

ADFTM**1200**
WORKSTATION

ADFTM**2400**
WORKSTATION

**OPERATING
GUIDE**

Quick Start

The ADF-1200/2400 is pre-configured at the factory so you can automatically control feedback without a thorough understanding of all its powerful features and benefits. To add an ADF to your existing sound system, follow this step by step procedure:

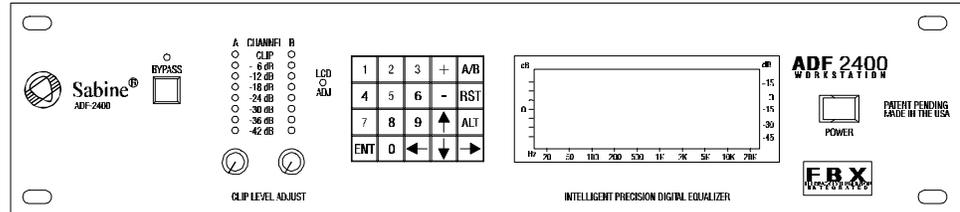
1. Place the microphones and speakers in the physical locations where they will be during the program.
2. Insert the ADF just before the power amp in the audio chain. Use low impedance connectors (pin 2 high).
3. Plug the power supply into the ADF and then into the wall socket.
4. Adjust the LCD until your screen reaches the appropriate contrast.
5. Power up the sound system, and finally the power amp.
6. Pull the microphone's sliders down on the mixer so the system will not emit feedback.
7. Play a CD or other program material through the system.
8. Press the red BYPASS button. (The LED will light to indicate BYPASS mode.) If you use an EQ, only use it to "shape" the room. Do not use the EQ to notch for feedback, since the ADF automatically controls feedback without muting the sound.
9. Press the BYPASS button again to return the ADF to ACTIVE mode. Adjust the front panel CLIP LEVEL so that the ADF clips at the same volume level as the power amp.
10. Turn off the CD program material. Lower the mixer's master volume. Raise the microphone's sliders to the level needed in the performance.
11. Select ADF's MAIN MENU 1 (Filter Control) and press ENTER. Now you can see the frequency, width and depth of the ADF's filters.
12. Press the front panel RST button to reset the filters. Hold until the filters are reset to 0 frequency and 0 depth. Channel A and Channel B must be reset individually on the ADF-2400.
13. Now you must teach the ADF-1200/2400 which frequencies feed back. SLOWLY raise the master volume slider. Inevitably, feedback will occur at a specific frequency. The ADF will automatically determine this frequency and place a 1/10 octave filter that cancels the feedback. You will notice that the filter's frequency, width and depth are displayed on the LCD.
14. Repeat step 13 until the seventh filter is set. Now lower the master volume a little so that the system is not on the verge of another feedback point. Make a mark on the master volume slider. This is the highest level you can reach and still control feedback without changing the system's configuration.
15. The sound system is now ready to use. Any new, transient feedback caused by moving or getting too close to the microphones will be automatically filtered by the three ADF DYNAMIC filters.
16. Read and follow the cautions at the end of this manual.

About Your ADF

Read the following detailed discussions and cautions to obtain the best performance from your ADF-1200/2400.

HARDWARE SET-UP:

ADF Front Panel



Mounting: Mount the ADF-1200/2400 in a standard 19" , 2- unit rack.

Power On/Off: Power to the ADF is toggled on and off with the front panel power switch.

Bypass: The ADF provides a hard-wired bypass: i.e., when in bypass mode, the input signal is routed directly to the output jacks without modification. The ADF automatically switches to bypass mode when the power is turned off.

LCD Display: The user interacts with the ADF through the keypad and the LCD display. The LCD display is used to prompt the user for numerical entries, to display filter status numerically and graphically, and to display the menus that control the ADF-1200/2400's mode of operation.

