency EQ	200Hz Center Frequency, 0 to −8dB Cut

Gain/Insertion Loss	0dB (All output level controls max)
Maximum Output Level	1.75 Volts (less than 0.1% THD)
THD at 1.0 Volts	Less than 0.05%
Frequency Response	10Hz −100kHz +0/−3dB (flat setting)
Signal-to-Noise Ratio (A-WTD, 1.0V)	More than 130dB
Stereo Separation	More than 70dB
Input Impedance	26k Ohms per channel, input switches add in parallel
Output Impedance	270 Ohms capacitively coupled

Feature and specification subject to change without notice.

SECTION VII: WARRANTY AND SERVICE

If you have followed the suggestions in this manual and are reasonably sure that your active crossover requires service, call the Harman Kardon dealer from which you purchased your CXO-1. It is important that service be carried out only by a designated Harman Kardon service agent to insure both proper service and to comply with the terms of the CXO-1 Limited Warranty.

Remember to keep your sales slip or receipt in a safe place since you will be required to show it for service during the duration of the Limited Warranty.

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1111-J30251
Issue 1