

# AFS<sup>2</sup>

ADVANCED FEEDBACK SUPPRESSION

## Owner's Manual



## Warranty

1. The warranty registration card that accompanies this product must be mailed within 30 days after purchase date to validate this warranty. You can also register online at [www.dbxpro.com](http://www.dbxpro.com). Proof-of-purchase is considered to be the responsibility of the consumer. A copy of the original purchase receipt must be provided for any warranty service.
2. dbx warrants this product, when purchased new from an authorized U.S. dbx dealer and used solely within the U.S., to be free from defects in materials and workmanship under normal use and service. This warranty is valid to the original purchaser only and is non-transferable.
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. 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.

## Technical Support & Service

If you require technical support, contact dbx Technical Support. Be prepared to accurately describe the problem. Know the serial number of your device – this is printed on a sticker attached to the chassis. If you have not already taken the time to fill out your warranty registration card and send it in, please do so now. You may also register online at [www.dbxpro.com](http://www.dbxpro.com).

Before you return a product to the factory for service, we recommend you refer to this manual. Make sure you have correctly followed installation steps and operating procedures. For further technical assistance or service, please contact our Technical Support Department at (801) 566-8800 or visit [www.dbxpro.com](http://www.dbxpro.com). If you need to return a product to the factory for service, you MUST first contact our Technical Support Department 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, 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. If the product is still under warranty, dbx will pay the return shipping.

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.

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# Overview

## **Introduction**

The AFS2 is the second generation feedback suppression processor from dbx®. Whether you're playing with your band, a live sound engineer, or an audio installer, you know how annoying and offensive feedback can be. Feedback is caused when an in-phase audio loop is created between an input transducer (such as a guitar pickup or microphone) and an output transducer (a loudspeaker). Using the updated AFS algorithm first introduced in the acclaimed dbx DriveRack PA2 speaker management system processor, the AFS2 kills feedback dead in its tracks without adversely affecting the tone of your system.

The AFS2 is a two-channel device and can be configured for stereo linked or dual mono operation. It provides 24 filters per channel with filter widths as narrow as 1/80th of an octave. Filters can be configured for Live or Fixed operation. Use the Fixed filters to initially ring out the system for higher gain before feedback then use the Live filters for on-the-fly, automatic feedback protection during the performance as conditions change. 24 Filter LEDs show at-a-glance status of all filters so you're never left guessing what the processor is doing. Need more detailed information about the filters? The easy-to-read, backlit LCD display shows the frequency, width, and attenuation amount of each set filter.

Not sure how to ring out a sound system? No problem. The new Wizard in the AFS2 walks you through the entire setup and ring-out procedure. Feedback suppression couldn't be any easier. Just press the big, red Wizard button and follow the on-screen instructions.

The updated AFS algorithm in the AFS2 can now detect and eliminate feedback faster than ever before and with even higher precision. The AFS2 offers the following enhancements over the AFS224:

- It's faster at eliminating the offending feedback frequency.
- It can better determine what is actually feedback, making it far less likely to set false triggers on feedback-like audio sources such as a flute or keyboard.
- It can better determine how much attenuation is required to notch out the feedback, resulting in notch filters which aren't as deep and are even less audible.
- It prevents the filters from being too narrow to tackle feedback at lower frequencies.
- It has better frequency resolution which provides pinpoint accuracy and uses the narrowest filters possible.
- Live filters are lifted more gradually to better determine if it is safe to lift the filter, preventing blaring feedback from suddenly returning.
- Allows you to store up to 5 user presets.

We think you'll agree that the AFS2 couldn't be any easier to use and is up for any feedback suppression task you throw at it.

Thanks for choosing dbx.

## Features

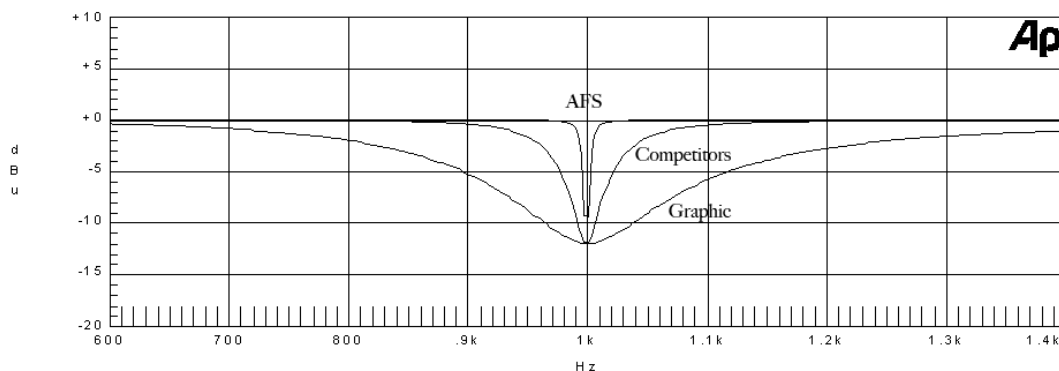
- Latest dbx Advanced Feedback Suppression (AFS™) Technology
- 24-Bit A/D, D/A Converters
- 48kHz/24-Bit Internal Processing
- 24 Programmable Filters w/Status LEDs per Channel
- Stereo Linked or Dual Mono Operation
- Live & Fixed Filter Modes
- Selectable Live Filter Lift Times
- Application-Specific Filter Types Include: Speech, Music, Music/Speech
- 5 User Storable Presets
- Input Signal Level Metering w/Input Clip Indicators
- XLR and TRS Electronically Balanced Input and Outputs
- +4 dBu / -10 dBV Operating Level Switch per Channel
- USB Port for Firmware Updates

## The AFS Advantage

Key features that set AFS apart are the Fixed and Live Modes of operation and the Live Filter Lift feature. The Live Mode of operation continuously updates filter placement which provides flexibility during a performance. The Live Filter Lift feature automatically removes filter assignments that are no longer necessary, which in turn, maximizes sonic integrity.

AFS uses precision frequency detection and state-of-the-art processing to determine the exact range of feedback frequencies to remove (instead of indiscriminately removing large sections of audio). 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 is put up against precision notch filters, such as those found in AFS, it becomes very evident that using graphic equalizers for this task severely affects the tone of the system. With AFS, the precision filters remove only a fraction of the frequency spectrum, eliminating the feedback with far less audible artifacts. The below graph shows a comparison of filter widths between the AFS filters, conventional 1/3 octave EQ filters, and notch filters used in competitor's feedback elimination processors.

**Filter Precision Comparison Chart**



# Installation

## Installation Recommendations

**FOR RACK MOUNT USE ONLY.** Install the AFS2 in a standard-width rack with the provided rack screws. The AFS2 should not be mounted above or below anything that generates excessive heat. Ambient temperatures should not exceed 95°F (35°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.

## Making Connections

The AFS2 has balanced inputs and outputs that can be connected to any balanced or unbalanced line-level device. To connect the AFS2 to your sound system:

1. Ensure the power is turned off on all interconnecting equipment and the AFS2 before making audio connections.
2. See **'Application Guide' on page 6** for application system diagrams and notes which can be used for reference when connecting the AFS2 to your system.
3. Make audio connections via the XLR or 1/4" TRS connectors according to application needs (see **'Audio Cable Diagrams' on page 28** for information on cable wiring). Either the XLR or 1/4" input and output connectors can be used for balanced or unbalanced connections. However, making simultaneous connections to both inputs of a channel could unbalance balanced lines, cause phase cancellation, short a conductor to ground, or cause damage to other equipment connected to the AFS2, therefore, it is not recommended. Connecting to both outputs of a channel simultaneously is perfectly acceptable as long as the combined parallel load is 1.2k $\Omega$  or greater. This is typically not a problem since most modern-day audio devices have been designed with high-impedance line inputs. If desired, parallel resistance calculators can be found online and used to verify if the parallel load meets this criteria. Simply enter the input impedance for the two receiving devices into the calculator to calculate the combined parallel load. Note that connecting both XLR and 1/4" outputs of a channel to an unbalanced and balanced input simultaneously will cause the balanced line to become unbalanced.

**NOTE:** The +4 dBu/-10 dBV switch on the back panel of the AFS2 must be set to the correct position for your application in order to avoid performance issues. +4 dBu is referred to as 'pro level' and will be the correct setting for most applications, as most pro and semi-pro mixers will output a nominal level of around +4 dBu. -10 dBV is referred to as 'consumer level' and will need to be used when connecting a source which has an output level approximately 12 dB lower than pro level equipment. If you're unsure of the nominal operating level of your mixer's connections, take a look at the mixer's manual or contact the mixer manufacturer.

## Applying Power

1. Ensure your power amplifiers or powered speakers are turned off.
2. Make sure that the included IEC power cable provided with your AFS2 has the proper connector for connection to your AC power outlet.
3. Connect the power cable to the AC power inlet on the AFS2's back panel.
4. Route the AC power cord to a convenient power outlet away from audio lines. Since the AFS2 does not have a power switch, an AC power strip or power conditioner can be used for switching power to the AFS2 on and off. Since the AFS2 consumes a relatively small amount of power, the unit may be left on continuously if required for the application.
5. Apply power to your mixer and rack processors then your power amplifiers or powered speakers. Note that the AFS2 will mute its outputs as it powers up and initializes. Once initialized, the outputs will automatically unmute.