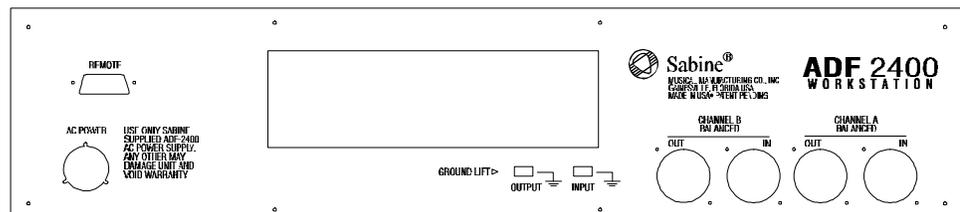
Keypad: The keypad is used for menu selection and numerical data entry. It consists of twenty keys with the following functions:

1. Ten keys (0 through 9) for numeric entry.
2. Four arrow keys for moving the cursor within the menus.
3. + and - keys for toggling certain alpha-numeric fields within menus.
4. An A/B key for toggling control and status between channels (ADF-2400 only).
5. ENTER key, which is used to indicate that a numeric entry is to be accepted as input, or that an action which is highlighted on the display is to be carried out.
6. ALT key that returns you to the MAIN MENU at any time.
7. RST key that resets all automatic feedback control filters to zero dB cut.

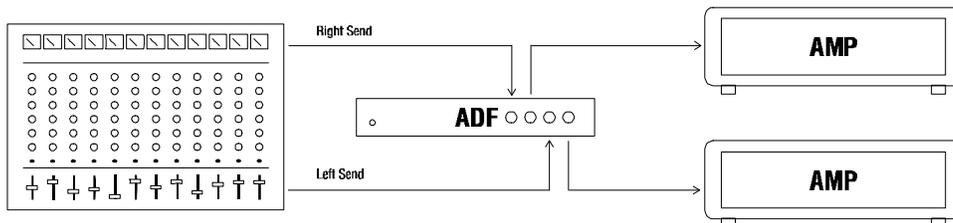
Clip Level Adjust: The clip level adjust potentiometer(s) on the front panel of the ADF-1200/2400 is used to match the clip level of the ADF with the clip level of the power amp. Adjust the CLIP LEVEL so that the ADF clips at the same volume level as the power amp. This adjustment allows you to make optimum use of the system's dynamic range.

LCD Adjust: This feature allows the user to adjust the screen's contrast. Be sure to insert only non-conductive tips into the unit.

ADF Back Panel



Signal Path: Insert the ADF in the signal path between the mixer and the power amp using three-prong XLR connectors (pin 2 high). The input signal must be balanced (symmetrical) and standard line level. Place the ADF after the EQ, compressor and other effects.



Signal Path Set-Up

Power On/Off: The ADF is equipped with an external power supply. Make sure it has the correct plug configuration and voltage required in your country. Plug the power supply into the ADF and then into the wall socket. (The power supply has a hanger so that it can be mounted conveniently inside a rack.) The power to the ADF is toggled on and off with the front panel POWER switch.

Ground Lift: This feature lifts the cable shields off the chassis ground and removes inter-equipment ground loops. It is not recommended that both the input and output be lifted at the same time.

Remote: Not currently operational.

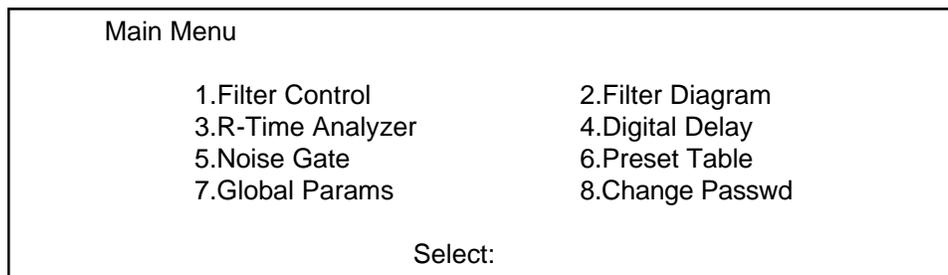
HOW TO USE THE ADF MENU FEATURES

The ADF-1200/2400 provides audio engineers with features and audio signal control never previously available. The section below explains these features, and explains how they can be modified to best suit your specific application.

ADF-1200/2400 MAIN MENU

When the power is turned on for the first time, the screen shown below appears. This screen is the ADF-1200/2400's MAIN MENU and provides access to the sub-menus.

MAIN MENU



MENU ITEM 1: FILTER CONTROL

Pressing 1 followed by ENTER takes you to the FILTER CONTROL MENU, as shown on the next page. This is where the current configurations of the system's filters are numerically displayed by the ADF and controlled by the user. The column marked T

displays the filter type (Fixed, Dynamic, or Parametric). The column marked FREQ displays the filter's center frequency. The column marked WIDTH displays the filter's width in fractions of an octave. The column marked DEPTH displays the filter's depth in dB. The fields marked HPASS and LPASS display the shelving filter cutoff frequencies.

