

**dbx**<sup>®</sup> *PROFESSIONAL PRODUCTS*

# AFS<sup>™</sup> 224

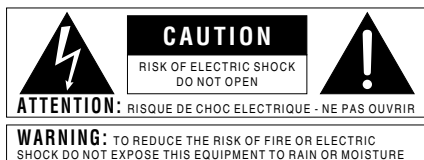
Dual Channel Advanced Feedback Suppression Processor



**H** A Harman International Company

*User Manual*

# IMPORTANT SAFETY INSTRUCTIONS



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 MUST BE EARTHED.

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.

## WARNING FOR YOUR PROTECTION READ THESE INSTRUCTIONS:

**KEEP THESE INSTRUCTIONS**

**HEED ALL WARNINGS**

**FOLLOW ALL INSTRUCTIONS**

**DO NOT USE THIS APPARATUS NEAR WATER**

**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:** For products provided with a power switch, the power switch **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.

**This Equipment is intended for rack mount use only.**

# IMPORTANT SAFETY INSTRUCTIONS

## 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 AFS 224  
Note: Product name may be suffixed by the letters-EU.

Product option: None

conforms to the following Product Specifications:

Safety: IEC 60065 (1998)

EMC: EN 55013 (1990)  
EN 55020 (1991)

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC as amended by Directive 93/68/EEC.

Vice-President of Engineering  
8760 S. Sandy Parkway  
Sandy, Utah 84070, USA  
Date: June 9, 2003

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

### Table of Contents

Defining the AFS 224 .....	i
Service Contact Info .....	ii
Warranty .....	ii
Installation Recommendations .....	1
Basic Connections .....	1
Rear Panel Connections .....	2
Front Panel Connections .....	2
User Setup .....	3
Applications .....	7
Block Diagram .....	10
Specifications .....	11

# AFS 224

## AFS 224 Operation



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PROFESSIONAL PRODUCTS

## INTRODUCTION

Congratulations on your purchase of the dbx Professional Products AFS 224. The AFS 224 Advanced Feedback Suppression processor was designed to provide state-of-the-art feedback elimination processing, while maintaining a simple and intuitive control interface. From the powerful DSP module to the no-nonsense user interface, the AFS 224 provides all the processing and control necessary for both installation and live use. The AFS 224 is an absolute must for any live sound application.

Ten and twelve filter feedback elimination processors have become the de facto standard, but the engineering staff at dbx have never been content residing in the neighborhood of the status quo. So, to raise the bar once again, they went out and developed a dedicated feedback suppression processor that offers up to 24 filters per channel with widths as narrow as 1/80 of an octave. To achieve these staggering numbers dbx utilized their patent-pending AFS technology that had previously only been available in the upper echelon line of products and made it available in this stand-alone processor. In addition to the plethora of feedback suppression filters available, the AFS 224 also offers selectable modes, live filter lift, and types of filtration, which are all readily available via the intuitive user interface front panel. This manual will be your guide to understanding the full functionality of the powerful AFS 224 series.

**Defining the AFS 224**

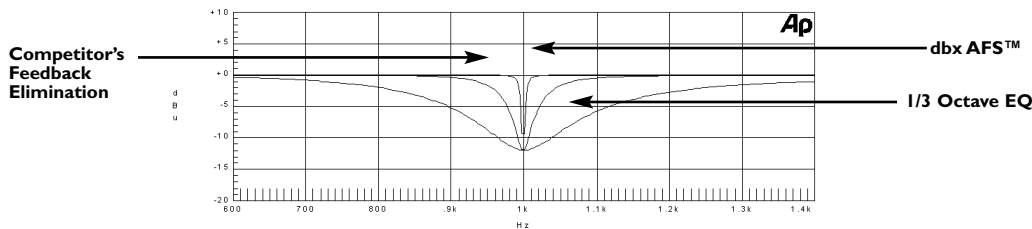
The dbx AFS 224 provide the user with the following features:

- **dbx's patent-pending Advanced Feedback Suppression (AFS™) technology**
- **24 Programmable Filters per Channel**
- **Stereo or Dual Independent Channel Processing**
- **Live and Fixed Filter Modes**
- **Selectable Filter Lift Times**
- **Application-specific filter types include: Speech; Music Low, Med and High**
- **Input Channel Metering**
- **24 Segment Filter Metering per Channel**
- **XLR and TRS Electronically Balanced Input and Outputs**

**The AFS 224 Advantage**

Key features that make the AFS 224 are its Fixed and Live modes of operation, as well as the units Filter Lift capabilities. The Live Mode of operation continuously updates filter placement which provides flexibility during a performance. The Filter Lift feature automatically removes filter assignments that are no longer necessary, which in turn, maximizes sonic integrity.

The AFS 224 allows the user to optimize the elimination of feedback. In the past, graphic equalizers were used to eliminate feedback from a system. This was an acceptable method for eliminating feedback, but when this method was precision tested, the result clearly showed that a single 1/3 octave EQ slider was removing approximately half of the signal power. With the AFS, the unit removes the feedback automatically and the proprietary, precision AFS filters remove only a fraction of the frequency spectrum. The diagram on the following page shows AFS as opposed to competitive feedback eliminators and conventional graphic EQs:



For more information regarding dbx Advanced Feedback Suppression (AFS™) technology, please refer to the white paper section online at: [www.dbxpro.com](http://www.dbxpro.com).