**WARNING:** When powering up a fully connected PA system, it is advisable to ALWAYS turn on the mixer and rack equipment (including the AFS2) first then turn on your amplifiers or powered speakers. It's also a good idea to ensure you're not passing audio to the mixer's outputs (or ensure your mixer's master faders are all the way down) before applying power to the amplifiers. When powering down the system, you should ALWAYS power down the amplifiers first, wait about 10 seconds to allow them to discharge, then power down the mixer and rack mount equipment. In short, every time you use your system, the power amps should be the last components turned on and the first components turned off.

# Application Guide

## Application Overview

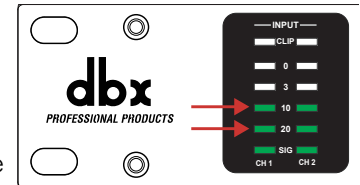
This section of the manual shows the various ways in which the AFS2 can be integrated into a system. It provides system diagrams and notes for each application type. Use these diagrams and notes for reference when initially connecting and configuring the AFS2 for your application.

The four basic ways to hookup the AFS2 to your system are as follows:

1. Connected to the mixer's channel insert jacks.
2. Connected to the mixer's subgroup (bus) insert jacks.
3. Connected to the mixer's master insert jacks.
4. Connected inline between the mixer and amp (or between the mixer and active crossover if using one).

## Gain Structure

For maximum performance and proper operation, the average input signal level to the AFS2 should consistently light the '20' LED, with the '10' LED occasionally lighting. Connection methods 1, 2, and 3 above are the preferred way to connect the AFS2 since the insert points on most mixers are pre fader. This allows proper signal level to be fed to the AFS2 without the channel, subgroup, or master fader affecting the level. Be sure to check the mixer's manual for the nominal operating level of the insert jacks and then set the +4 dBu/-10 dBV switch on the back of the AFS2 accordingly.



If no insert points are available, then method 4 would be utilized. In this situation, be sure that the AFS2 input level allows the '20' and '10' LEDs to light as indicated above. If optimal level cannot be achieved, you can try raising the SENSITIVITY parameter. See **'AFS Options Menu' on page 24** for more information on the SENSITIVITY parameter.

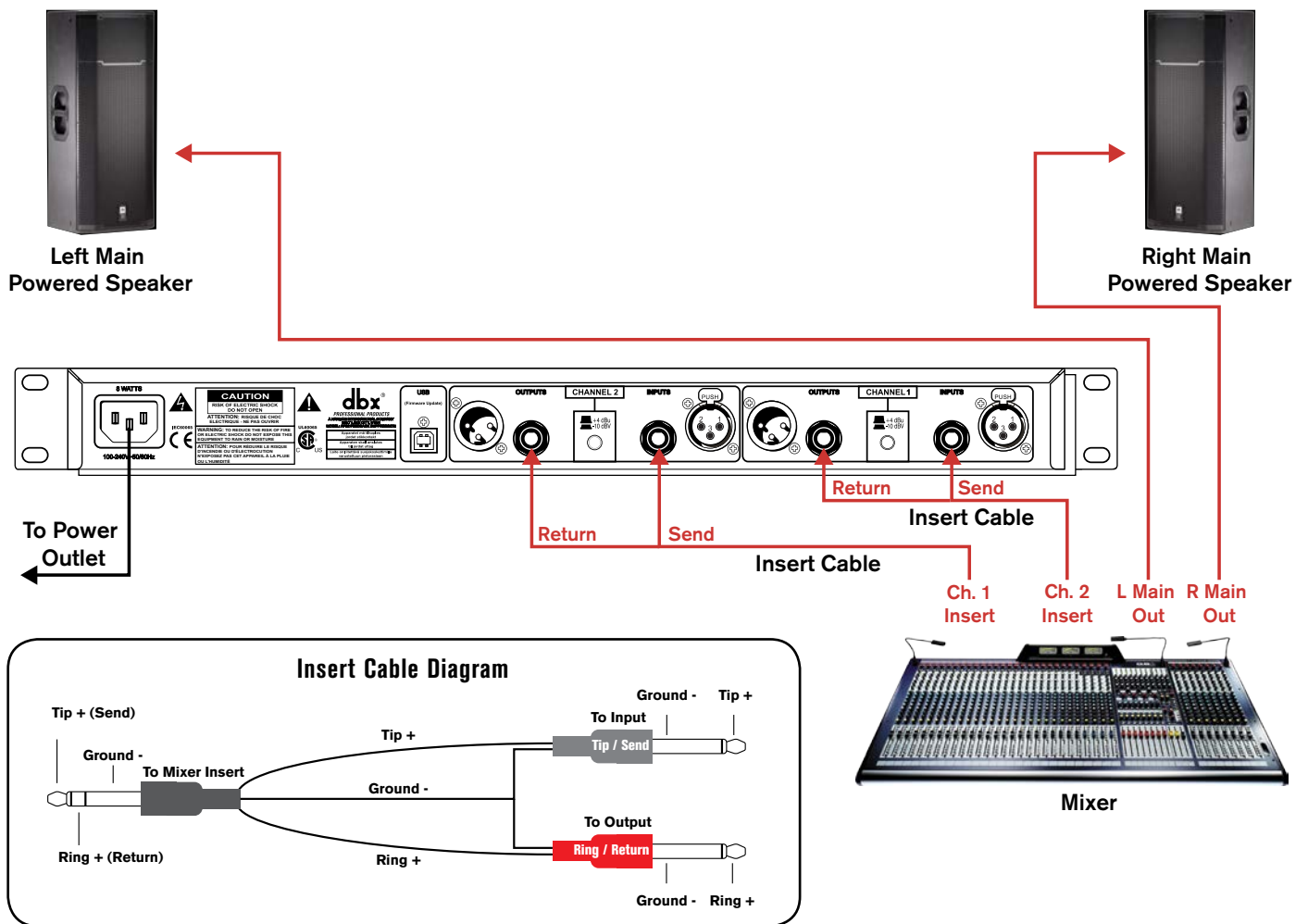


## Application 1 – Mixer Channel Inserts

Use this configuration to independently protect two single microphones from feedback while leaving all other audio channels unaffected. This application provides two independent channels of feedback suppression with up to 24 filters per microphone channel.

### Application Notes:

- Ensure all interconnecting equipment is turned off, including the amplifiers or powered speakers.
- Connect the mixer's channel inserts to the AFS2.
- Apply power to the system. Ensure that the amplifiers or powered speakers are turned on last.
- Ensure the AFS2 is configured for dual mono (unlinked) operation, see **'Linking/Unlinking Channels' on page 18** for further information.

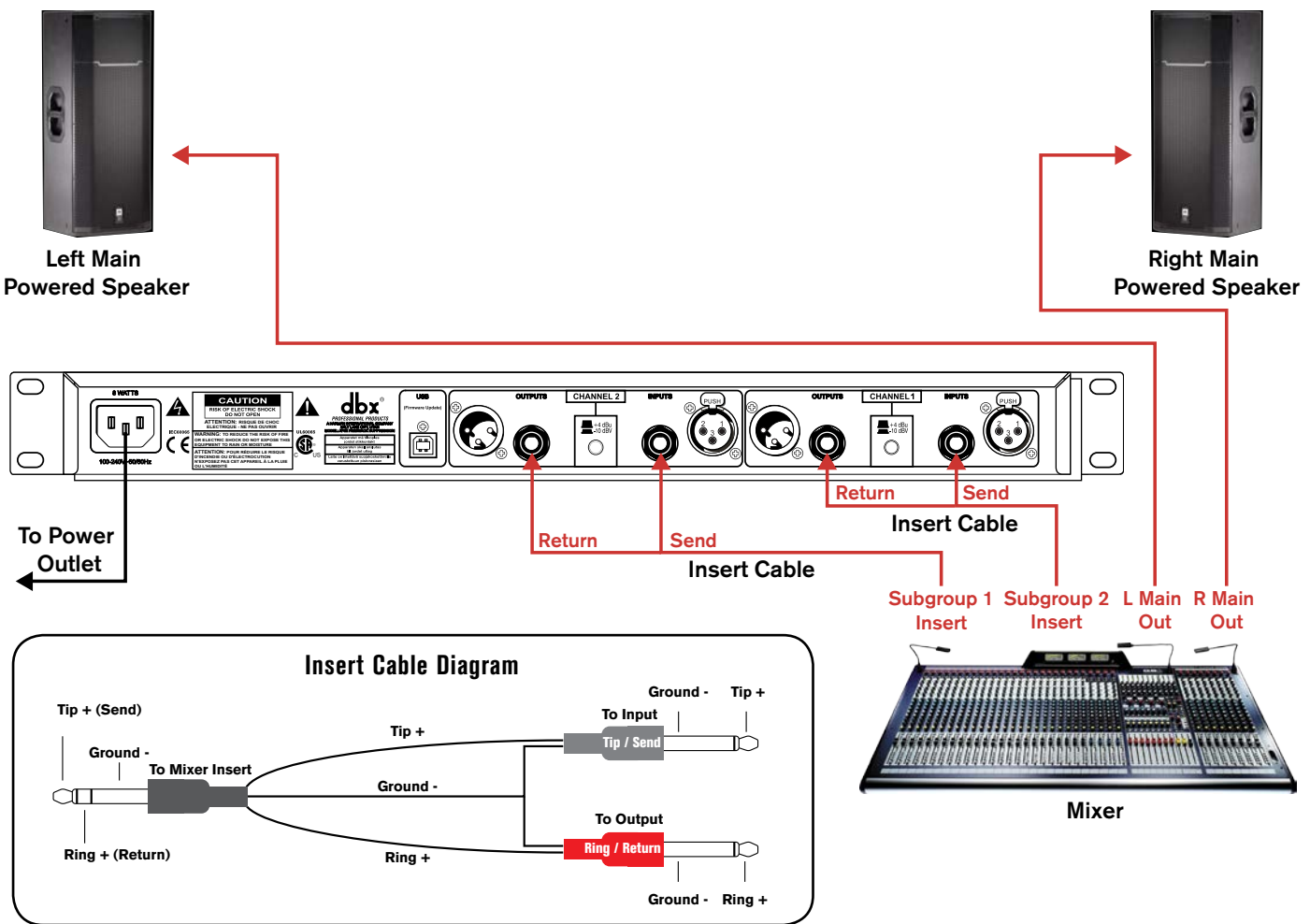


## Application 2 – Mixer Subgroup (Bus) Inserts

Use this configuration to protect two independent groups of microphones from feedback while leaving all other audio channels unaffected. For example, feedback suppression could be applied to certain instruments which require feedback suppression (e.g., drum mics, vocal mics, etc.) while keeping instruments that desire feedback (such as loud guitar cabinets in a rock band) separated. This application provides two channels of feedback suppression with up to 24 filters per microphone channel.

