dbx
by HARMAN

223s, 223xs
234s, 234xs

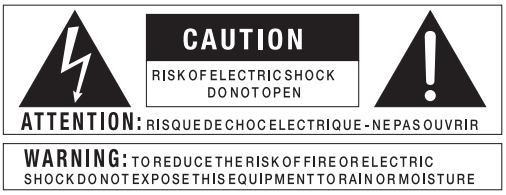
2-Way, 3-Way
4-Way Crossovers



User Manual

Professional Audio Equipment

IMPORTANT SAFETY INFORMATION



The symbols shown above are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowpoint in an equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

These symbols warn that there are no user serviceable parts inside the unit. Do not open the unit. Do not attempt to service the unit yourself. Refer all servicing to qualified personnel. Opening the chassis for any reason will void the manufacturer's warranty. Do not get the unit wet. If liquid is spilled on the unit, shut it off immediately and take it to a dealer for service. Disconnect the unit during storms to prevent damage.

SAFETY INSTRUCTIONS

NOTICE FOR CUSTOMERS IF YOUR UNIT IS EQUIPPED WITH A POWER CORD.

WARNING: THIS APPLIANCE SHALL BE CONNECTED TO A MAINS SOCKET OUTLET WITH A PROTECTIVE EARTHING CONNECTION.

The cores in the mains lead are coloured in accordance with the following code:

GREEN and YELLOW - Earth BLUE - Neutral BROWN - Live

As colours of the cores in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core which is coloured green and yellow must be connected to the terminal in the plug marked with the letter E, or with the earth symbol, or coloured green, or green and yellow.
- The core which is coloured blue must be connected to the terminal marked N or coloured black.
- The core which is coloured brown must be connected to the terminal marked L or coloured red.

This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. If the attachment plug needs to be changed, refer servicing to qualified service personnel who should refer to the table below. The green/yellow wire shall be connected directly to the units chassis.

CONDUCTOR		WIRE COLOR	
		Normal	Alt
L	LIVE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E	EARTH GND	GREEN/ YEL	GREEN

WARNING: If the ground is defeated, certain fault conditions in the unit or in the system to which it is connected can result in full line voltage between chassis and earth ground. Severe injury or death can then result if the chassis and earth ground are touched simultaneously.



If you want to dispose this product, do not mix it with general household waste. There is a separate collection system for used electronic products in accordance with legislation that requires proper treatment, recovery and recycling.

Private household in the 25 member states of the EU, in Switzerland and Norway may return their used electronic products free of charge to designated collection facilities or to a retailer (if you purchase a similar new one).

For Countries not mentioned above, please contact your local authorities for a correct method of disposal.

By doing so you will ensure that your disposed product undergoes the necessary treatment, recovery and recycling and thus prevent potential negative effects on the environment and human health.

WARNING FOR YOUR PROTECTION READ THE FOLLOWING:

KEEP THESE INSTRUCTIONS

HEED ALL WARNINGS

FOLLOW ALL INSTRUCTIONS

THE APPARATUS SHALL NOT BE EXPOSED TO DRIPPING OR SPLASHING LIQUID AND NO OBJECT FILLED WITH LIQUID, SUCH AS VASES, SHALL BE PLACED ON THE APPARATUS.

CLEAN ONLY WITH A DRY CLOTH.

DO NOT BLOCK ANY OF THE VENTILATION OPENINGS. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

DO NOT INSTALL NEAR ANY HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, STOVES, OR OTHER APPARATUS (INCLUDING AMPLIFIERS) THAT PRODUCE HEAT.

ONLY USE ATTACHMENTS/ACCESSORIES SPECIFIED BY THE MANUFACTURER.

UNPLUG THIS APPARATUS DURING LIGHTNING STORMS OR WHEN UNUSED FOR LONG PERIODS OF TIME.

Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

Use only with the cart stand, tripod bracket, or table specified by the manufacture, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

POWER ON/OFF SWITCH: If the equipment has a Power switch, the Power switch used in this piece of equipment DOES NOT break the connection from the mains.

MAINS DISCONNECT: The plug shall remain readily operable. For rack-mount or installation where plug is not accessible, an all-pole mains switch with a contact separation of at least 3 mm in each pole shall be incorporated into the electrical installation of the rack or building.

FOR UNITS EQUIPPED WITH EXTERNALLY ACCESSIBLE FUSE RECEPTACLE: Replace fuse with same type and rating only.

MULTIPLE-INPUT VOLTAGE: This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. Connect this equipment only to the power source indicated on the equipment rear panel. To reduce the risk of fire or electric shock, refer servicing to qualified service personnel or equivalent.

If connected to 240V supply, a suitable CSA/UL certified power cord shall be used for this supply.

IMPORTANT SAFETY INFORMATION

ELECTROMAGNETIC COMPATIBILITY

This unit conforms to the Product Specifications noted on the **Declaration of Conformity**. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

Operation of this unit within significant electromagnetic fields should be avoided.