### 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 rear or side of the unit. 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** 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.

### 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 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.

## Installation Recommendations

**FOR RACK MOUNT USE ONLY** - Install the AFS 224 in your rack with the provided rack screws. When installed in a rack, the unit should be positioned with enough room (at least one 1U above the and 1U below the unit) to allow proper ventilation. The AFS 224 should not be mounted above or below anything that generates excessive heat. Ambient temperatures should not exceed 113°F (45°C) when equipment is in use. Although the unit is shielded against radio frequency and electromagnetic interference, extremely high fields of RF and EMI should be avoided where possible.

## Basic Connection of the AFS 224

The AFS 224 has balanced inputs and outputs that can be used with any balanced or unbalanced line-level device.

To connect the AFS 224 to your sound system refer to the following steps:

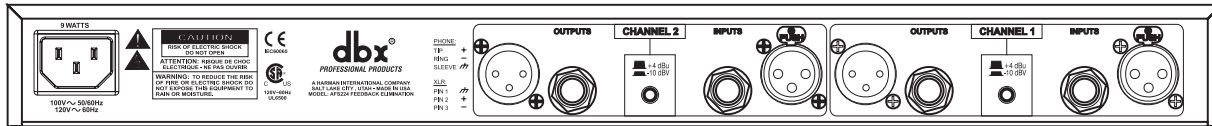
- Turn off all equipment before making connections.
- Mount AFS 224 in a standard-width rack.

Install the AFS 224 in a rack with the rack screws provided. It can be mounted above or below anything that does not generate excessive heat. Ambient temperatures should not exceed 113° F (45°C) when equipment is in use. Although the unit's chassis is shielded against radio frequency and electromagnetic interference, extremely high fields of RF and EMI should be avoided.
- Make audio connections via XLR, or 1/4" TRS jacks connectors according to application needs. Both types of connectors for the inputs and outputs can be used for balanced or unbalanced connections. The use of more than one connector at a time for the inputs could unbalance balanced lines, cause phase cancellation, short a conductor to ground, or cause damage to other equipment connected to the AFS 224. More than one output may be used simultaneously as long as the combined parallel load is greater than 600Ω.
- Apply power to the AFS 224. Connect the AC power cord to the AC power receptacle on the back of the AFS 224. Route the AC power cord to a convenient power outlet away from audio lines. The unit may be turned on and off from a master equipment power switch. Since the AFS 224 consumes a relatively small amount of power, the units may be left on continuously.



### Rear Panel

#### AFS 224 Rear



**Power Cord Receptacle:** Connects AC power to the AFS 224.

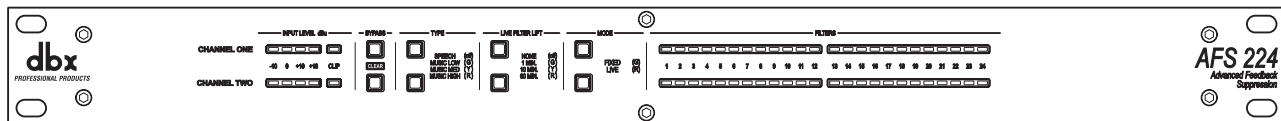
**Input Connectors:** Two types of input connectors are provided for input connections: female locking XLR type connectors, and 1/4" tip-ring-sleeve phone jack connectors. The maximum input level that the processor can accept is +20dBu (ref: 0.775Vrms).

**Operating Level Switch:** This button allows you to select between either +4dBu or -10dBV nominal operating level.

**Output Connectors:** Two types of output connectors are provided for output connections: male XLR type connectors, and 1/4" tip-ring-sleeve phone jack connectors.

### Front Panel

#### AFS 224 Front



**Input Level Bar Graph:** These four LEDs indicate input level of the AFS 224. Input level LEDs range from -10 to +18dBu.

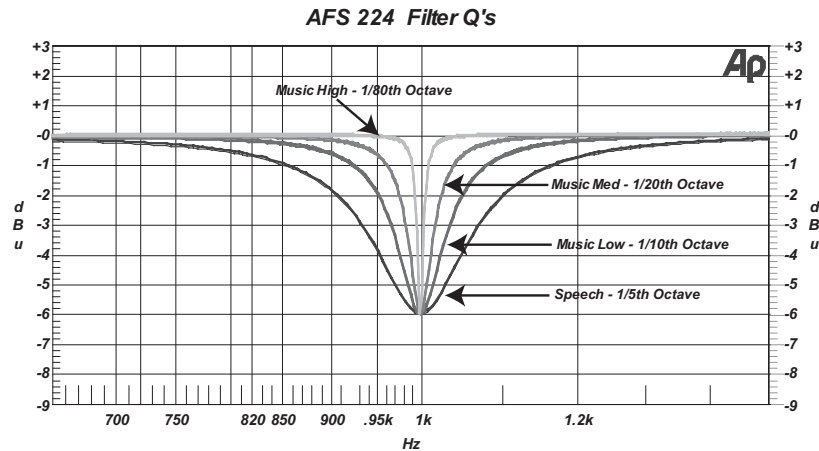
**IMPORTANT** - For maximum performance and proper operation, the average input signal should consistently light the **0** dBu LED, with the **+10** dBu LED occasionally lighting.