### Application Notes:

- Ensure all interconnecting equipment is turned off, including the amplifiers or powered speakers.
- Connect the mixer's subgroup inserts to the AFS2.
- Apply power to the system. Ensure that the amplifiers or powered speakers are turned on last.
- Ensure the AFS2 is configured for dual mono (unlinked) operation if processing two independent subgroups. If processing a stereo subgroup, the AFS2 should be configured for stereo (linked) operation. See **'Linking/Unlinking Channels'** on **page 18** for further information on this configuration option.

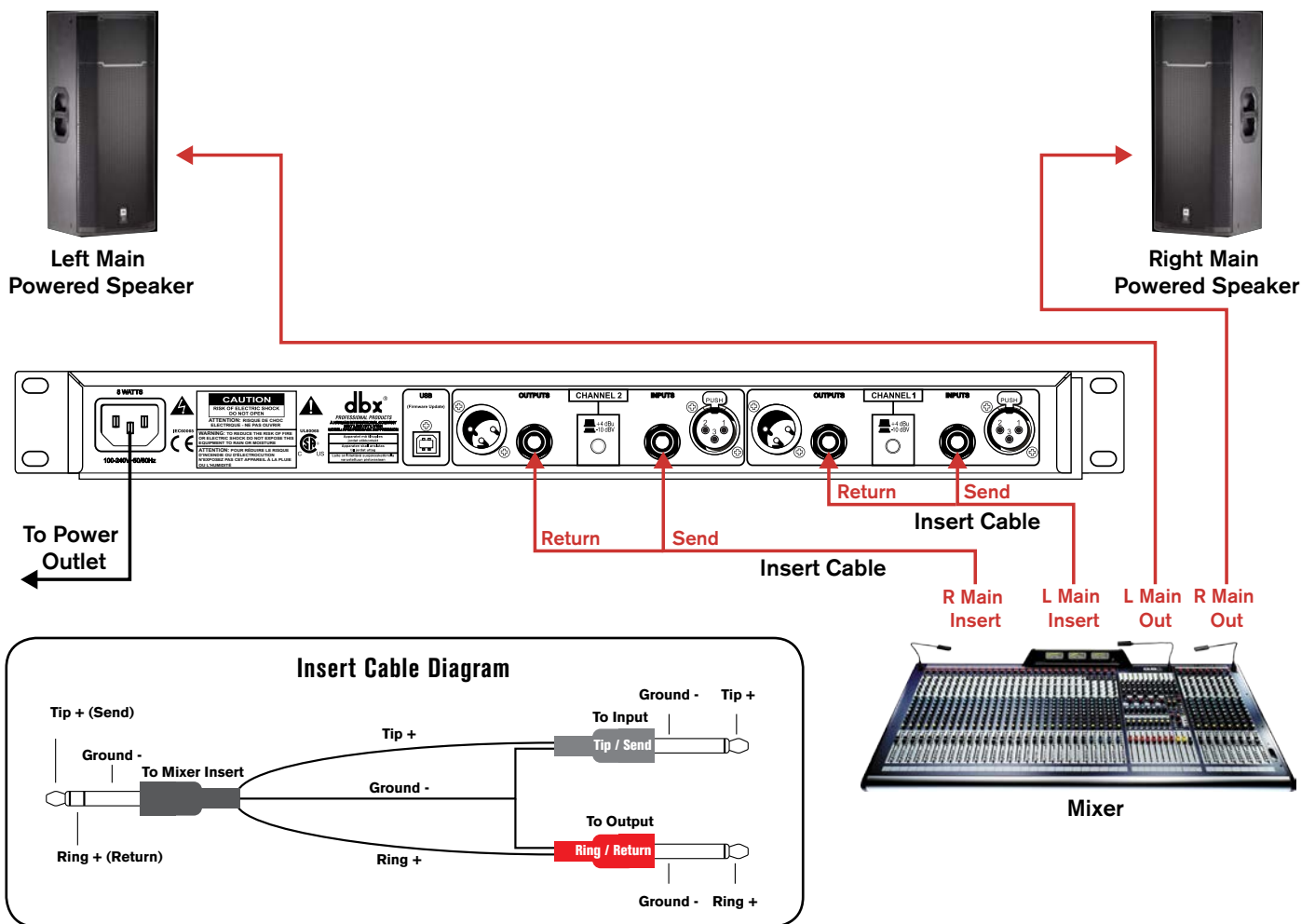


## Application 3 – Mixer Master Inserts

Use this configuration to protect the entire system from feedback. Your mixer must have master insert connections to use this configuration. This places the AFS2 before the master fader so that it can work optimally no matter where the master fader is set. If you have a system EQ, you can place it before or after the AFS2 in the chain. This application provides two channels of feedback suppression with up to 24 filters per channel.

### Application Notes:

- Ensure all interconnecting equipment is turned off, including the amplifiers or powered speakers.
- Connect the mixer's master inserts to the AFS2.
- Apply power to the system. Ensure that the amplifiers or powered speakers are turned on last.
- Ensure the AFS2 is configured for stereo (linked) operation, see **'Linking/Unlinking Channels' on page 18** for further information.

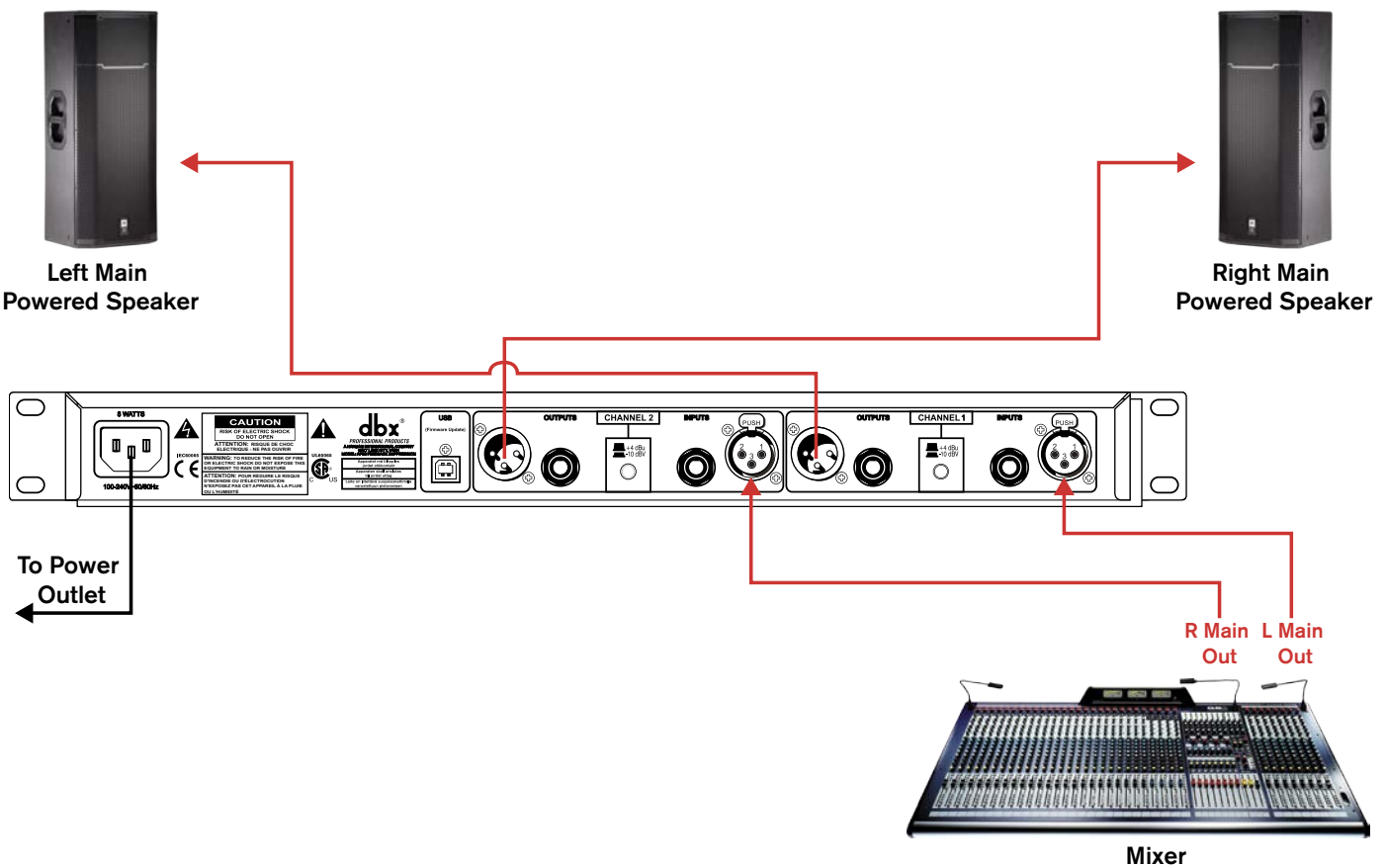


## Application 4 – In-line Between Mixer & Amp

Use this configuration to protect the entire system from feedback when your mixer doesn't have master insert connections. If your mixer does have master insert connections, it is recommended that you connect the AFS2 to these master insert jacks as described in **'Application 3 – Mixer Master Inserts' on page 9**. If you have a system EQ, you can place it before or after the AFS2 in the chain. This application provides two channels of feedback suppression with up to 24 filters per channel.