- use only shielded interconnecting cables.

U.K. MAINS PLUG WARNING

A molded mains plug that has been cut off from the cord is unsafe. Discard the mains plug at a suitable disposal facility.

NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET.

Do not use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS1362.

DECLARATION OF CONFORMITY

Manufacturer's Name: dbx Professional Products
Manufacturer's Address: 8760 S. Sandy Parkway
Sandy, Utah 84070, USA

declares that the product:

Product name: dbx 223s, 223xs, 234s, 234xs
Note: Product name may be suffixed by the EU.

Product option: None

conforms to the following Product Specifications:

Safety: IEC 60065 -01+Amd 1

EMC: EN 55022:2006 (N/A; Analog Product)
IEC61000-4-2
IEC61000-4-3
IEC61000-4-4
IEC61000-4-5
IEC61000-4-6
IEC61000-4-8
IEC61000-4-11

Supplementary Information:

The product herewith complies with the requirements of the:
The product herewith complies with the requirements of the:
Low Voltage Directive 2006/95/EC
EMC Directive 2004/108/EC.
RoHS Directive 2002/95/EC
WEEE Directive 2002/96/EC

With regard to Directive 2005/32/EC and EC Regulation 1275/2008 of 17 December 2008, this product is designed, produced, and classified as Professional Audio Equipment and thus is exempt from this Directive.

Roger Johnsen
Vice-President of Engineering
8760 S. Sandy Parkway
Sandy, Utah 84070, USA
Date: November 1, 2010

European Contact: Your local dbx Sales and Service Office or

Harman Music Group
8760 South Sandy Parkway
Sandy, Utah 84070, USA
Ph: (801) 566-8800
Fax: (801) 568-7583

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Section 1 - Introduction

1.1 Introduction

Congratulations on your purchase of the dbx 223s/223xs or 234s/234xs crossover. We are confident you will find this crossover to be the finest product of its kind. We have taken care to include all of the features you need to make your system sound its best. Some of the features common to both the 234s/234xs and the 223s/223xs crossovers are:

- back panel switches for selecting the operating mode of the crossover.
- back panel switches indicating the selected range of crossover frequencies. Both of these features have LED indicators on the front panel so you can see at a glance which mode the unit is in.
- low frequency summed output designed specifically for mono subwoofer applications.
- phase invert switches on all outputs.
- individual level controls on every output.

We are sure you will agree that these crossovers are built to provide extremely high quality frequency division for all your PA applications.

1.2 Service Contact Info

If you require technical support, contact dbx Customer Service. Be prepared to accurately describe the problem. Know the serial number of your unit - this is printed on a sticker attached to the bottom panel. If you have not already taken the time to fill out your warranty registration card and send it in, please do so now.

Before you return a product to the factory for service, we recommend you refer to the manual. Make sure you have correctly followed installation steps and operation procedures. If you are still unable to solve a problem, contact our Customer Service Department at (801) 568-7660 for consultation. If you need to return a product to the factory for service, you MUST first contact Customer Service to obtain a Return Authorization Number.

No returned products will be accepted at the factory without a Return Authorization Number.

Please refer to the Warranty information on the following page, which extends to the first end-user. After expiration of the warranty, a reasonable charge will be made for parts, labor, and packing if you choose to use the factory service facility. In all cases, you are responsible for transportation charges to the factory. dbx will pay return shipping if the unit is still under warranty.

Use the original packing material if it is available. Mark the package with the name of the shipper and with these words in red: DELICATE INSTRUMENT, FRAGILE! Insure the package properly. Ship prepaid, not collect. Do not ship parcel post.

1.3 Warranty

This warranty is valid only for the original purchaser and only in the United States.

1. The warranty registration card that accompanies this product must be mailed within 30 days after purchase date to validate this warranty. Proof-of-purchase is considered to be the burden of the consumer.

2. dbx warrants this product, when bought and used solely within the U.S., to be free from defects in materials and workmanship under normal use and service.

3. dbx liability under this warranty is limited to repairing or, at our discretion, replacing defective materials that show evidence of defect, provided the product is returned to dbx WITH RETURN AUTHORIZATION from the factory, where all parts and labor will be covered up to a period of two years. A Return Authorization number must first be obtained from dbx by telephone. The company shall not be liable for any consequential damage as a result of the product's use in any circuit or assembly.