**Clip LED:** This LED indicates that there is signal clipping at the input.

**Bypass:** This button bypasses the notch filters in the signal path by pressing once. Pressing and holding the Bypass button is used to reset the filters. For more information regarding filter reset, please see the Clearing Filters in the User Setup Section.

**Type:** This button is used to select the AFS type and to link Channel A and Channel B. The AFS 224 offers several feedback suppression types, which are Speech, Music Low, Music Medium and Music High. Each selected Type controls the width of the notch filter used to remove the feedback. MUSIC HIGH uses very narrow notch filters minimizing the effect on the music, whereas the SPEECH type uses much wider notch filters allowing the AFS 224 to work faster. The Type, LED color and Frequency Q are listed below and a representative filter Q graph is shown on the next page.

Type	LED	Q
Music High:	Red	1/80th Octave
Music Med:	Yellow	1/20th Octave
Music Low:	Green	1/10th Octave
Speech:	Not Lit	1/5th Octave



**Live Filter Lift:** Live Filter Lift provides maximum sonic integrity by removing unnecessary feedback filters. This button is used to select the live filter lift times and are indicated as follows:

<u>LED</u>	<u>Lift Time</u>
Not Lit -	Lift Off
Green -	10 Seconds
Yellow -	10 Minutes
Red -	60 Minutes

**Mode:** This button is used to select FIXED (button is green) or LIVE (button is red). The Mode button is also used to set the number of filters. For more information please see Section B Set Up

**AFS Filter LEDs:** The AFS 224 offers 24 filter LEDs per channel, which are used to indicate the number of fixed and set filters within each channel.

## User Setup

This section of the manual is provided to give the user step-by-step instructions for setting up and optimizing the performance of the AFS 224.

### A - Setting Gain Structure

The four basic ways to hookup the AFS 224 to your system are as follows:

- 1) Connected to the insert jack(s) on a microphone channel of a mixer.
- 2) Connected to the insert jack(s) on the main outputs of a mixer.
- 3) Connected to the subgroup insert jack(s) of a mixer.
- 4) Connected inline w/outputs of a mixer (output of mixer to input of 224, output of 224 to amplifiers).

For maximum performance and proper operation, the average input signal should consistently light the **0** dBu LED, with the **+10** dBu LED occasionally lighting. Hookup methods 1, 2 & 3 above are the preferred way to connect the AFS 224 since the insert points on most mixers are pre output fader. This allows the proper signal level to be fed to the AFS 224 without the channel or output fader affecting the level as the fader is moved up or down. Be sure to check the mixer's manual for the nominal operating point for the insert jacks, and then select the +4dBu or -10dBV switch on the back of the AFS 224 accordingly.

If no insert points are available, then method 4 would be utilized. In this situation, be sure that the AFS 224 input level allows the 0 and +10 dBu LEDS to light as indicated above. The input level to the amplifiers may have to be reduced in this situation so that they are not over-driven by the signal from the AFS 224.

## B – Setup Mode

The AFS 224 setup mode is used to set the Total Number of Filters and the Number of Fixed Filters in each channel. The number of Live filters is the difference between the Total Number of Filters and the Number of Fixed filters (Live filters = Total Filters-Fixed filters). Note: If channels are linked (See F-2 Linking Channels) the setup will assign the same number of filters to channel 1 and 2.

### B-1 Entering Setup Mode

Press and hold the channel 1 **<MODE>** button until the Filter LED's light from left to right and repeat. Release the channel 1 **<MODE>** button to enter the Setup Mode. This is indicated by the **<MODE>** button lighting yellow. You are now in the Set Total Number of Filters mode.

### B-2 Selecting the Total Number of Filters

The Set Total Number of Filters mode is indicated by the channel **<MODE>** button lighting yellow when in the Setup mode. The current setting for the Total Number of Filters is indicated by the number of Filter LED's lit for that channel. To change the Total Number of Filters use the channel **<LIVE FILTER LIFT>** button to increment and the **<TYPE>** button to decrement the number of filters. Each press of the button will increment or decrement the Total Number of Filters. Press and hold each button to slowly increment or decrement the number.

**Warning:** Changing the Total Number of Filters may remove feedback filters already set.

### B-3 Selecting the Number of Fixed Filters

Use the selected channel **<MODE>** button to toggle to the Set Number of Fixed Filters mode indicated by the selected channel's **<MODE>** button, which will light green. The current setting for the Number of Fixed Filters is indicated by the number of Filter LED's lit for that channel. To change the number of Fixed Filters, use the selected channel's **<LIVE FILTER LIFT>** button to increment and the **<TYPE>** button to decrement the number of filters. Each press of the button will increment or decrement the Total Number of Fixed Filters. Press and hold each button to slowly increment or decrement the number. Pressing the selected channel's **<MODE>** button will toggle between the Set Total Number of Filters and the Set Number of Fixed Filters mode for each channel. If the channels of the AFS 224 are linked (see F-2 Linking Channels) the above procedure will set the same number of filters for both channels.

**Warning:** Changing the Number of Fixed Filters may remove feedback filters already set.

### B-4 Exit Setup Mode

To exit the setup mode and return to operation mode press and hold the channel 1 **<MODE>** button until the Filter LED's light from left to right and repeat (same as entering Setup mode).