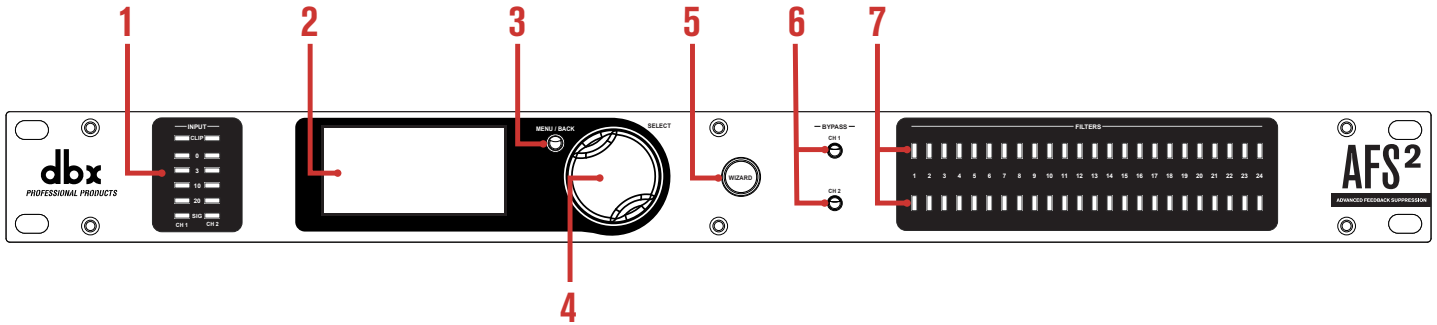
### Application Notes:

- Ensure all interconnecting equipment is turned off, including the amplifiers or powered speakers.
- Connect the main outputs of the mixer to the inputs of the AFS2.
- Connect the outputs of the AFS2 to the power amplifier's inputs or the next device in the chain if using a system EQ or active crossover.
- Apply power to the system, ensuring to turn the amplifiers or powered speakers on last.
- Ensure the AFS2 is configured for stereo (linked) operation, see **'Linking/Unlinking Channels' on page 18** for further information.



## The User Interface & Connectors

### Front Panel



#### 1. Input Level Meters w/Clip Indicator

These LED meters show the incoming signal level of each channel and indicate when the input signal is clipping. Input level LEDs range from -28 dBu (SIG) to +22 dBu (CLIP). The below table shows the correlation between the input meter LEDs and signal level depending on the +4 dBu/-10 dBV switch position on the rear panel.

Input LEDs	(switch set to +4 dBu)	(switch set to -10 dBV)
CLIP	22 dBu	8 dBV
0	19.9 dBu	5.9 dBV
3	17 dBu	3 dBV
10	10 dBu	-4 dBV
20	0 dBu	-14 dBV
SIG	-28 dBu	-42 dBV

**NOTE:** AFS works best when the signal entering the AFS2's inputs is sufficient. This requires proper gain staging between the mixer and AFS2. For maximum performance and proper operation, the average input signal level should consistently light the '20' LED, with the '10' LED lighting occasionally. If the signal level is too low, AFS may be slow to respond to feedback. See **'Gain Structure' on page 6** for further information on gain structure.

#### 2. LCD Display

This LED backlit LCD display provides the visual cues necessary for navigating and operating the AFS2.

#### 3. MENU/BACK Button

Pressing this button from the Information View Home Screen in Home Mode will enter the AFS2 menus. Pressing it from the Filter Plot Home Screen will return to the Information View Home Screen. Pressing it when in any menu will move back one level in the current menu hierarchy. Pressing it from the first screen in the menu hierarchy will return to Home Mode.

#### 4. DATA Wheel

This encoder is used for making on-screen selections and editing parameters. Pressing this DATA wheel from Home Mode will also toggle between the two available Home Screens. One screen shows detailed information about each set filter (i.e., the width, attenuation amount, and set frequency) and the other displays a graphical representation of the set AFS notch filters. See **'Navigating & Modes Of Operation' on page 14** for further information on these Home Screens.

## 5. WIZARD Button

Press this button to enter the Wizard, which will walk you through the entire AFS2 setup and ring-out procedure.

## 6. BYPASS Buttons

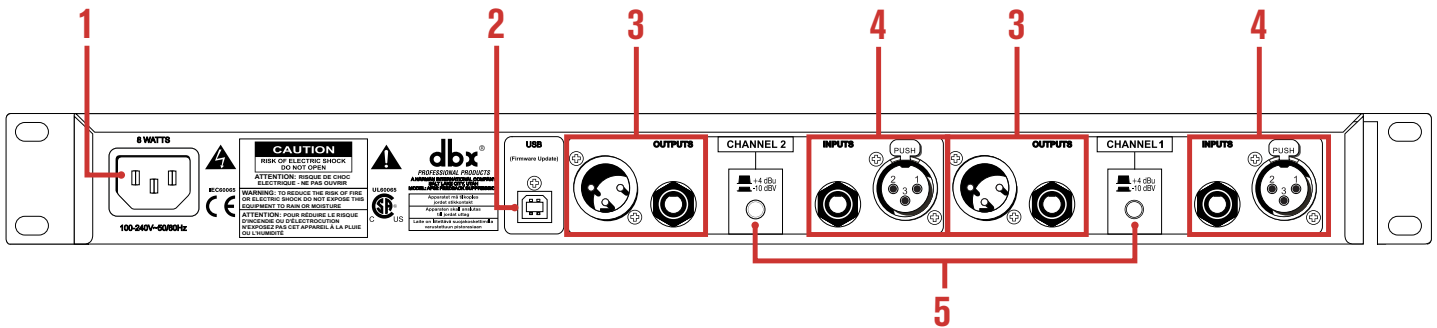
Pressing these buttons will enable and bypass the AFS filters in each channel. When each button's LED is lit, the channel is bypassed. Note that when the AFS2 is configured for stereo linked operation, these bypass buttons will also be linked. Pressing and holding a channel's **BYPASS** button will bring up a menu where you can quickly clear just the Live filters or all filters for the channel.

**WARNING!** If AFS is enabled and filters are set, be careful when bypassing the filters as all filters will be immediately removed from the signal path and sudden feedback could occur. It is recommended that you lower the mixer outputs feeding the AFS2 before bypassing any AFS filters with the BYPASS buttons.

## 7. Filter Status LEDs

These LEDs indicate how many filters have been set in each channel – each lit LED indicates a set Fixed or Live filter.

## Rear Panel



### 1. Power Connector

Connect the included IEC power cord to this connector and the other end to an available AC outlet.

### 2. USB Connector

This connector is used for updating the firmware in the AFS2 from a connected computer. As firmware updates become available, they will be found on the AFS2 product page at [dbxpro.com](http://dbxpro.com).

### 3. Output Connectors

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

### 4. Input Connectors

Two types of balanced input connectors are provided for input connections: female locking XLR type connectors and 1/4" tip-ring-sleeve phone connectors. Either of these input connector types can be used with balanced or unbalanced connections. The maximum input level that the processor can accept is +20 dBu (ref: 0.775 Vrms).

### 5. Operating Level Switches

These switches allow you to select between a nominal operating level of either +4 dBu or -10 dBV for each channel. Use these switches to match the operating level of the AFS2 to the interconnecting equipment.

**NOTE:** The +4 dBu/-10 dBV switch on the back panel of the AFS2 must be set to the correct position for your application in order to avoid performance issues. +4 dBu is referred to as 'pro level' and will be the correct setting for most applications, as most pro and semi-pro mixers will output a nominal level of around +4 dBu. -10 dBV is referred to as 'consumer level' and will need to be used when connecting a device which has an output level approximately 12 dB lower than pro level equipment. If you're unsure of the nominal operating level of your device's connections, take a look at the device's manual or contact the device manufacturer.

# Operating The AFS2

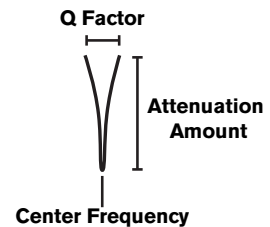
## Navigating & Modes Of Operation

There are three modes of operation in the AFS2, they are: Home Mode, Menu Mode, and Wizard Mode.