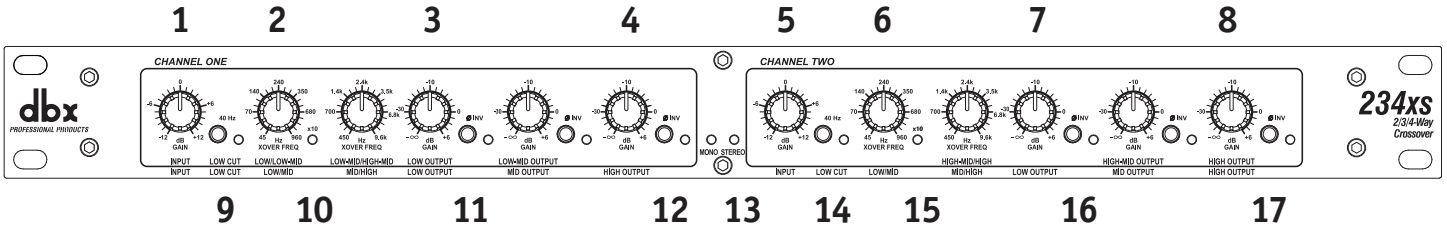
4. dbx reserves the right to make changes in design or make additions to or improvements upon this product without incurring any obligation to install the same additions or improvements on products previously manufactured.

5. The foregoing is in lieu of all other warranties, expressed or implied, and dbx neither assumes nor authorizes any person to assume on its behalf any obligation or liability in connection with the sale of this product. In no event shall dbx or its dealers be liable for special or consequential damages or from any delay in the performance of this warranty due to causes beyond their control.

Section 2 - Operating Controls

2.1 dbx 234s/234xs Front Panel

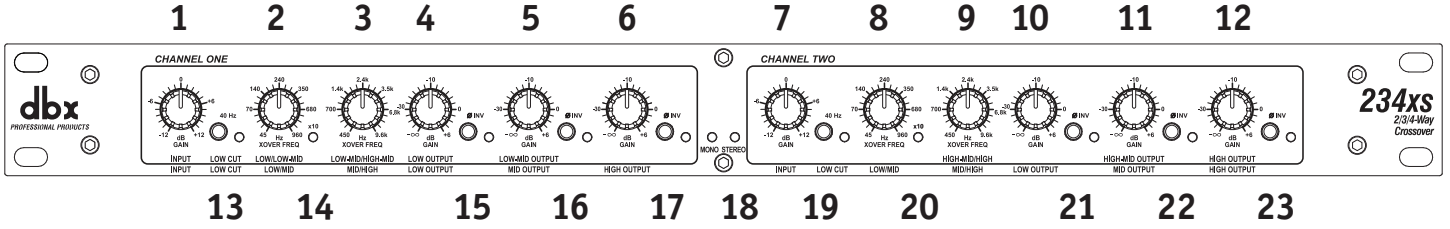
Note:
There are no front panel differences between the 234s and the 234xs. Therefore the 234xs is shown below, representing both the 234s and the 234xs.



STEREO 2-WAY MODE
In 2-way stereo mode the controls are marked in black BELOW the horizontal black line. Channel One and Channel Two functions are identical in the stereo mode. Front panel controls not described in this section are not active in stereo 2-way operation.

[1] & [5]	**Input Gain**	Controls the INPUT level with +/- 12 dB of gain.
[2] & [6]	**Low/Mid***	Selects crossover point between the LOW and HIGH outputs.
[3] & [7]	**Low Output**	Controls the Low frequency output level with a range of -∞ to +6 dB.
[4] & [8]	**High Output**	Controls the High frequency output with a range of -∞ to +6 dB.
[9] & [14]	**Low Cut**	Switch for selecting the 40 Hz high pass filter. An LED indicates the selection.
[10] & [15]	**x10 LED**	Indicates that the LOW/HIGH crossover frequency range is 450 Hz to 9.6 kHz.
[11] & [16]	**Phase Invert**	Switch for reversing the polarity on the LOW Output. An LED indicates that the phase is inverted.
[12] & [17]	**Phase Invert**	Switch for reversing the polarity on the HIGH Output. An LED indicates that the phase is inverted.
[13]	**Stereo**	LED indicating stereo mode operation.

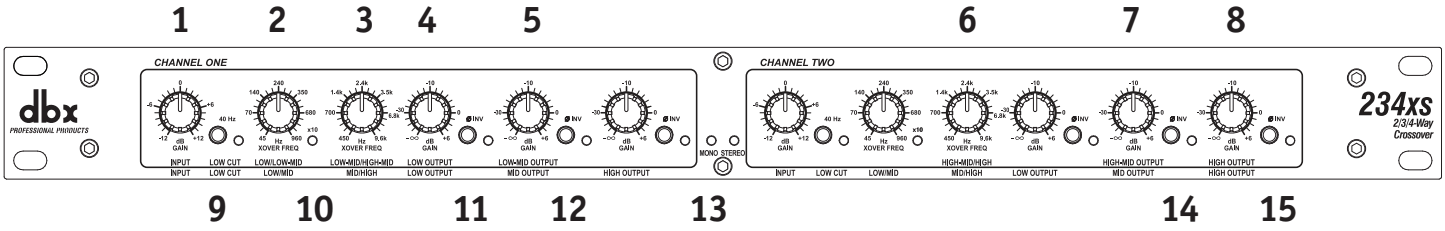
*although this control is labeled as "**Low/Mid**", it operates as the crossover frequency control between low and high frequencies in stereo 2-way operation.