FILTER CONTROL MENU

T	Freq	Width	Depth	T	Freq	Width	Depth
P	0	0.10	-0	P	0	0.10	-0
F	0	0.10	-0	F	0	0.10	-0
F	0	0.10	-0	F	0	0.10	-0
F	0	0.10	-0	F	0	0.10	-0
F	0	0.10	-0	D	0	0.10	-0
D	0	0.10	-0	D	0	0.10	-0
Filt Edit			Hpass: none		Lpass: None		

Values shown are the factory default settings

It is very simple to control the ADF-1200/2400's filters using the keypad and the filter control screen. This screen serves two purposes: Current ADF filter status is displayed and user instructions are passed to the ADF. As the ADF-1200/2400 sets automatic feedback control filters, their center-frequencies, widths, and depths are displayed on the screen. Any time the status changes, these changes are reflected by the display. Perhaps more importantly, the user controls filters from this screen. Initially, a filter which is not set is indicated by a center-frequency equal to 0 Hz, a width equal to 0.10-octave, and a depth of 0 dB.

TYPES OF FILTERS

Use the cursor keys to move the cursor to the Type field of the filter you wish to change. Pressing the + or - keys toggles the filter type between Parametric, Fixed and Dynamic, indicated by a P, F or D respectively. Press the ENTER key to make the change take effect. If a cursor key is pressed before the ENTER key, the change will not register. This enables you to revert to an old setting if you change your mind.

TYPE F (Fixed) and D (Dynamic)

The unique and most useful feature of the ADF-1200/2400 is its ability to automatically sense and eliminate feedback. There are two types of FBX automatic feedback control filters: FIXED and DYNAMIC. FIXED filters provide gain before feedback. DYNAMIC filters eliminate transient feedback that comes and goes throughout the program. Follow the QUICK START procedure described previously to "teach" the FBX automatic feedback control filters the positions and depths necessary to control feedback in your system.

BACKGROUND: The ADF uses a sophisticated algorithm (patents pending) to monitor the input signal and detect the onset of feedback. It then makes a precise determination of the feedback frequency and sets a filter of prescribed width (typically, 0.10 octave, but this can be modified by the user in the global parameters menu) at this frequency. Initially, the filter is only -3 dB deep, and this is often sufficient to eliminate the feedback. If the feedback persists, the filter is progressively deepened to a maximum depth (which is also user-selectable).

FIXED FBX filters are used to eliminate feedback due to characteristics which are unlikely to change, such as room acoustics. Once a FIXED filter is set, its center frequency remains fixed, but it may be deepened automatically, if necessary, to control feedback.

DYNAMIC FBX filters are used to deal with transient feedback that comes and goes during a program. When a new feedback frequency occurs, a new DYNAMIC FBX filter is automatically assigned to eliminate the feedback. When all of the DYNAMIC filters have been used, the filter that was set earliest is reassigned to handle subsequent feedback, and so on.

One trait shared by both the FIXED and DYNAMIC FBX filters is their ability to track feedback. We have already said that DYNAMIC FBX filters will set new filters or recycle old filters to eliminate feedback and that FIXED FBX filters are not recycled. If, however, the feedback frequency is detected to be very close to an existing feedback frequency, it is presumed that this new feedback is the result of a "drift" in the resonating frequency of the original feedback. Drifting can be the result of changes in air temperature. In this case, the closest filter will be moved slightly to a new frequency to track this feedback.

If the P.A. system is moved from the original set-up, the ADF must be "re-taught" where to place filters to eliminate feedback. To reset: Press and hold the RST button for approximately four seconds to reset all FBX fixed and FBX dynamic filters to 0 dB cut and 0 frequency. Both channels must be reset individually on the ADF-2400.

(See the section on GLOBAL PARAMETERS for more information about controlling FBX automatic feedback control filters.)

TYPE P (Parametric)

You will notice that once a filter has its type set to P, it is possible to edit its frequency, width and depth by moving to the appropriate field with the cursor keys. You can place the center FREQUENCY of an ADF-1200/2400 parametric filter anywhere between 20 Hz and 20 kHz with 1 Hz placement resolution. The filter's WIDTH ranges from 1 octave to .01 octave. The DEPTH can be set anywhere from -84 dB cut to +12 dB gain in 1 dB increments.