## C - Using Fixed mode

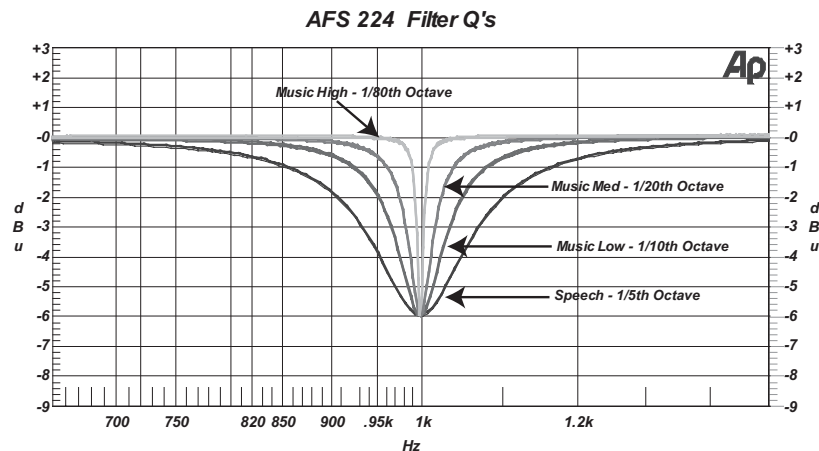
The AFS 224 offers two main modes of operation, Fixed and Live. Fixed mode is used to detect and remove feedback problems in the system due to microphone placement, room modes etc. Once set these filters are not removed until reset or cleared. Live mode detects and removes feedback during a performance or event.

### C-1 Ringing out a system

Fixed mode filters are set before a performance in a process called "ringing out a system". This is done after all other system EQ'ing has been done. First, bring down the main mix, turn off all music sources and open all the mics. Place the AFS 224 into fixed mode by pressing the **<MODE>** button for the channel. A **<MODE>** button lighting green indicates Fixed mode for that channel. Select the channel's filter type by pressing the channel's **<TYPE>** button. See Using Types in Fixed mode below. Slowly turn up the main mix, raising the gain of the system, until feedback occurs. The AFS 224 will detect and remove feedback by placing notch filters at the feedback frequency. Continue to slowly raise the gain until all feedback has been eliminated or all fixed filters have been used, this will be indicated by the flashing **<MODE>** button.

### C-2 Using Types in Fixed mode

The AFS 224 offers several feedback suppression types. These are Speech, Music Low, Music Medium and Music High. The selected type controls the width of the notch filter used to remove the feedback. Music High uses very narrow notch filters minimizing the effect on the music. The Speech type uses much wider notch filters allowing the AFS 224 to work faster. See Type in Front Panel section for descriptions and indicators.



During the filter setting process the filter type can be changed by pressing the channels **<TYPE>** button. This will change the filter type for the next filter and will not change existing filters. When all fixed filters have been used new feedback occurrences will not be removed. Pressing the **<MODE>** button will place the AFS 224 into Live mode (indicated by the **<MODE>** button lit Red) and feedback will continue to be removed. If more fixed filters are needed, reallocate more filters by following the steps in Setup Mode or clear the filters (See section E-Clearing Filters) by pressing and holding the **<BYPASS>** button until all the Filter LED's blink and repeat the procedure above with a wider filter type.

### D - Using Live Mode

Live Mode allows feedback filters to be set and removed based on changes in the environment and is designed to be used during a performance. The AFS 224 can be put into Live Mode by pressing the **<MODE>** button until it lights red. Once in Live Mode, if feedback occurs a filter will be set at the feedback frequency. If there are additional occurrences of feedback, additional notch filters will be set until all the Live Filters are used. If new frequencies begin to feedback and no more Live Filters are available, the AFS algorithm will take the first Live Filter set, and move it to the new feedback frequency. The AFS 224 will continue to "round robin" through the Live Filters as new feedback is detected.

### D-1 Using Live Filter Lift

Live Filter Lift provides maximum sonic integrity by removing unnecessary feedback filters. The Live Filter Lift function provides a timer for each of the Live Filters. This timer length can be adjusted by pressing the **<LIVE FILTER LIFT>** button, and can be switched between off, 1 minute, 10 minutes or 60 minutes. The filter lift default time is 10 minutes from the factory. If Live Filter Lift is on, once a filter's time period has expired, the AFS algorithm will check to see if the feedback filter is still necessary. If no longer needed, the notch filter will then slowly lift. If the filter is still required to eliminate feedback, the timer will be reset. If the Live Filter Lift is off, the notch filters will remain in place until they are cleared, or until needed for other frequencies.

### D-2 Using Types in Live Mode

As in Fixed Mode, the AFS 224 offers several feedback suppression types. These types control the width of the notch filter used to remove the feedback. The Speech type uses wider notch filters allowing the AFS 224 to work faster. The Music types provide sharper notch filters than the Speech type, with up to 1/80th of an octave in the Music High type (see AFS filter Q graph on the previous page). Pressing the **<TYPE>** button switches between the different types. You can select different types for both Live and Fixed Mode.