STEREO 3-WAY MODE

In 3-way stereo operation the controls are marked in black BELOW the horizontal black line. Channel One and Channel Two functions are identical in the stereo mode. LEDs are disabled for controls which are non-functional in this mode.

[1] & [7]	**Input Gain**	Controls the INPUT level with +/- 12 dB of gain.
[2] & [8]	**Low/Mid**	Selects crossover point between LOW and MID frequencies.
[3] & [9]	**Mid/High**	Selects crossover point between MID and HIGH frequencies.
[4] & [10]	**Low Output**	Controls the Low Frequency output level with a range of -∞ to +6 dB.
[5] & [11]	**Mid Output**	Controls the Mid Frequency output with a range of -∞ to +6 dB.
[6] & [12]	**High Output**	Controls the High Frequency output with a range of -∞ to +6 dB.
[13] & [19]	**Low Cut**	Switch for selecting the 40 Hz high pass filter. An LED indicates the selection.
[14] & [20]	**x10 LED**	Indicates that the LOW/MID crossover frequency range is 450 Hz to 9.6 kHz.
[15] & [21]	**Phase Invert**	Switch for reversing the polarity on the LOW Output. An LED indicates the selection.
[16] & [22]	**Phase Invert**	Switch for reversing the polarity on the MID Output. An LED indicates the selection.
[17] & [23]	**Phase Invert**	Switch for reversing the polarity on the HIGH Output. An LED indicates the selection.
[18]	**Stereo**	LED indicating stereo mode operation.



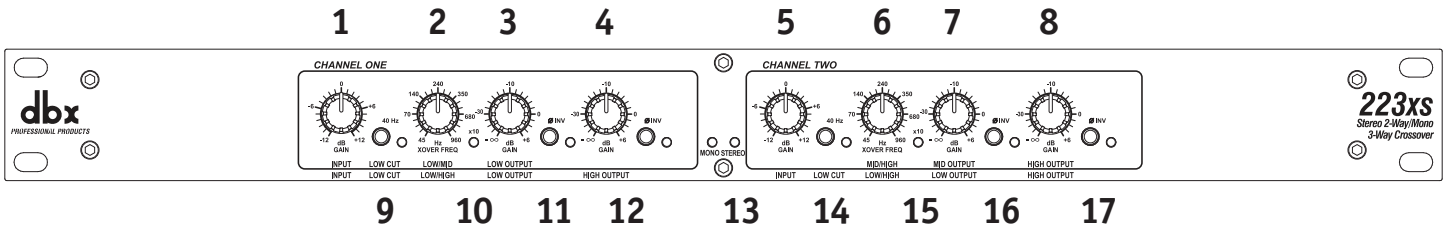
MONO 4-WAY MODE

In 4-way mono operation the controls are marked in red ABOVE the horizontal black line. Front panel controls not described in this section are not active in mono 4-way mode. LEDs are disabled for controls which are non-functional in mono 4-way mode.

[1]	**Input Gain**	Controls the INPUT level with +/- 12 dB of gain.
[2]	**Low/Low-Mid**	Selects crossover point between LOW and LOW-MID frequencies.
[3]	**Low-Mid/High-Mid**	Selects the crossover point between LOW-MID and HIGH-MID frequencies.
[4]	**Low Output**	Controls the LOW frequency output level with a range of -∞ to +6 dB.
[5]	**Low-Mid Output**	Controls the LOW-MID frequency output level with a range of -∞ to +6 dB.
[6]	**High-Mid/High**	Selects the crossover point between HIGH-MID and HIGH frequencies.
[7]	**High-Mid Output**	Controls the HIGH-MID frequency output level with a range of -∞ to +6 dB.
[8]	**High Output**	Controls the HIGH frequency output level with a range of -∞ to +6 dB.
[9]	**Low Cut**	Switch for selecting the 40 Hz high pass filter. An LED indicates the selection.
[10]	**x10 LED**	Indicates that the LOW/LOW-MID crossover frequency range is 450 Hz to 9.6 kHz.
[11]	**Phase Invert**	Switch for reversing the polarity on the LOW Output. An LED indicates the selection.
[12]	**Phase Invert**	Switch for reversing the polarity on the LOW-MID Output. An LED indicates the selection.
[13]	**Mono**	LED indicating mono mode operation.
[14]	**Phase Invert**	Switch for reversing the polarity on the HIGH-MID Output. An LED indicates the selection.
[15]	**Phase Invert**	Switch for reversing the polarity on the HIGH Output. An LED indicates the selection.