Unlike conventional analog parametric filters, the ADF's digital filters do not drift with temperature or cause phase-shifting outside of the filters. For the first time, engineers can set extremely narrow parametric filters to eliminate power-line hum.

For example, to set the first filter to be a parametric notch filter centered at 60 Hz with .01-octave width and -65 dB depth, move the cursor to the Type field for the first filter. Press the + key until a P is displayed; then press ENTER. The cursor then moves automatically to the center FREQUENCY field. At this point, type 6 0, followed by ENTER. The cursor moves to the WIDTH field, where you next type 1, followed by ENTER, which moves the cursor to the DEPTH field. Next, type - for the sign, then 6 5, then ENTER. The filter is now set. In some cases, another filter may be required at 120 Hz to eliminate power-line hum.

Similarly, a Fixed or Dynamic filter that has been set by the ADF-1200/2400 can be "frozen" by moving to the appropriate Type field and changing it to a P. At this point, the filter can be left as is or edited further.

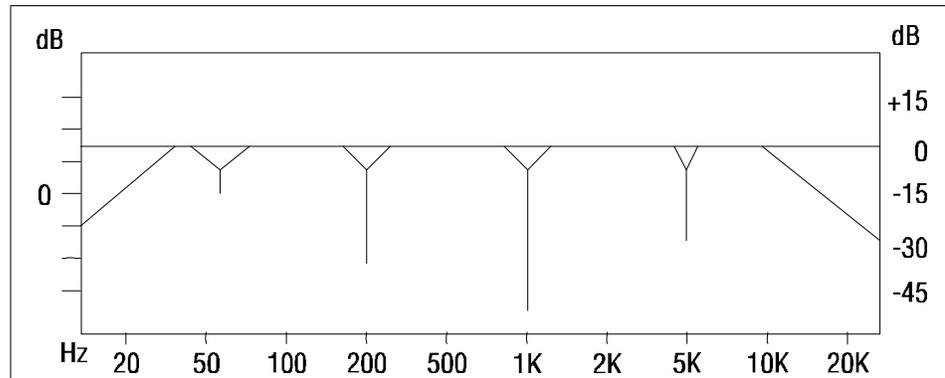
Shelving Filters

At the bottom of the filter control menu, you will find two fields that are labeled HPASS and LPASS. These are the high- and low-end shelving filters that are used to custom-tailor the low- and high-end frequency response. The high pass filter can be used to suppress phenomena such as low-frequency rumble, while the low pass filter can be used to attenuate high-frequency hiss or for band limiting the ADF-1200/2400's output signal for telecommunications or subsequent digital recording.

To change the shelving filter settings, move to the HPASS or LPASS field and adjust the cutoff frequency using the + or - key, respectively. You can also choose the NONE option. Press ENTER after each selection. Once you are done editing the filters, you can either return to the main menu by pressing the ALT key or leave this screen on the display so you can continue to monitor the filter status. The A or B channel indicator is found in the lower left hand corner of the screen (ADF-2400 only).

MENU ITEM 2: FILTER DISPLAY

Main Menu Selection 2 brings up the filter display screen that gives a graphical depiction of the notch and shelving filter settings. The graph indicates whether a filter is boosting or cutting, and shows the filter width and depth as well as the positions of the shelving filters in the audio spectrum. The filter display screen updates in real time as FBX filters are set or deepened.



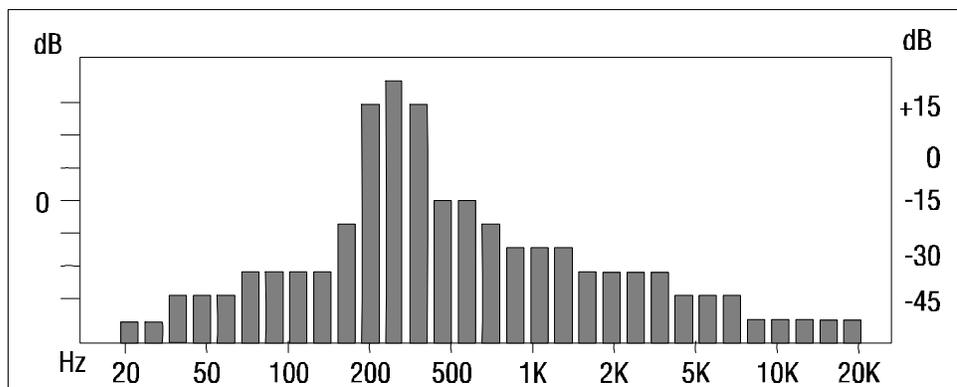
Filter Display Menu (sample)

The ADF-2400 allows you to toggle between channels A and B with the A/B button on the front panel. An A or B channel indicator appears in the top left-hand corner.