## E - Clearing Filters (Fixed and Live)

To clear the Live filters, press and hold the **<BYPASS>** button on the selected channel for approximately two seconds. The currently assigned live filter LEDs will flash. If you wish to clear only the Live filters, release **<BYPASS>** button at this time. If you wish to reset all filters, continue to hold the **<BYPASS>** button an additional two seconds until all filter LEDs are flashing. At this point, release the **<BYPASS>** button and all filters will be cleared.

## F - Other Functions

The AFS 224 also offers the security feature of front panel lockout and the ability to link channels. The following information provides instruction for both procedures.

### F- 1 Front Panel Lockout

To lockout all access to the front panel of the AFS 224, press and hold the channel 1 **<LIVE FILTER LIFT>** button until all of the filter LEDs light from outside to inside. To unlock the front panel lockout, press and hold the channel 1 **<LIVE FILTER LIFT>** button until the LEDs light from the inside to the outside.

### F-2 Linking Channels

To link both channels, press and hold the Channel 1 **<TYPE>** button until all button LED's blink will set the unit into LINKED mode. As feedback in either channel occurs, notch filters will be placed in both channels to remove feedback. To unlink channels, press and hold the channel 1 **<TYPE>** button. After the unit is unlinked, both channels will behave independently.

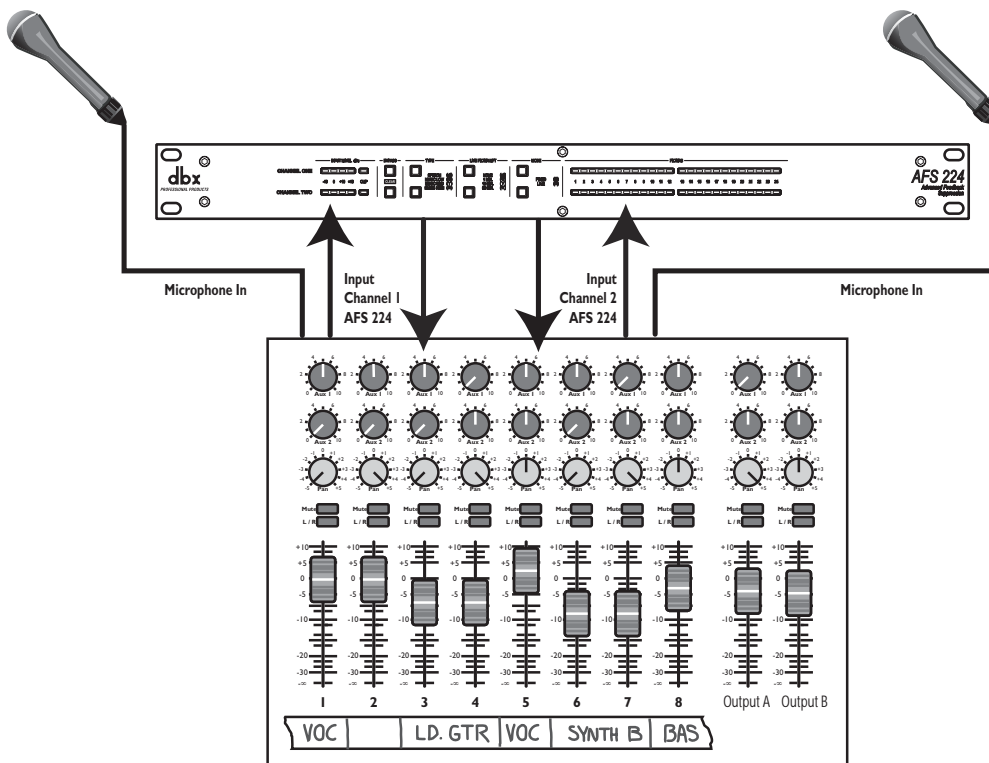
### Applications

#### Application 1 - Insert On the Microphone Channel

This application is ideal for dedicated feedback suppression on microphone channels of a mixing console. This application provides the user with individual channels of 24 filter of feedback suppression per microphone.

1. Connect the channel insert output from the mixer to the input of the AFS 224.
2. Connect the output of the AFS 224 to the insert return of the mixer.

For maximum performance and proper operation, the input signal to the dbx 224 must cause the “0” dBu LED to light fairly consistently and the “+10” dBu LED to light occasionally. Be sure to check the mixer’s manual of the nominal operating point for the insert jacks, and then select the +4dBu or -10dBV switch on the back of the 224 accordingly.