### Home Mode

This is the operating mode which the AFS2 enters after power-up and initialization. There are two Home Screens which can be viewed from Home Mode. To toggle between the two available Home Screens, just press the **DATA** wheel from Home Mode. When viewing either Home Screen, turn the **DATA** wheel to select a filter. As each filter is selected, the channel and filter assignment numbers for the selected filter will be displayed at the bottom of the screen. As each 'set' filter is selected, the filter's properties will also be displayed at the bottom of the screen. The filter properties displayed are:

- **Center Frequency** – This is the frequency of the center point of the filter.
- **Attenuation Amount** – This is the amount of attenuation applied at the filter's center frequency.
- **Q** – This is the width of the filter represented in 'Quality' factor or 'Q' factor. A Higher Q value represents a narrower filter and a lower Q value represents a wider filter.



The two available Home Screens are shown below.

**Information View Home Screen**

AFS Filters (F=Fixed, L=Live) (White Box=Set Filters)

Filter Mode: FIXED SP/HUS

Content Mode

Selected Filter: FFFFFFFFFF

CHAN-1

CHAN-2 LIVE SPEECH

Selected Channel/Filter #: CH:1-1

Filter Center Frequency: 500Hz

Filter Attenuation Amount: -12.0dB

Filter Q Factor: 7

**Filter Plot Home Screen**

Filter/Frequency Graph

AFS Filters (F=Fixed, L=Live) (White Box=Set Filters)

Selected Filter: FFFFFFFFFF

Selected Channel/Filter #: CH:1-1

Filter Center Frequency: 500Hz

Filter Attenuation Amount: -12.0dB

Filter Q Factor: 7

### Menu Mode

In Menu Mode you can edit AFS options (these parameters are used when manually ringing out a sound system with AFS), save and load presets, and edit system parameters. To enter Menu Mode, press the **MENU/BACK** button from the Information View Home Screen. If viewing the Filter Plot Home Screen, you can enter Menu Mode by pressing and holding the **MENU/BACK** button for approximately 2 seconds or pressing the **MENU/BACK** button twice. When navigating in menus, turning the **DATA** wheel will select on-screen options. In menus which have two columns, pressing the **DATA** wheel will jump between columns, allowing you to jump back and forth between selecting the parameter to edit and then editing the parameter. Turning the **DATA** wheel will adjust selected parameters. To see the menu structure and options available in these menus, see **'Menu Navigation Map'** on page 15.

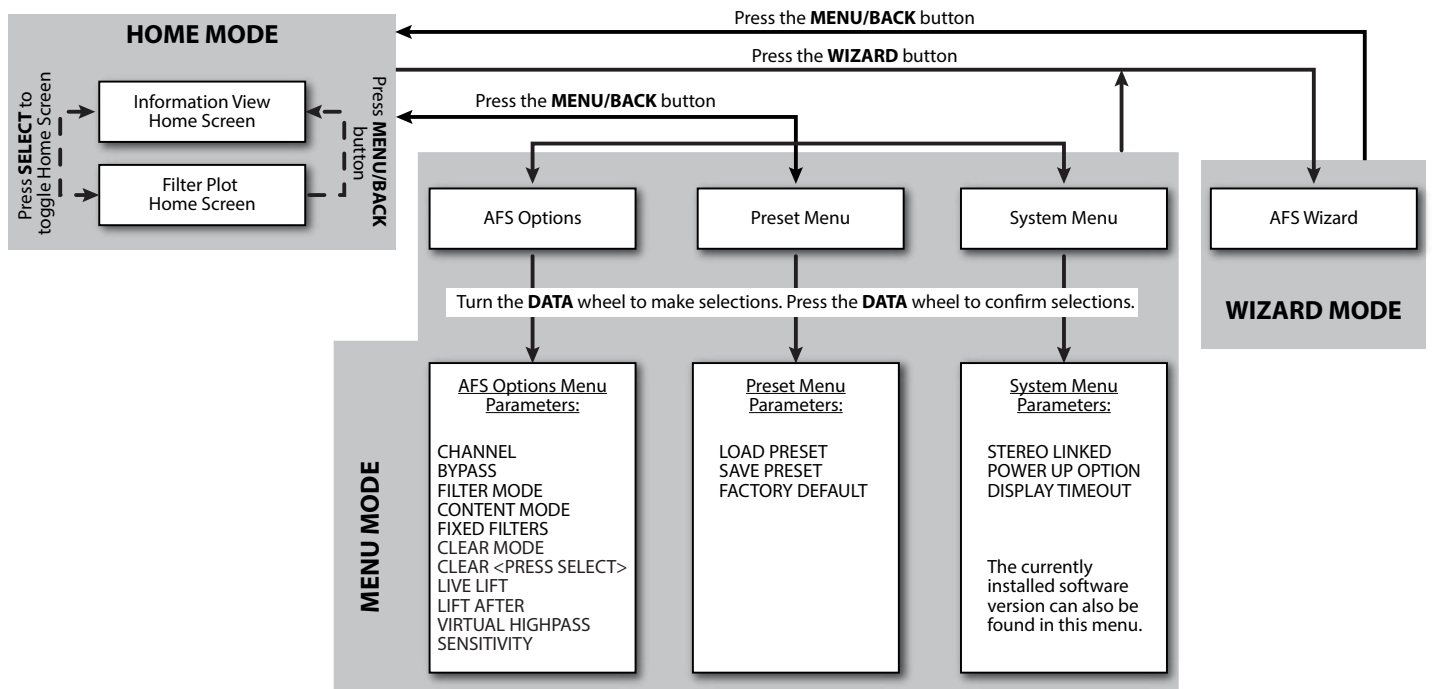


## Wizard Mode

This operating mode is entered by pressing the **WIZARD** button. The Wizard walks you through the configuration and ring-out procedure with simple, step-by-step instructions. By ringing out the system for feedback, higher system gain can be achieved before the onset of feedback. This is accomplished by pushing your system into feedback so AFS can detect the frequencies prone to feedback and then notch them out using Fixed filters. When the AFS Wizard is complete, it will automatically enable the Live filters for automated protection during system use. See **'Ringing Out The Sound System' on page 19** for further information on using the Wizard.

## Menu Navigation Map

The below navigation map shows the navigational hierarchy of the AFS2 and how to navigate the unit.



For further information on the menus and parameters in Menu Mode, see **'The Menus & Parameters' on page 24**.

## The AFS Filters

AFS offers two types of filters: Fixed and Live. Fixed filters are set during the initial AFS ring-out procedure. Live filters are then enabled for protection against new occurrences of feedback during system use. The Live filters in the enhanced AFS algorithm in the AFS2 can better distinguish between program material and feedback, dramatically lowering the probability of false Live filters being set on feedback-like music material, such as flute. When you run the AFS Wizard, AFS will automatically switch between Fixed and Live Mode operation.

### Fixed Filters

Fixed filters are active when the FILTER MODE parameter in the AFS OPTIONS menu is set to FIXED. Fixed filters cannot differentiate between what is music and what is feedback, so these filters are used to initially ring out the sound system before use and notch out frequencies which are most prone to feedback in the system/venue. This allows the system gain to be raised without introducing feedback.

**NOTE:** When in Fixed Mode, the Fixed filters will be allowed to move around and/or widen in order to center themselves better on offending feedback regions. Upon switching to Live Mode, all Fixed filters will become truly 'fixed'.

Fixed filters are just that, 'fixed'. They will remain set – even after power cycling the AFS2 – until they are cleared by the user or a different preset is loaded, in which case all set Fixed filters in the loaded preset will be set.

### Live Filters

Live filters are active when the FILTER MODE parameter in the AFS OPTIONS menu is set to LIVE. Live filters are smarter than Fixed filters. They have the ability to detect feedback within complex program material. This makes them ideal for protecting the system from feedback as conditions change during the performance. Live filters also have the ability to detect when they are no longer needed and can intelligently remove themselves from the chain, effectively restoring sonic fidelity and freeing up Live filters for use. The parameters that control this behavior are the LIVE LIFT and LIFT AFTER parameters. See **'The Menus & Parameters' on page 24** for additional information on these parameters.

If a condition is met where all Live filters have been set, they will begin to round robin – meaning that if all Live filters have been set and new feedback occurs, the first Live filter set will be released then re-set at the new feedback frequency location. AFS will continue to round robin through the Live filters as long as all Live filters are set and new feedback is detected.

### Filter Widths

The AFS2 offers three filter width options, they are: SPEECH, SPEECH/MUSIC, and MUSIC. The selected option controls the width of the notch filter used to remove the feedback. These options can be found under the CONTENT MODE parameter in the AFS OPTIONS menu. See **'AFS Options Menu' on page 24** for further information on the CONTENT MODE options.

**NOTE:** All AFS filters are allowed to widen if necessary in order to tackle wider feedback regions.

## Clearing Filters

The AFS2 gives you the ability to clear all AFS filters or only the Live filters. Clearing all filters allows you to start from scratch, for example when ringing out a system in a new venue. Clearing only the Live filters allows you to refresh a system for use, for example if you're using the same system in the same venue, but act two is about to begin. There are two methods for clearing filters; the steps for performing these two methods are outlined below.

**WARNING!** Ensure the signal level feeding the AFS2 is reduced before clearing filters. Failing to do so may cause sudden feedback to occur once the filters are cleared.

### ***Method 1 - Clearing filters from the AFS Options menu:***

1. From the Home Screen, press the **BACK/MENU** button. A menu list will be displayed on-screen.
2. Select the AFS OPTIONS menu item by pressing the **DATA** wheel.
3. Turn the **DATA** wheel to select the CLEAR MODE parameter then press the **DATA** wheel.
4. Turn the **DATA** wheel to select which filters you wish to clear. Select the LIVE ONLY option to clear only the Live filters. Select the ALL option to clear all Live and Fixed filters.
5. Press the **DATA** wheel to jump back to the left column then turn the **DATA** wheel to select the CLEAR <PRESS SELECT> option.
6. Press the **DATA** wheel to initiate the clear function.