MENU ITEM 3: REAL-TIME ANALYZER

The Real-Time Analyzer (RTA) can be viewed by choosing option 3 in the main menu, which gives the RTA display shown below. This display shows the power spectrum of the input signal. The ADF-2400 allows you to toggle between channel A and B RTA screens with the A/B button on the front panel.

The single channel ADF-1200 provides a display of the power spectrum of the input signal. The dual channel ADF-2400 functions as a 31-band real-time analyzer when combined with an external pink noise generator. The ADF-2400 filters can then be used to adjust the frequency response of the sound system.



Real-Time Analyzer (sample)

BACKGROUND: The ADF's real-time analyzer (RTA) is used to measure the power content of the input signal in the FREQUENCY domain in real time before filtering. The RTA displays the signal power over 31 FREQUENCY bands between 20 Hz and 20 kHz. Each bar on the RTA display gives a measure of the relative signal power over a

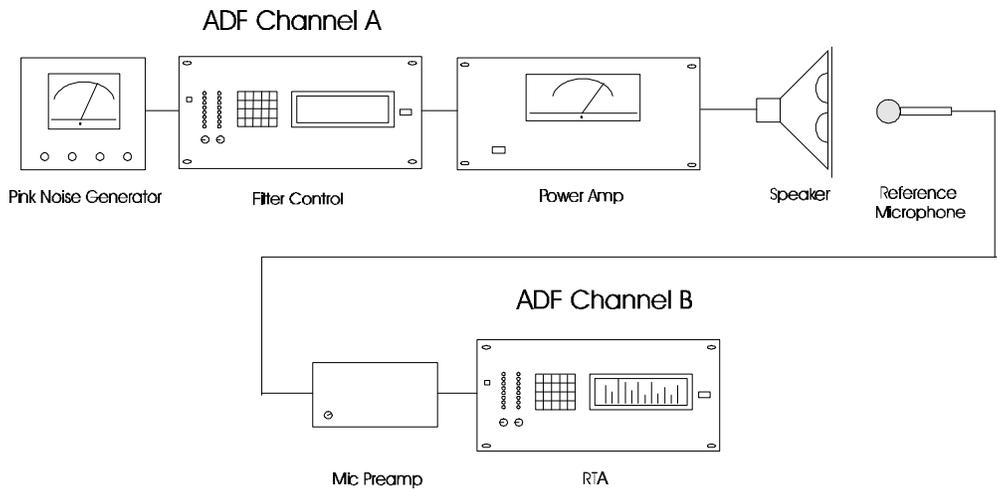
1/3-octave interval centered at the standard 1/3-octave ISO center frequencies. The RTA operates in conjunction with the parametric filters, shelving filters, noise gate, digital delay, and FBX filters that have already been set. However, the ADF will not detect or control new feedback while in RTA mode.

The RTA is useful for visually analyzing the frequency content of the ADF's input signal. For example, a sinusoidal input will yield a peak in the RTA display in the band closest to the frequency of the input. Or, a pink noise input will give a display that is roughly flat with a height that is proportional to the pink noise power.

The RTA is most often used for room set-up to bring the sound system to a state where the frequency response of the room is flat. This can be accomplished by playing pink noise through the system, feeding a reference microphone input into the ADF and monitoring the RTA display. The objective is to bring the RTA display to a nearly flat profile, which can be done by boosting or attenuating over each frequency band, as appropriate. The boost or cut can be obtained by using either a graphic EQ or some of the parametric filters. If you also wish to perform feedback elimination, be sure to leave some fixed or dynamic FBX filters enabled for the FBX mode of operation.

NOTE: In RTA mode, the feedback detection capability of the ADF is disabled until you exit RTA mode to access any other menu.

**ADF-2400 RTA
Set-up:**



- Step 1: Configure your system as shown in the drawing above.
- Step 2: Set all CH A filters to P, 0 frequency and .01 depth; LPASS and HPASS=None.
- Step 3: Generate pink noise through the speaker.
- Step 4: Adjust the mic preamp and/or ADF clip level to obtain an adequate RTA reading on CH B.
- Step 5: Observe the RTA and determine which frequencies need to be cut or boosted.
- Step 6: Set appropriate filters on CH A to achieve the desired results on CH B RTA.