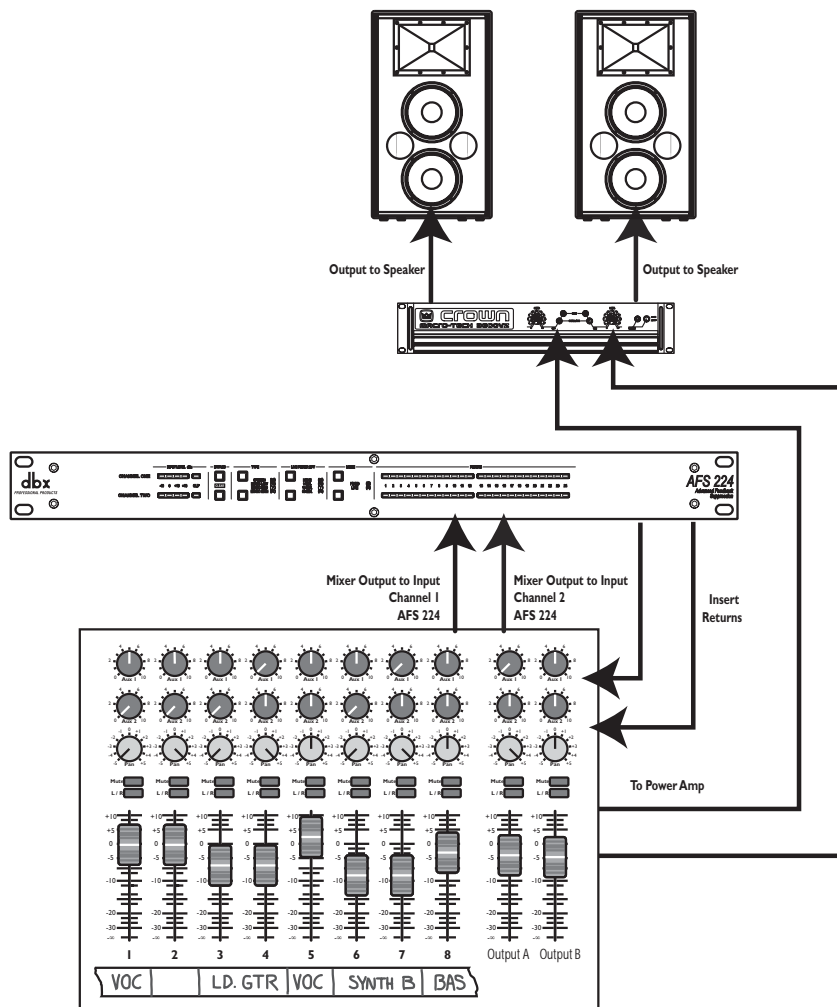


### Application 2 - Insert On the Main Stereo Outputs of a Mixing Console

This application is ideal for dedicated feedback suppression on the outputs of a mixing console. This application provides the user with dual channels of 24 filters of feedback suppression per channel.

1. Connect the stereo output inserts of the mixer to the inputs of the AFS 224.
2. Connect the outputs of the AFS 224 to the insert returns of the console.
3. Apply power to the mixer and amplifiers.

For maximum performance and proper operation, the input signal to the dbx 224 must cause the “0” dBu LED to light fairly consistently and the “+10” dBu LED to light occasionally. Hookup at the insertion point since the insert points on most mixers are pre output fader. This allows the proper signal level to be fed to the 224 without the channel or output fader affecting the level as the fader is moved up or down. Be sure to check the mixer’s manual for the nominal operating point for the insert jacks, and then select the +4dBu or -10dBV switch on the back of the 224 accordingly.

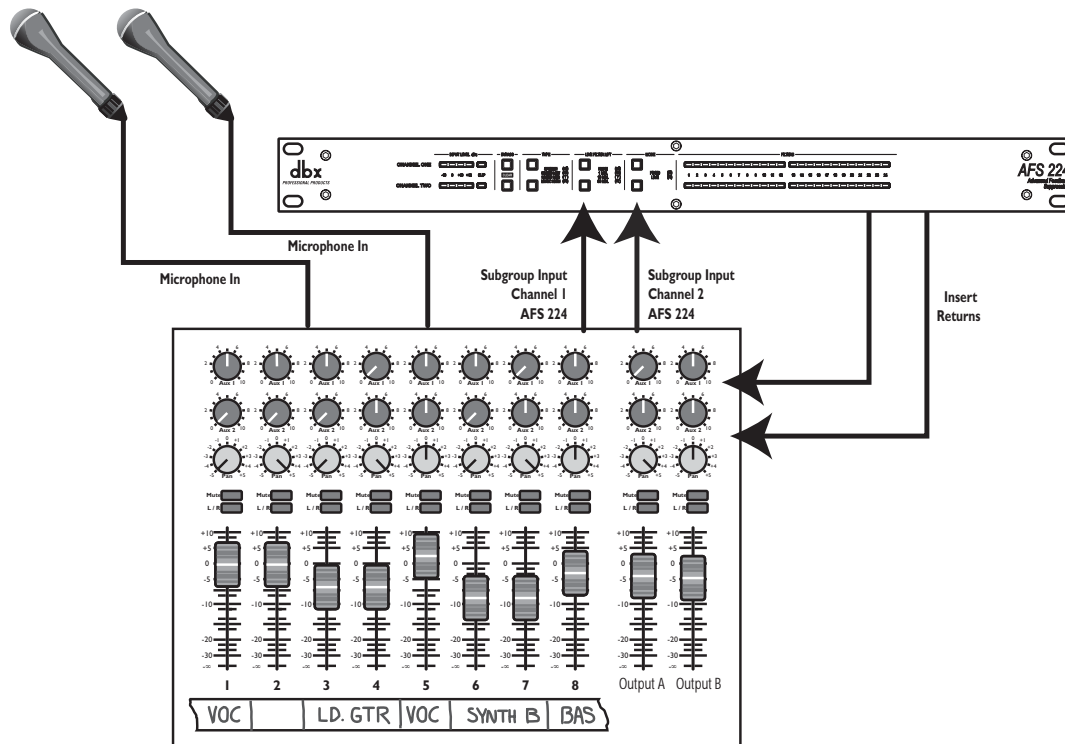


### Application 3 - Insert on the Subgroups of a Mixer

This setup is ideal for applications that require feedback suppression on certain instruments such as microphones, while keeping instrument that desire feedback (such as guitars) separated. This application provides the user with dual channels of 24 filter suppression per stereo channel of the mixing console subgroup.