2.2 dbx 223s/223xs Front Panel

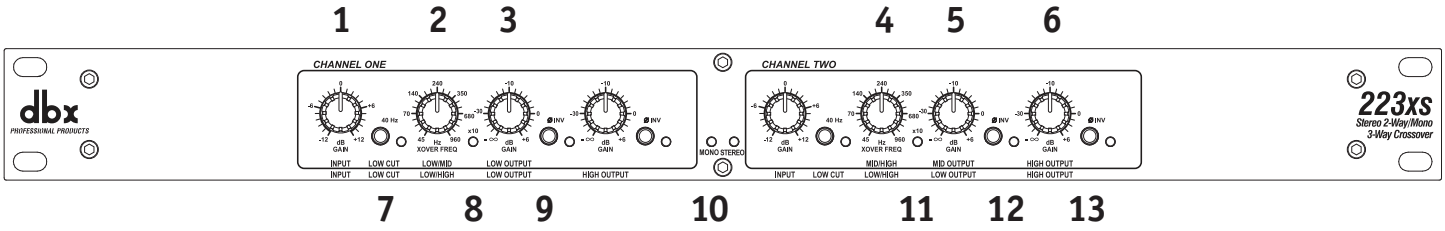
Note:
There are no front panel differences between the 223s and the 223xs. Therefore the 223xs is shown below, representing both the 223s and the 223xs.



STEREO 2-WAY MODE

In 2-way stereo mode the controls are marked in black BELOW the horizontal black line. Channel One and Channel Two functions are identical in the stereo mode. LEDs are disabled for controls which are non-functional in this mode.

[1] & [5]	**Input Gain**	Controls the INPUT level with +/- 12 dB of gain.
[2] & [6]	**Low/High**	Selects crossover point between the LOW and HIGH outputs.
[3] & [7]	**Low Output**	Controls the Low Frequency output level with a range of -∞ to +6 dB.
[4] & [8]	**High Output**	Controls the High Frequency output with a range of -∞ to +6 dB.
[9] & [14]	**Low Cut**	Switch for selecting the 40 Hz high pass filter. An LED indicates the selection.
[10] & [15]	**x10 LED**	Indicates that the LOW/HIGH crossover frequency range is 450 Hz to 9.6 kHz.
[11] & [16]	**Phase Invert**	Switch for reversing the polarity on the LOW Output. An LED indicates the selection.
[12] & [17]	**Phase Invert**	Switch for reversing the polarity on the HIGH Output. An LED indicates the selection.
[13]	**Stereo**	LED indicating stereo mode operation.



MONO 3-WAY MODE

In 3-way mono operation the controls are marked in red ABOVE the horizontal black line. Front panel controls not described in this section are not active in mono 3-way mode. LEDs are disabled for controls which are non-functional in this mode.

[1]	**Input Gain**	Controls the input level with +/- 12 dB of gain.
[2]	**Low/Mid**	Selects crossover point between LOW and MID frequencies.
[3]	**Low Output**	Controls the LOW frequency output level with a range of -∞ to +6 dB.
[4]	**Mid/High**	Selects the crossover point between MID and HIGH frequencies.
[5]	**Mid Output**	Controls the MID frequency output level with a range of -∞ to +6 dB.
[6]	**High Output**	Controls the HIGH frequency output level with a range of -∞ to +6 dB.
[7]	**Low Cut**	Switch for selecting the 40 Hz high pass filter. An LED indicates the selection.
[8]	**x10 LED**	Indicates that the LOW/MID crossover range is 450 Hz to 9.6 kHz.
[9]	**Phase Invert**	Switch for reversing the polarity on the LOW Output. An LED indicates that the phase is reversed.
[10]	**Mono**	LED indicating mono mode operation.
[11]	**x10 LED**	Indicates that the MID/HIGH crossover frequency range is 450 Hz to 9.6 kHz
[12]	**Phase Invert**	Switch for reversing the polarity on the MID Output. An LED indicates that the phase is reversed.
[13]	**Phase Invert**	Switch for reversing the polarity on the High Output. An LED indicates that the phase is reversed.

Section 3 - Rear Panel Operations

3.1 Rear Panel Operations

The mode switches on the back panel of the unit are used to select one of the three modes of operation in the 234s/234xs and one of two modes of operation in the 223s/223xs. There could be disastrous consequences if the crossover were improperly setup or the switches were mistakenly pushed during the regular operation of a sound system. Therefore great care should be taken when setting these switches. There is a mode diagram on the back panel to help you understand at a glance how this is done. The following steps should be taken in setting up your system:

- Know the loudspeaker manufacturer's requirements regarding the amplification needs of your particular speaker system. Follow the manufacturer's guidelines carefully, as dbx is not responsible for damage relating to improper setup or implementation of the 234s/234xs or the 223s/223xs.