The second method provides a faster way to clear filters using the BYPASS buttons.

### ***Method 2 - Clearing filters using the BYPASS buttons:***

1. Press and hold the **CH1** or **CH2 BYPASS** button for approximately 2 seconds until the FILTER CLEAR menu appears.
2. Turn the **DATA** wheel to select the desired option then press the **DATA** wheel to perform the selected clearing function. To cancel the operation, select the CLEAR NONE option or press the **MENU/BACK** button.

**NOTE:** If you've configured the AFS2 for stereo linked operation, performing the above procedure will clear filters on both channels.

## **Linking/Unlinking Channels**

Channels can be configured for stereo (linked) or dual mono (unlinked) operation. This option can be configured when you run the Wizard or manually from the System menu.

**NOTE:** When linked, the parameters for both channels will be linked but AFS detection and filter placement will not. In other words, both channels will share the same parameter settings but feedback will be detected and notched out independently per channel. When clearing filters with the channels linked, both channels will be cleared.

### **To link/unlink channels manually:**

1. From the Home Screen, press the **BACK/MENU** button.
2. Turn the **DATA** wheel to select the SYSTEM MENU option then press the **DATA** wheel to advance.
3. With the STEREO LINK option selected, press the **DATA** wheel.
4. Turn the **DATA** wheel to select the desired option – select YES for stereo linked operation or NO for unlinked operation.
5. Press the **MENU/BACK** button repeatedly to return to the Home Screen.

## **Ringling Out The Sound System**

Fixed filters are set before a performance in a process called 'ringing out a system'. This is done after all other system EQ has been performed. Ringing out the sound system for feedback before use allows you to squeeze more gain out of the system before the onset of feedback and can help ensure you're not right at the edge of feedback during system use.

The AFS2's Wizard does a great job of taking the guesswork out of ringing out the sound system. However, you can also ring out the system manually. This allows you to select different filter width settings for the Fixed versus Live filters and precisely determine how many Fixed filters will be used to maximize the system's gain before feedback, freeing up all remaining filters for Live Mode use.

**NOTE:** AFS works best when the signal coming into the AFS2 is sufficiently optimized. See '**Gain Structure**' on **page 6** for further information on optimizing the gain structure between your mixer and the AFS2.

### **Using The Wizard**

To use the Wizard, just press the big, red Wizard button and follow the on-screen instructions. It's as simple as that! Note that pressing and holding the **MENU/BACK** button during the Wizard process will abort the procedure and return to the AFS main menu.

### **Manual Method**

#### **To manually ring out the sound system:**

1. Set both channels to bypass using the **CH 1/CH 2 BYPASS** buttons.
2. Make sure all filters are cleared before beginning, see '**Clearing Filters**' on **page 17** for further information.
3. Perform a sound check and set up a rough mix for all microphones which will be active during the performance. When done, take note of the mixer's main output fader position (mixer master sends if ringing out stage monitors or subgroup faders if ringing out subgroups) – your target gain when ringing out the system will be around 5 dB above this setting.
4. If noise gates are being used on any of the active mics – including vocal effect processors with built-in noise gates – bypass them before ringing out the system. You can re-enable them once the ring-out procedure is complete.
5. Have the musicians stop playing and fully lower the main mixer faders (mixer master sends if ringing out stage monitors or subgroup faders if ringing out subgroups).
6. Turn STEREO LINKED on or off depending upon desired operation (see previous page).
7. Set the FILTER MODE parameter to FIXED. This parameter can be found by pressing the **BACK/MENU** button from the Home Screen then selecting AFS OPTIONS from the menu.
8. Set the FIXED FILTER parameter in the AFS OPTIONS menu to 12.
9. Set the CONTENT MODE parameter to select the desired width for the Fixed filters – select the MUSIC option for the most precise and inaudible feedback suppression.
10. Adjust the VIRTUAL HIGH PASS parameter if you do not want to allow AFS to notch out lower frequencies.
11. Ensure the musicians are not playing then unbyypass the channels you wish to ring out using the **CH 1/CH 2 BYPASS** buttons.

**NOTE:** When ringing out the system in Fixed Mode, any sustained sound detected by AFS will trigger Fixed filters to be set. Therefore, make sure the microphones are active, but there is no appreciable signal present at the mics.

12. Slowly raise the main mixer faders (mixer master sends if ringing out stage monitors or subgroup faders if ringing out subgroups) until you reach your target gain (described in step 3) or run out of Fixed filters, whichever happens first.

**HINT:** When ringing out the system, it sometimes helps to start the ringing by triggering a sharp sound, such as a finger snap or clap.

**HINT:** If you run out of Fixed filters in the above step and haven't yet reached your target gain, you can go to the FIXED FILTERS parameter and increase it then repeat the above step.

13. Lower the main mixer faders (mixer master sends if ringing out stage monitors or subgroup faders if ringing out subgroups) back to performance level – this is the level at which you had the mixer's fader or send during sound check in step 3.

**HINT:** If there are any allocated Fixed filters which were not set during the ring-out procedure, you can free them up by lowering the FIXED FILTERS parameter. This will set the unused Fixed filters to Live filters so they can be utilized. Make sure not to lower the FIXED FILTERS parameter beyond the amount of unused Fixed filters as doing so will remove Fixed filters you just set. In other words, if the FIXED FILTERS parameter is set to 18 and you have 2 unused Fixed filters, you would want to lower the FIXED FILTERS parameter by 2 and no more.

14. Set the FILTER MODE parameter to LIVE.
15. Go to the CONTENT MODE parameter and select the desired width for the Live filters – select the MUSIC/SPEECH option for the best all around real-time feedback protection. Select the MUSIC option if sonic quality is of the utmost importance. Select the SPEECH option if feedback suppression speed is of the utmost importance.
16. Set the LIVE LIFT and LIFT AFTER parameters per your application. See **'The Menus & Parameters' on page 24** for further information on these parameters.
17. The system is now ready for use and any available Live filters will be available for on-the-fly feedback suppression during the performance.

**HINT:** When ringing out the system, you can change the CONTENT MODE parameter at any time. This will change the filter width for any new filters set, but will not change the width of filters already set. For example, you could use the high precision 'MUSIC' setting when ringing out the system with the Fixed filters, then switch over to the 'SPEECH/MUSIC' setting for the Live filters for slightly faster feedback suppression during the performance.

## **Presets**

### **Saving Presets**

Up to 5 user presets can be stored in the AFS2 for later recall. When saving presets, the following settings will be saved:

- All Set Fixed Filters (Gain/Q/Frequency values)
- Fixed Filters Parameter Setting (number of Fixed vs. Live filters)
- Content Mode Parameter Setting (filter width)
- Live Lift Enable Parameter Setting
- Lift Time Parameter Setting
- Stereo Link Parameter Setting
- Virtual High Pass Parameter Setting
- Sensitivity Parameter Setting

### **To save a preset:**

1. From the Home Screen, press the **BACK/MENU** button.
2. Turn the **DATA** wheel to select the PRESET MENU option then press the **DATA** wheel to advance.
3. Turn the **DATA** wheel to select the SAVE PRESET option then press the **DATA** wheel to advance.
4. Turn the **DATA** wheel to select the preset memory location at which the preset will be saved.

**NOTE:** Any settings currently saved to the selected preset will be overwritten.

5. Press the **DATA** wheel to save the settings to the selected preset location.

### **Loading Presets**

#### **To load a preset:**

1. From the Home Screen, press the **BACK/MENU** button.
2. Turn the **DATA** wheel to select the PRESET MENU option then press the **DATA** wheel to advance.
3. Select the LOAD PRESET option then press the **DATA** wheel to advance.
4. Turn the **DATA** wheel to select the preset to load.
5. Press the **DATA** wheel to load the selected preset.

## **Front Panel Lockout**

The AFS2's front panel controls can be locked to prevent unauthorized tampering. When the front panel is locked, a 4-digit PIN must be entered to unlock the unit and make any parameter changes. The PIN is a fixed number and is '1234'.

### ***To enable system lockout:***

1. From the Home Screen, press the **MENU/BACK** button.
2. Turn the **DATA** wheel to select the SYSTEM MENU option then press the **DATA** wheel to advance.
3. Turn the **DATA** wheel to select the DISPLAY TIMEOUT option then press the **DATA** wheel.
4. Turn the **DATA** wheel to select the amount of time it will take for the front panel to lock after no user activity.
5. Press the **MENU/BACK** button repeatedly to return to the Home Screen.

### ***To enter the PIN and unlock the front panel:***

1. Turn the **DATA** wheel and select the number 1.
2. Press the **DATA** wheel to enter 1 as the first number of the PIN.
3. Turn the **DATA** wheel and select the number 2.
4. Press the **DATA** wheel to enter 2 as the second number of the PIN.
5. Turn the **DATA** wheel and select the number 3.
6. Press the **DATA** wheel to enter 3 as the third number of the PIN.
7. Turn the **DATA** wheel and select the number 4.
8. Press the **DATA** wheel to enter 4 as the fourth number of the PIN.



## Factory Resets

**WARNING!** Performing these resets will clear all set filters. Ensure the system's gain is reduced before performing these procedures to ensure the system does not go into feedback once the filters are cleared.