1. Connect the stereo output inserts of the mixer to the inputs of the AFS 224.
2. Connect the outputs of the AFS 224 to the insert returns of the console.
3. Making sure that all outputs are muted, apply power to the mixer and amplifiers.

For maximum performance and proper operation, the input signal to the dbx 224 must cause the “0” dBu LED to light fairly consistently and the “+10” dBu LED to light occasionally. Be sure to check the mixer’s manual for the nominal operating point for the insert jacks, and then select the +4dBu or -10dBV switch on the back of the 224 accordingly.





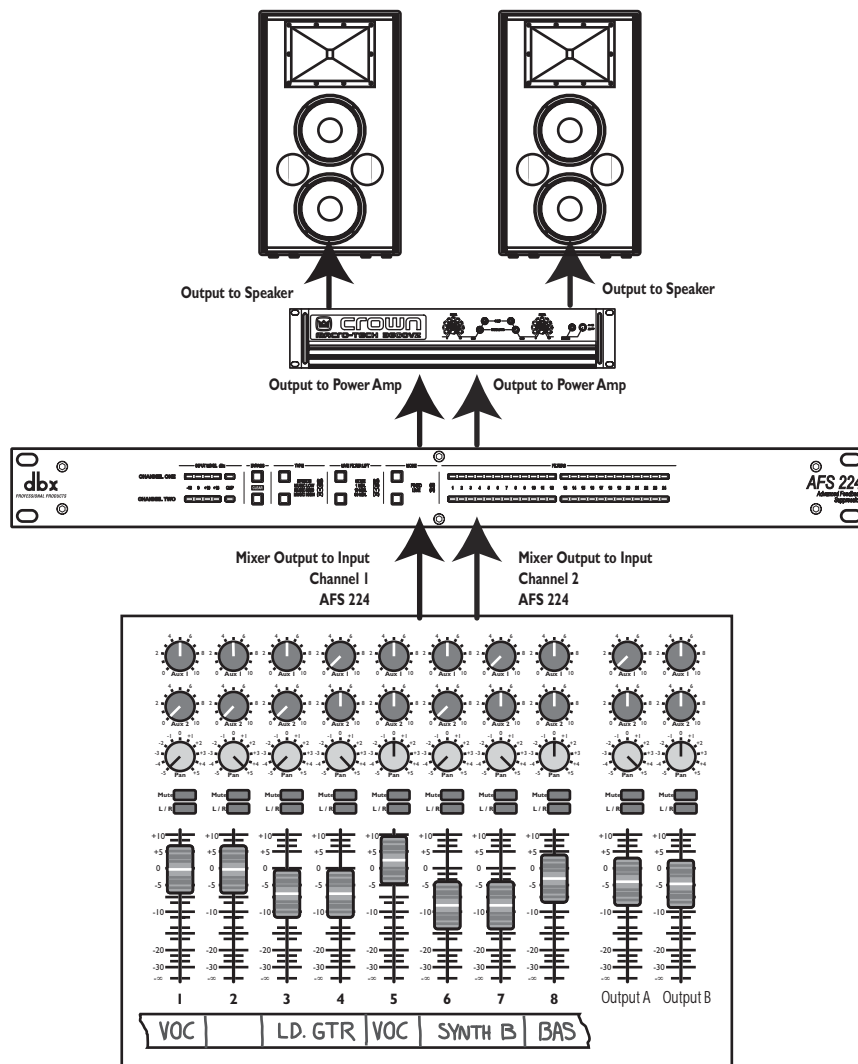
### Application 4- Connected Inline with the Outputs of a Mixer

This application is ideal for dedicated feedback suppression on the outputs of a mixing console. This application provides the user with dual channels of 24 filters of feedback suppression per output channel of the mixing console.