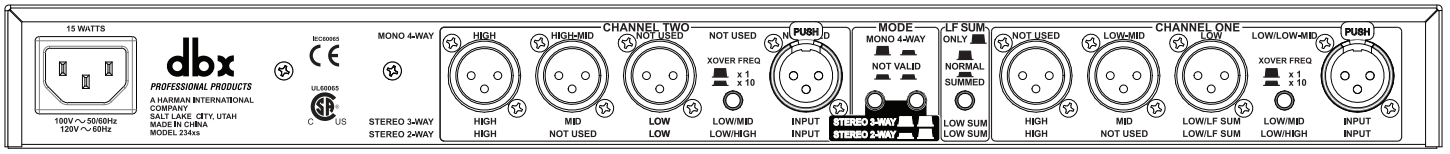
- Without any audio or power connections in place, use the back panel switches on the crossover to set it to the proper mode of operation; either stereo 2-way, stereo 3-way, or mono 4-way for the 234s/234xs, or stereo 2-way or mono 3-way for the 223s/223xs.

- Use the literature that came with your speaker system to properly set up the mode of operation and crossover frequencies to the manufacturer's specifications.

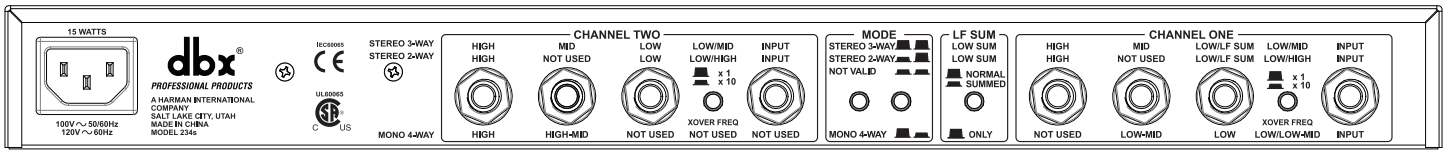
- There is one of the four possible mode button combinations for the 234s/234xs which is marked "not valid". Be sure you have not selected this combination as the 234s/234xs will not operate correctly in this mode.

3.2 dbx 234xs/234s Rear Panels

dbx 234xs Rear Panel



dbx 234s Rear Panel



When you are certain that the proper selections have been made, complete the steps described below and in the "234s/234xs or 223s/223xs Audio Connections" section on page 9.

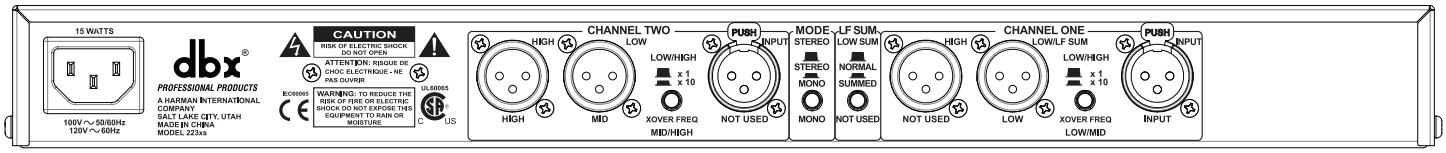
On the back panel of the 234s/234xs, there are markings to help you connect the source devices and amplifiers to your crossover.

To operate the 234s in stereo 3-way application, follow the top row of markings horizontally along the length of the 234s. For stereo 2-way operation of the 234s, use the second row of markings above the connectors. For mono 4-way operation of the 234s, use the markings directly below the connectors. The connectors not used in the selected mode are marked “Not Used”. This designation applies only to that mode of operation.

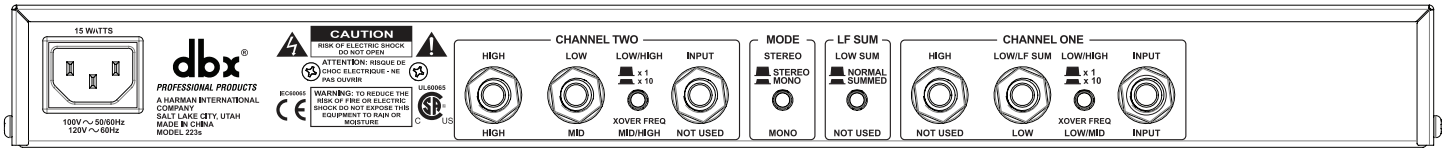
To operate the 234xs in stereo 3-way application, use the first row of markings below the connectors. For stereo 2-way operation of the 234xs, use the second row of markings below the connectors. For mono 4-way operation of the 234s, use the markings directly above the connectors. The connectors not used in the selected mode are marked “Not Used”. This designation applies only to that mode of operation.

3.3 dbx 223xs/223s Rear Panels

dbx 223xs Rear Panel



dbx 223s Rear Panel



The 223s/223xs is marked in a similar way: for stereo 2-way operation use the markings above the connectors. To operate the 223s/223xs in mono 3-way mode use the markings below the connectors. The connectors which are not used in the selected mode are marked “not used”. This designation applies only to **that mode** of operation.

3.4 dbx 234s/234xs or 223s/223xs Audio Connections

- Before connecting anything to the crossover, make sure it is not connected to any power source.

- Be sure that the source device (equalizer, compressor, mixing console, etc.) for the 234s/234xs or 223s/223xs is turned off. Connect the output(s) of the source device to the inputs of the crossover, following the rear panel markings carefully.