### Factory Default Reset

This reset option can be found in the PRESET menu and is used to reset all current AFS2 settings back to their factory default state. Note that this reset will not overwrite presets.

The Factory Default Reset will reset the following parameters back to their factory default state:

- All set AFS filters.
- All parameters in the AFS OPTIONS menu.
- All parameters in the SYSTEM menu.

#### **To perform a Factory Default Reset:**

1. From the Home Screen, press the **BACK/MENU** button.
2. Turn the **DATA** wheel to select the PRESET MENU option then press the **DATA** wheel to advance.
3. Turn the **DATA** wheel to select the FACTORY DEFAULT option then press the **DATA** wheel to begin the procedure.

### Factory Hard Reset

This reset option involves a boot sequence and can be used to reset all settings (including presets) back to their factory default state.

The Factory Hard Reset will reset the following parameters back to their factory default state:

- All set AFS filters.
- All parameters in the AFS OPTIONS menu.
- All parameters in the SYSTEM menu.
- All presets.

#### **To perform a Factory Hard Reset:**

1. While powering on the AFS2, press and hold both the **CH1** and **CH2 BYPASS** buttons until the reset confirmation prompt appears on-screen.
2. Select the YES option with the **DATA** wheel then press the **DATA** wheel to confirm the selection and begin the procedure. Select the NO option or press the **MENU/BACK** button to abort the procedure.

# The Menus & Parameters

## AFS Options Menu

The AFS Options menu houses all the parameters for the two channels. Following is a description of all the parameters found in this menu.

### **CHANNEL [1, 2]**

This parameter selects the channel to edit.

### **BYPASS [ON, OFF]**

This parameter bypasses the selected channel and will override the channel's BYPASS button on the front panel.

### **FILTER MODE [FIXED, LIVE]**

This parameter determines whether the AFS algorithm will set Live or Fixed filters. See **'The AFS Filters' on page 16** for further information on Fixed and Live filters.

### **CONTENT MODE [SPEECH, MUSIC, MUSIC/SPEECH]**

This parameter sets the width of the AFS filters. The available options are:

- **SPEECH (Constant bandwidth of 11 Hz below 76 Hz, constant Q of 7 at or above 76 Hz)**

This option is optimized for speech sound reinforcement, where wider notch filters are less noticeable. Select this option when using the sound reinforcement system for speech only. With this option selected, notch filters will be wider but will provide the fastest, most solid protection against feedback.

- **MUSIC (Constant bandwidth of 8 Hz below 927 Hz, constant Q of 116 at or above 927 Hz)**

This option is optimized for live music sound reinforcement and offers the highest level of sonic quality. When this option is selected, the AFS algorithm will zero in on the offending feedback frequency while leaving the surrounding frequencies unscathed.

- **MUSIC/SPEECH (Constant bandwidth of 9 Hz below 260 Hz, constant Q of 29 at or above 260 Hz)**

This option is optimized for live music sound reinforcement or speech and provides the best all-around protection. It will provide the best combination of fast feedback suppression and precision, using filters slightly narrower and less audible than the SPEECH setting, but slightly faster than the MUSIC setting. If you're not sure which setting to use, select this option.

**NOTE:** To guarantee that feedback is suppressed using the minimum number of filters possible, AFS may automatically widen filters. For example, if you had selected the MUSIC setting and an adjacent frequency is feeding back, AFS will detect both frequencies, and if they are in close enough proximity, will set a single, wider filter rather than two narrow filters. Using a single, wider filter rather than two narrow filters will not alter the sonic quality and will ensure that the maximum number of filters will always be available for use. Automatically adjusted filter widths will never be any wider than the SPEECH setting.

**FIXED FILTERS** [0 - 24]

This parameter sets how many of the AFS filters will be allocated as Fixed filters. There are a total of 24 AFS filters available. The number of Live filters is the difference between the total number of filters and the number of Fixed filters. For example, if you select a FIXED FILTER setting of 12, you will have 12 Live filters available for use (24 - 12 = 12).

**HINT:** Since it's not really possible to predict exactly how many Fixed filters you may need, a good setting to start with is the default setting of 12. If you feel you need to squeeze more gain out of the system after the ring-out procedure, you can increase the FIXED FILTERS setting and run the AFS Wizard again or manually ring out only the newly added Fixed filters in the AFS OPTIONS menu.

**NOTE:** If the FIXED FILTERS setting is changed after filters have been set, the filters will be cleared one by one as you increase or decrease the setting. For example, if you decrease the FIXED FILTERS setting by one, the last Fixed filter set will be cleared because the Fixed filter will be changed to a Live filter. Likewise, if the FIXED FILTERS setting is increased by one (and thus the number of Live filters goes down), then the first Live filter set will be cleared. The Fixed/Live filter allocation is indicated at the bottom of the LCD display in the Home Screen or in the AFS OPTIONS menu. 'F' indicates Fixed filters and 'L' indicates Live filters. A highlighted F or L indicates a filter that is set, or in use.

**CLEAR MODE** [ALL, LIVE ONLY]

This parameter lets you select whether you would like to clear all filters (Live and Fixed) or only the Live filters.

**CLEAR <PRESS SELECT>**

Selecting this option then pressing the **DATA** wheel will clear set filters. Which filters will be cleared is determined by the option selected for the CLEAR MODE parameter. See **'Clearing Filters' on page 17** for more information on clearing filters.

**LIVE LIFT** [ON, OFF]

This parameter turns the LIVE LIFT feature on and off. When turned on, this parameter enables a timer for each Live filter. Turn LIVE LIFT on when you want AFS to lift Live filters after a predetermined time set by the LIFT AFTER parameter. Higher fidelity can be restored to the system by lifting Live filters when they are no longer needed (for example, if a singer steps to the front of the stage and triggers feedback, setting a Live filter, and then backs off).

If LIVE LIFT is off, the Live filters will remain in place until they are cleared by the user, the unit is power cycled, or a different preset is loaded.

**LIFT AFTER** [5S - 60M]

When the LIVE LIFT parameter is turned on, this parameter determines how long it will take before AFS will attempt to lift a set Live filter. The selectable options range from 5S (5 seconds) to 60M (60 minutes). Once a timer has expired, AFS will slowly release the Live filter by 3 dB increments to determine if it is safe to remove it. If it gets to 0 dB and no feedback reoccurs, the filters are completely lifted. If feedback attempts to reappear while releasing, the filter is once again set and the timer resets. This helps prevent a sudden reoccurrence of blaring feedback in the event a Live filter is still needed and should remain set.

**VIRTUAL HIGH PASS** *[OFF, 30Hz - 500Hz]*

This parameter places a high pass filter in the AFS detector path. If you don't want AFS to have the ability to set any filters below a set frequency (for example, if you don't want AFS to notch any frequencies below 100Hz), adjust this parameter to the frequency below which you want AFS to ignore.

**SENSITIVITY** *[-6.0 dB to +6.0 dB]*

This parameter adjusts the input level feeding the AFS detector and makes AFS more or less prone to mark a signal as feedback.

When AFS is set to Fixed Mode, SENSITIVITY adjusts the feedback level perceived by AFS. For example, setting SENSITIVITY to +6 will allow AFS to detect the feedback and notch it out more quickly. Conversely, setting SENSITIVITY to -6 will cause AFS to be a little more hesitant to set a filter on the feedback until it reaches a higher level.

When AFS is set to Live Mode, SENSITIVITY will work the same way as during Fixed Mode on pure feedback tones, but will also affect where AFS draws the line between feedback and music. If you find that AFS is being too hesitant to set filters on feedback during your live performance, try increasing the SENSITIVITY setting. If you find AFS mistaking an instrument for feedback, try decreasing the SENSITIVITY setting for that channel.

## **Preset Menu**

### **LOAD PRESET**

Select this option to load a previously saved user preset, see **'Loading Presets' on page 21** for further information.

### **SAVE PRESET**

Select this option to save the current settings as a preset, see **'Presets' on page 21** for further information.

### **FACTORY DEFAULT**

Select this option to set all current settings back to their factory default state. This procedure will not delete presets from memory. See **'Factory Resets' on page 23** for further information on this feature.

## **System Menu**

The System menu allows you to edit global system parameters and view the currently installed firmware version.

### **STEREO LINK [NO, YES]**

This parameter links the AFS2 for stereo linked operation when set to YES. When set to NO the two AFS2 channels will work independently in dual mono operation. See **'Linking/Unlinking Channels' on page 18** for further information on linking/unlinking channels.