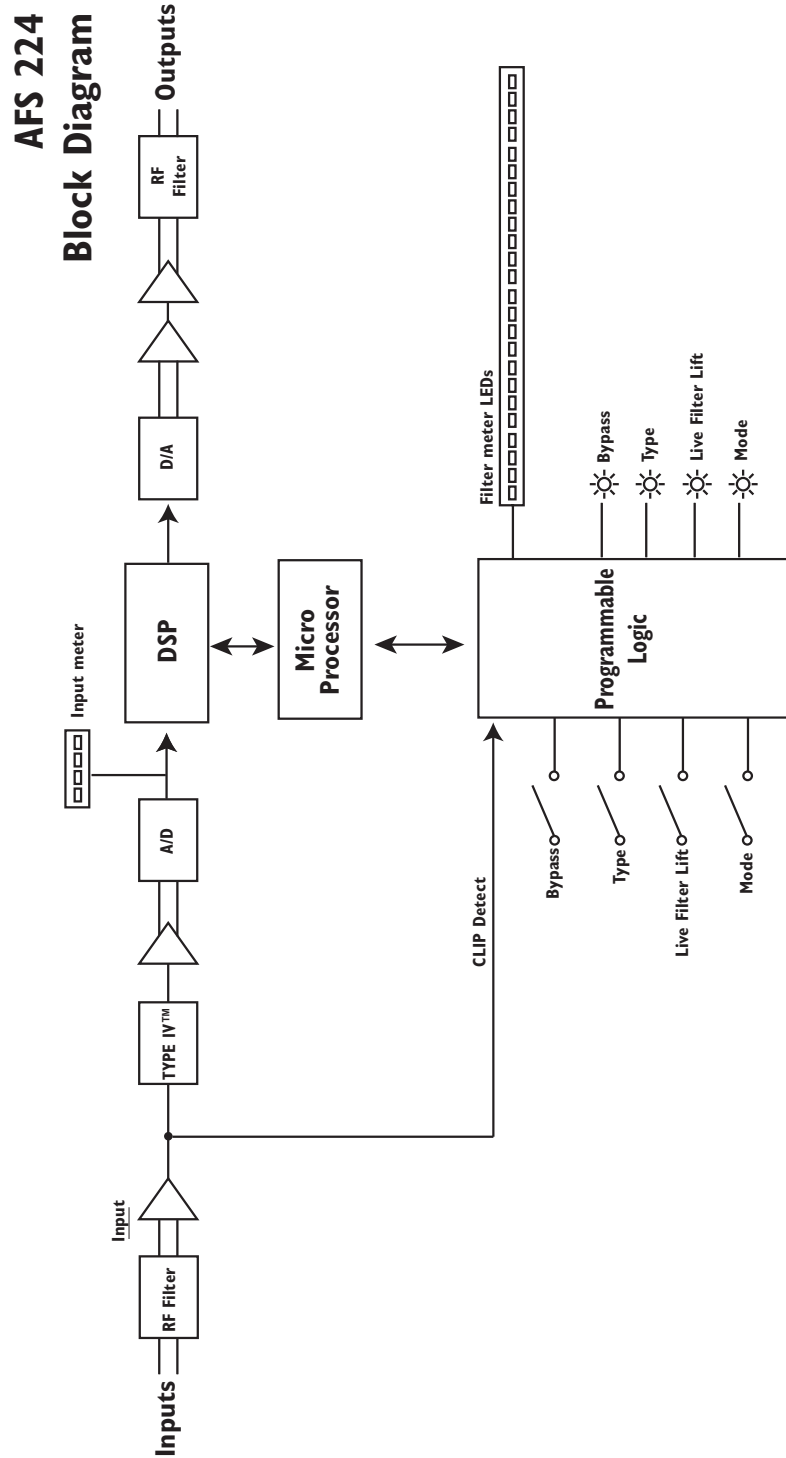
1. Connect the outputs from the mixer to the inputs of the AFS 224.
2. Connect the outputs of the AFS 224 to the power amps.
3. Apply power to the mixer and amplifiers.

For maximum performance and proper operation, the input signal to the dbx 224 must cause the “0” dBu LED to light fairly consistently and the “+10” dBu LED to light occasionally.

The input level to the amplifiers may have to be reduced in this situation so that they are not overdriven by the signal from the 224.



### Block diagram



## Specifications

**Analog Inputs:**

Number of Inputs:	2
Connectors:	Female XLR and 1/4" TRS
Type:	Electronically balanced/unbalanced, RF filtered
Impedance:	Balanced 50k $\Omega$ , Unbalanced 25k $\Omega$
Max input line level:	+20dBu
CMRR:	>40dB, typically >55dB @ 1kHz

**Analog Outputs:**

Number of Outputs:	2
Connectors:	Male XLR and 1/4" TRS
Type:	Electronically balanced/unbalanced, RF filtered
Impedance:	Balanced >120 $\Omega$ , unbalanced >60 $\Omega$
Max Output Level:	+20dBu

**A/D Performance:**

Type:	dbx Type IV™ conversion system
Dynamic Range:	>113 dB A-weighted, >110 dB unweighted, 22kHz BW
Type IV™ dynamic range:	>119 dB, A-weighted, 22kHz BW >117 dB, unweighted, 22kHz BW
A/D Conversion:	24 bit

**D/A Performance:**

Dynamic Range:	112 dB A-weighted, 109dB unweighted
D/A Conversion:	24 bit

**System Performance:**

Sample Rate:	48kHz
Dynamic Range:	>109dB A-weighted, >106 dB unweighted, 22kHz BW
THD+N:	0.003% typical at +4dBu, 1kHz
Frequency Response:	20Hz – 20kHz, +/- 0.5dB
Interchannel Crosstalk:	>80dB typical
Crosstalk input to output:	>80dB typical
Operating Voltage:	100VAC 50/60Hz, 120VAC 60Hz and 230VAC 50/60Hz
Power Consumption:	9 Watts

**Safety Agency Approvals:** UL 6500, IEC 60065, EN 55013, E 60065



## ***PROFESSIONAL PRODUCTS***

**H** A Harman International Company

**8760 South Sandy Pkwy.**

**Sandy, Utah 84070**

**Phone: (801) 568-7660**

**Fax: (801) 568-7662**

**Questions or comments**

**E•mail us at: [customer@dbxpro.com](mailto:customer@dbxpro.com)**

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