**MENU ITEM 4:
DIGITAL DELAY**

Main Menu Selection 4 takes you to the digital delay screen shown on the next page. When you first enter the Digital Delay Menu, the cursor is in the FEET field, but you can move it to either the METER or MILLISECOND fields with the cursor keys. Type in the desired audio signal delay and press the ENTER key.

DIGITAL DELAY MENU

Digital Delay			
	Feet:	000.0	(0--384.6)
	Meters:	000.0	(0--116.8)
	Milliseconds:	000.0	(0--340.0)
<i>Values shown are the factory default settings</i>			

If you enter the value of the delay in terms of FEET, the equivalent values will be automatically entered in the METER and MILLISECOND fields. The same applies to METERS and MILLISECOND.

The ADF-1200's maximum delay is 340 milliseconds. The ADF-2400's maximum delay is 170 millisecond per side. The smallest incremental adjustment (resolution) is 0.1 milliseconds.

The ADF-2400 allows you to toggle between channels A and B with the A/B button on the front panel. An A or B channel indicator appears in the top left hand corner. The delay can be set independently in each channel.

BACKGROUND: The ADF's digital delay facility can be used for many purposes, but perhaps most importantly for speaker signal alignment. Consider the case where an audio signal is emitted simultaneously from two speakers that are separated by some distance. The clarity and intelligibility of the program in the far sound field is greatly enhanced if the two signals arrive at the same time. In order for this to happen, the signal that emanates from the closer speaker must be delayed to compensate for its proximity to the listener.

The delay can be calibrated in terms of milliseconds, feet, or meters using the digital delay screen. For example, if the speakers were separated by 50 feet, the appropriate delay would be 50 feet. The conversion between milliseconds, feet, and meters is made automatically by the ADF-1200/2400. This conversion is based on the fact that the speed of sound in air at a temperature of XX degrees Fahrenheit is 1,100 feet per second. Since the speed of sound is a function of the air temperature, it is important that this be taken into account to precisely compute delay time. In this case, it is best to specify the delay in terms of milliseconds after you have computed it yourself as a function of the distance and the air temperature. For rough calibration, however, delay time specification in terms of distance should suffice.

MENU ITEM 5: NOISE GATE

Main Menu Selection 5 calls up the noise gate control screen. It allows you to specify the noise gate DWELL TIME and the THRESHOLD level below which the noise gate should suppress the output signal. Move the cursor to the field you wish to edit with the ARROW or ENTER keys and enter the desired numerical value with the NUMBER keys. The changes take effect when you press the ENTER key after editing. The range of permissible values is in parentheses.

NOISE GATE MENU

NOISE GATE	
Dwell Time (msec): 100	(100-999)
Threshold (db): -95	(1 --- 95)
<i>Values shown are factory default settings</i>	

BACKGROUND: The purpose of the ADF's noise gate is to suppress low-level broad-band noise, such as tape hiss between songs. Noise can arise from a number of different sources, including quantization error in the signal path of certain digital signal processors, and surface noise in magnetic media. The noise is most noticeable during the quiet times between program material — while there is no sound to mask the low-level noise.

There are two parameters that govern the behavior of the ADF-1200/2400's noise gate — THRESHOLD and DWELL TIME. THRESHOLD is indicated in dB and tells the ADF the level below which the input should be regarded as noise. DWELL TIME is indicated in milliseconds and tells the ADF how long the input signal must stay below the THRESHOLD level before the input signal should be regarded as noise. If the input signal level stays below the THRESHOLD setting for a period of time greater than the DWELL TIME setting, the ADF turns off the D/A converter and the output signal is set to zero. The instant the input crosses above the noise gate THRESHOLD, the output is turned back on and the dwell time counter is reset.

The noise gate level is measured relative to the clip level of the analog-to-digital (A/D) converter inside the ADF. Recall that the clip level is determined by the position of the clip level adjust potentiometer. When this potentiometer is in the full counterclockwise position, the clip level is 26 dB above the level obtained with a 0 dBV input. Therefore, with the noise gate level set to -80 dB and the clip level adjust set full counterclockwise, for instance, signals that are 106 dB below the clip level of the A/D converter will be suppressed.