- Make sure that the amplifiers which will be used to drive your speaker system are turned off. Using the back panel markings as a guide, use high quality cables to connect the amplifiers to the appropriate outputs of the 234s/234xs or 223s/223xs.

Section 4 - Electrical Connections

Ensure that your 234s/234xs or 223s/223xs crossover conforms to the AC power specifications in your area, by checking the marked voltage spec on the rear of the unit. Never plug the incorrect voltage into your crossover, as this may cause severe damage not covered under the dbx warranty. Connect the power cord to the crossover first, then to a power source that is properly grounded. Never lift the ground as a shock hazard may result.

After you have safely plugged in the crossover, turn on the source device(s). Turn the amplifiers' outputs all the way down (-∞) and turn on the amplifiers. All of the elements of your sound system should now be on, and the amplifiers should be turned all the way down. Turn the source device to its nominal operating level, sending a nominal (average) level to the 234s/234xs or 223s/223xs. Slowly turn up the amplifiers' outputs until you can hear signal at a comfortable volume. Make adjustments as you desire.

Section 5 - Features

x10 OPERATION

If you are using your system in stereo 2-way or 3-way mode, the needed crossover frequency may be higher than 960 Hz, making it necessary to set the x10 switch to the active position. This changes the range of operation of the frequency selector from 45-960 Hz to 450 Hz to 9.6 kHz. All other frequency selectors remain the same. When using the x10 switch, ALWAYS ensure that the amplifiers feeding all speaker systems are turned off or that the input gain controls on the power amplifiers are turned down before changing the setting of the x10 switch. Not doing so may send a spurious signal to the outputs of the crossover when the x10 switch is engaged, and may damage speaker systems which are powered at the time of the spurious signal.

POLARITY SWITCH

Every output is equipped with a polarity (Ø) reverse switch on the front panel. When speakers are not "in phase", the frequency response of the system is compromised, particularly in the low frequencies. Out of phase signals can also cause "comb-filtering" in the high frequencies. The polarity switch is extremely useful for fine tuning your sound system for peak performance. An LED is activated when the output polarity is reversed.

LOW FREQUENCY SUMMING

The other feature accessed on the back panel is "low frequency summing". This is useful with systems that utilize mono subwoofers. Activating the LF sum switch "sums" the low frequencies of both the left and right inputs. The sum is sent to channel one's low output marked "LF SUM", while channel two's low output is not used, and channel two's phase invert led is disabled, indicating it is not operational in "LF Sum" mode. The summed low frequencies represent all the low frequencies of both the left and right inputs, and since lows are generally non-directional anyway, it will not detract from the true stereo picture of the source material.

RACK MOUNTING, GROUNDING AND SAFETY

We have provided 4 rack screws and washers for easy mounting in standard audio racks. You should avoid mounting the unit near large power transformers or motors. Route the AC cord away from audio lines and plug it into a power source close by. If the power cord must cross over audio lines, you should take care to have them cross at 90 degree angles.

For the dbx 223s and dbx 234s, the input and output connectors are balanced/unbalanced 1/4" TRS type connectors. The tip of the plug is wired as hot (+), the ring is wired as cold (-), and the sleeve is wired as the ground or shield. For the dbx 223xs and dbx 234xs, the input and output connectors are XLR connectors.

The 234s/234xs or 223s/223xs crossovers have differentially balanced input and output circuits. Balanced wiring is recommended, even with unbalanced source devices, especially when running long paths. Twin-conductor, shielded cable is more reliable since it does not depend on the shield wire itself to complete the signal connection. Using twin conductor cable, a broken shield may only result in a slight increase in noise or hum due to the lack of shielding. You may also use unbalanced cables to connect to and from the crossover.

Section 6 - Troubleshooting

NO SOUND

If there appears to be no power:

- Check that either the stereo or mono LED on the front panel of the 234s/234xs or 223s/223xs is lit.
- Check that the power cord is seated properly in the back panel of the crossover and that it is plugged into an active AC power source.

If there appears to be power, but no audible signal:

- Confirm that active audio lines are connected to the crossover's inputs and outputs.
- Check that both the input and output gain controls are advanced sufficiently.
- Check to make sure that you have turned up the amplifiers' outputs.

ABNORMAL AUDIO OUTPUT

- Ensure that the proper mode for your setup has been selected via the rear panel mode switches.
- Check the LF Sum switch.
- Check the x10 switch. This changes the range of the crossover frequency from 45 - 960 Hz to 450 Hz - 9.6 kHz.

HUM AND/OR BUZZ

If you suspect that the hum is caused by a ground loop:

- Systematically remove and/or connect the audio grounds of the devices in the signal path.
- Remember, for safety you must maintain connection to chassis ground. Never lift a safety ground.

If you suspect the hum is not caused by a ground loop.