### **POWER UP OPTION [Current, Preset1, Preset2, Preset3, Preset4, Preset5]**

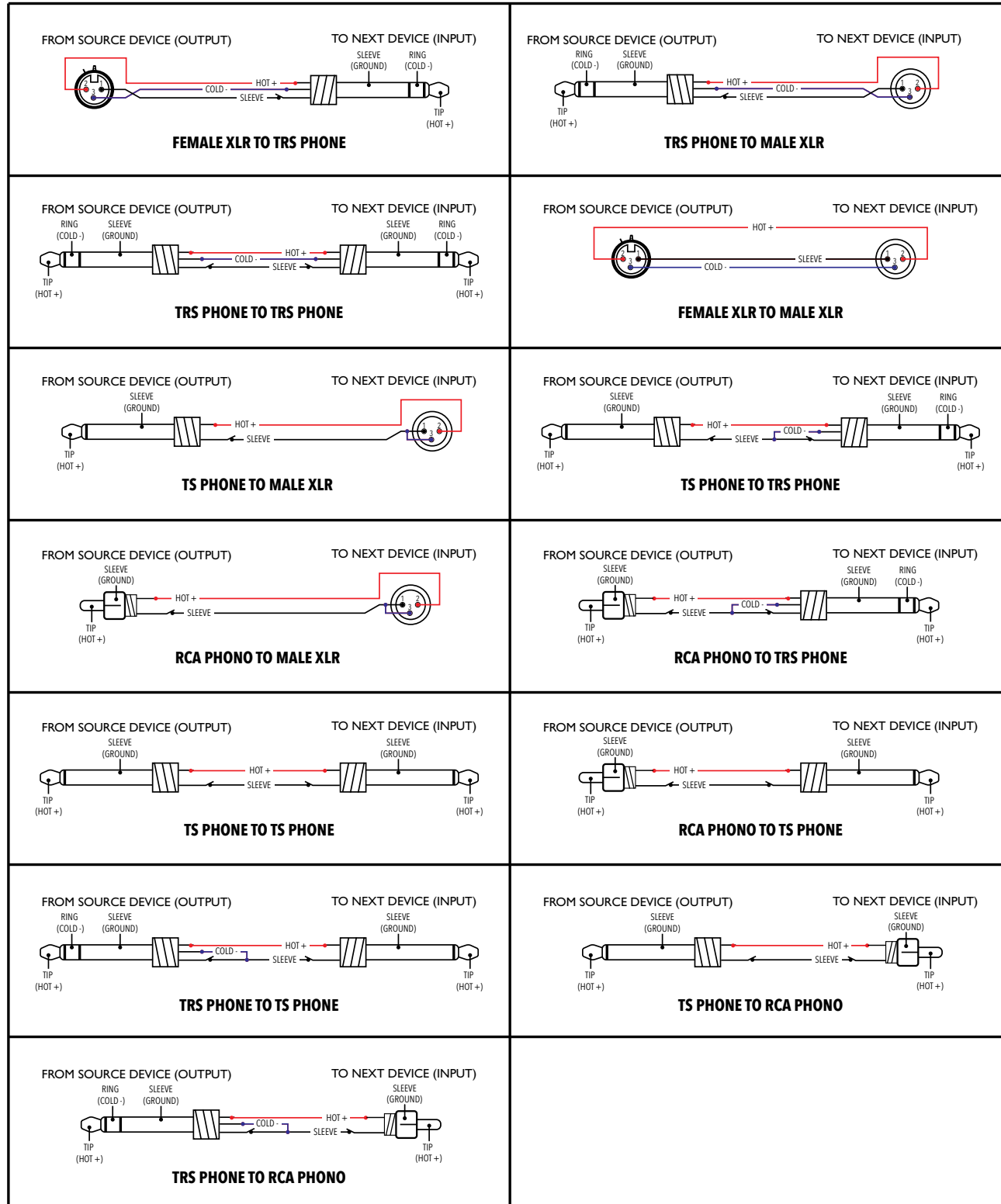
This parameter determines the settings that will be loaded after power-up. If the CURRENT option is selected, the AFS2 will boot with the same settings it had when it was last powered down. If one of the PRESET options is selected, the AFS2 will always boot with the settings saved in the selected preset.

### **DISPLAY TIMEOUT [10S, 30S, 1M, 2M, 3M, 4M, 5M, 10M, 15M, 20M, DISABLED]**

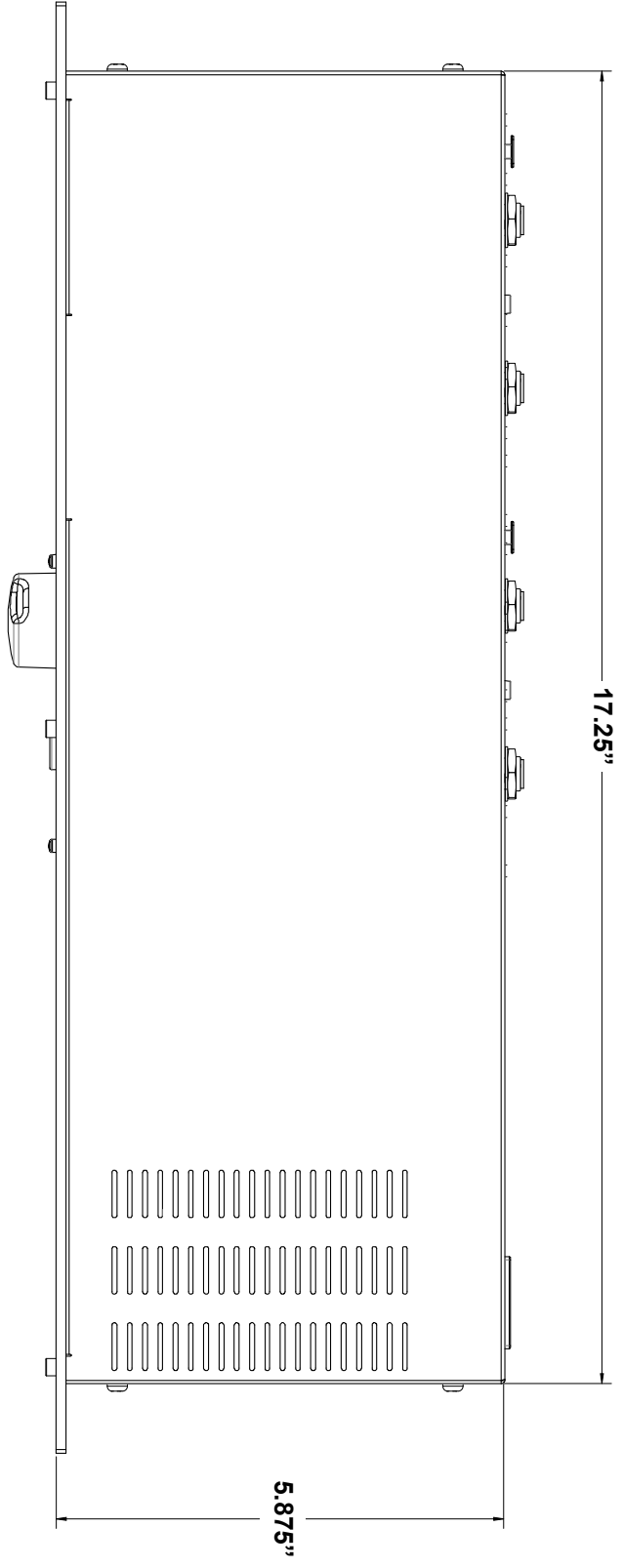
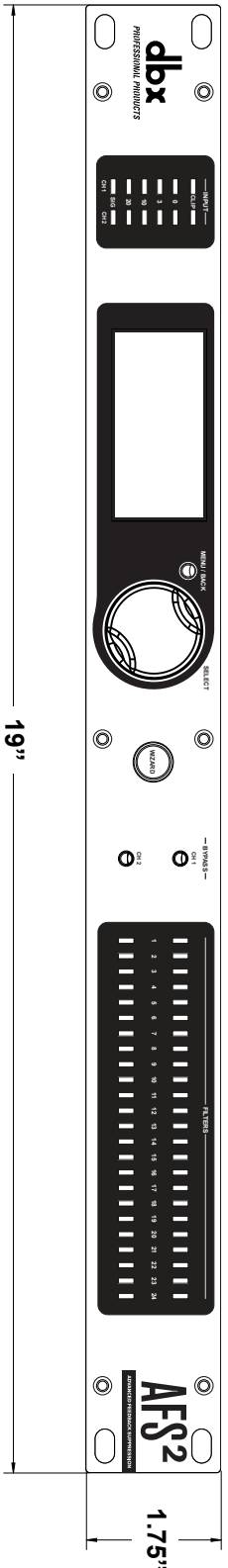
This parameter enables/disables a timer which will cause the AFS2 to automatically lock out the front panel after a period of user inactivity. The time is user selectable and ranges from 10 seconds to 20 minutes. After the set time expires, a PIN entry page will appear on-screen, requiring the correct PIN to be entered before any AFS parameters can be seen or edited. The PIN is a fixed number and is '1234'. See **'Front Panel Lockout' on page 22** for further information on this feature.

# Technical Information

## Audio Cable Diagrams



# Dimensions



## **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:	>110dB A-weighted, >107dB unweighted, 22kHz BW
Type IV™ dynamic range:	>119dB, A-weighted, 22kHz BW >117dB, unweighted, 22kHz BW
A/D Conversion:	24-bit

### **D/A PERFORMANCE:**

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

### **SYSTEM PERFORMANCE:**

Sample Rate:	48kHz
Dynamic Range:	>107dB A-weighted, >104dB unweighted, 22kHz BW
THD+N:	0.004% typical at 1Vrms input, 1KHz at +4 dBu 0.006% typical at 0.2Vrms input, 1KHz at -10 dBV
Frequency Response:	20Hz – 20kHz, +/- 1.0dB
Interchannel Crosstalk:	>100dB typical
Crosstalk input to output:	>100dB typical
Operating Temperature:	0° to 40° C (32° to 104° F)

### **POWER**

Operating Voltage:	100-240VAC, 50Hz/60Hz
Power Consumption:	8 Watts

### **PHYSICAL**

Unit Weight:	4.5 lbs. (2.04 kg)
Dimensions:	1.75" (H) x 5.875" (D) x 19" (W) 4.45cm (H) x 14.92cm (D) x 48.26cm (W)

Specifications are subject to change without notice.





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AFS2 Owner's Manual

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