- Check the audio at an earlier stage in the audio chain.
- Low level equipment should be mounted away from power amplifiers to avoid induction of this type of hum.
- Be certain that all audio wiring except for loudspeaker lines is well shielded, and that low level wiring is not run parallel to and/or in close proximity to AC power wiring.

INTERMITTENT AUDIO

- Check the other equipment and the wiring to make certain that the signal is not intermittent earlier in the chain.
- Check the integrity of all cables using a cable tester.

Section 7 - Technical Specifications

INPUT

Connectors:	1/4" TRS (223s/234s) or XLR (223xs/234xs)
Type:	Electronically balanced/unbalanced, RF filtered
Impedance:	Balanced > 50 kΩ, unbalanced > 25 kΩ
Max Input Level:	+22 dBu typical, balanced or unbalanced
CMRR:	>40 dB, typically > 55 dB at 1 kHz

OUTPUT (223s/234s):

Connectors:	1/4" TRS
Type:	Impedance-balanced/unbalanced, RF filtered
Impedance:	Balanced 200Ω, unbalanced 100Ω
Max Output Level:	>+21 dBu balanced/unbalanced into 2 kΩ or greater

OUTPUT (223xs/234xs):

Connectors:	XLR
Type:	Electronically balanced/unbalanced, RF filtered
Impedance:	Balanced 60Ω, unbalanced 30Ω
Max Output Level:	>+20 dBu balanced/unbalanced into 600Ω or greater

PERFORMANCE:

Bandwidth:		20 Hz to 20 kHz, +0/-0.5 dB	
Frequency Response:		< 3 Hz to > 90 kHz, +0/-3 dB	
Signal-to-Noise:		Ref: +4 dBu, 22 kHz measurement bandwidth	
		Stereo Mode:	Mono Mode:
234s/234xs:	Low Output:	> 94 dB	> 94 dB
	Low-Mid Output:		> 94 dB
	Mid Output:	> 93 dB	
	High-Mid Output:		> 92 dB
	High Output:	> 90 dB	> 88 dB
223s/223xs:	Low Output:	> 94 dB	> 94 dB
	Mid Output:		> 93 dB
	High Output:	> 91 dB	> 91 dB
Dynamic Range:		> 106 dB, unweighted, any output	
THD+Noise:		< 0.004% at +4 dBu, 1 kHz	
		< 0.04% at +20 dBu, 1 kHz	
Interchannel Crosstalk:		< -80 dB, 20 Hz to 20 kHz	

Section 7 - Technical Specifications

CROSSOVER FREQUENCIES:	
234s/234xs: Stereo Mode:	
Low/High:	45 Hz to 960 Hz or 450 Hz to 9.6 kHz (x10 setting)
Low/Mid:	45 Hz to 960 Hz or 450 Hz to 9.6 kHz (x10 setting)
Mid/High:	450 Hz to 9.6 kHz
234s/234xs: Mono Mode:	
Low/Low-Mid:	45 Hz to 960 Hz or 450 Hz to 9.6 kHz (x10 setting)
Low-Mid/High-Mid:	450 Hz to 9.6 kHz
High-Mid/High:	450 Hz to 9.6 kHz
223s/223xs: Stereo Mode:	
Low/High:	45 Hz to 960 Hz or 450 Hz to 9.6 kHz (x10 setting)
223s/223xs: Mono Mode:	
Low/Mid:	45 Hz to 960 Hz or 450 Hz to 9.6 kHz (x10 setting)
Mid/High:	45 Hz to 960 Hz or 450 Hz to 9.6 kHz (x10 setting)
Filter Type:	Linkwitz-Riley, 24 dB/octave, state-variable
FUNCTION SWITCHES:	
Front Panel:	
Low Cut:	Activates 40 Hz Butterworth, 12 dB/octave high-pass filter, one switch per channel.
Phase Invert:	Inverts the phase at the output, one switch per output.
Rear Panel:	
x10:	Multiplies crossover frequency range by 10, one switch per channel.
Mode:	Selects stereo/mono and 2/3/4-way operation.
LF Sum:	Selects normal (stereo) or mono-summed low frequency operation.
INDICATORS:	
Stereo Operation:	Green LED
Mono Operation:	Yellow LED
Low Cut:	Red LED per channel
x10:	Green LED per channel
Phase Invert:	Red LED per output (3 per channel)
POWER SUPPLY:	
Operating Voltage:	100 VAC 50/60 Hz, 120 VAC 60 Hz 230 VAC 50/60 Hz
Power Consumption:	15 Watts
Mains Connection:	IEC 320 receptacle
PHYSICAL:	
Dimensions:	1.75" H X 19" W X 6.9" D (4.4cm x 48.3cm x 17.5cm)
Weight:	234: 4.0 lbs. (1.8 kg) 223s: 3.7 lbs. (1.7 kg)
Shipping Weight:	234: 5.8 lbs. (2.6 kg) 223s: 5.4 lbs. (2.5 kg)
	Specifications are subject to change.



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