MENU ITEM 6: PRESETS

Main Menu Selection 6 takes you to the PRESETS screen shown below. It allows you to name and save the current FBX parameter configuration or to load and run a configuration saved previously.

PRESETS MENU

Memory Presets	
* 0.Default	
1.	2.
3.	4.
5.	6.
7.	8.
Save:0	< > Load:

Values shown are factory default settings

To load a PRESET configuration, move the cursor to the LOAD field using the cursor keys, enter the number of the preset you wish to load, and then press ENTER. An asterisk (*) will appear next to the preset number that has been loaded.

To save the current configuration to a preset location, move the cursor to the SAVE field using the cursor keys, enter the number of the desired preset location, and press ENTER.

Each PRESET can be assigned a name up to 8 alpha-numeric characters long. For example, you may pre-configure the ADF specifically for a warm-up band and the main performer during separate rehearsals and then quickly recall the configurations between sets of the performance. You can name the configurations WARM UP and MAIN 1. Up to eight user-definable configurations can be stored.

To enter or edit a name, move the cursor to the position you wish to change with the ARROW keys. Change the values of the alpha-numeric characters at the cursor with the + and - keys.

The presets can also be used to compare the effects caused by changes in the system's configurations. For example, you may save a configuration in preset 8, then modify it and save the new configuration in preset 9. Now if you toggle between 8 and 9, you can hear the difference in each configuration.

Factory Default Presets: Preset #0 is of special interest. It contains the factory default configurations and cannot be modified by the user. Preset #0 is a useful starting point for programming new configurations. It is also a useful reference if you cannot remember which settings are appropriate to use.

Power-up Default Setting: Each time the power is turned on, the ADF will automatically return to the same configuration it was in when the power was last turned off. You will not have to waste time recalling a configuration every time you start up the ADF. The first time you turn on your ADF, it will load and execute the factory default configuration.

MENU ITEM 7: GLOBAL PARAMETERS

Both the ADF-1200 and 2400 give you control over minute details of the system parameters so you can optimize the settings for a particular venue. These parameters pertain primarily to the feedback detection and tracking performance of the ADF. They also give added control to the fixed and dynamic FBX filter characteristics. Precise level of control has never been possible with conventional analog filters and is unique to Sabine's DSP-based filtering system (patents pending). Global parameters are saved as part of each preset. For example, each preset can have totally different FBX characteristics.

Main Menu Selection 7 invokes the GLOBAL PARAMETERS control screen shown below. The A/B switch on the ADF-2400 allows you to toggle between channel A and B FBX configuration settings. A description of each menu choice follows:

GLOBAL PARAMETERS

FBX Config	
Filter Width: 1/10	Filter Depth: -60
Threshold: 3	Persistence: 3
Mode: Mono	Clustering: Yes
Language: English	

Values shown are factory default settings

FILTER WIDTH: In general, narrower filters are more transparent and mute the

program less. Wider filters provide more gain before feedback and allow the user to move the microphone a greater distance and still protect against feedback. A value of 1/10 octave is recommended for musical performances, and a value of 1/5 octave is recommended for lecture halls and other spoken word applications. Permissible values: 1/1-1/20.

FILTER DEPTH: determines the maximum depth to which FBX filters are allowed to grow in the presence of persistent feedback. Permissible values: 0 dB to -80 dB.

THRESHOLD: determines the level to which feedback must grow in order to be classified as feedback. Although lower values for this parameter will allow the feedback to grow larger in magnitude before it is detected, too high a value can result in mistaking certain musical tones for feedback. Permissible values: 0-5.

PERSISTENCE: There is a trade-off between how fast the system will filter feedback and how well it will distinguish feedback from program material. If the program is a flute or organ solo, set the Persistence in the lower values so the system does not mistake the music for feedback and set filters in the wrong place. If the program is just spoken word, set the Persistence in the higher values so that it can catch feedback quickly. Permissible values: 0-5.

MODE: The ADF-2400 can be set to operate in either DUAL MONO mode or STEREO mode. In DUAL MONO mode, each channel is completely independent. In STEREO mode, a filter set in one channel is also automatically set in the other channel. There is only one edit screen when in the STEREO mode.

CLUSTERING: The CLUSTERING parameter controls how close FBX filters may be automatically set together. If CLUSTERING is set to YES, the minimum distance between FBX filters is one Hertz. If CLUSTERING is set to NO, the minimum distance between FBX filters is five Hertz. Feedback that occurs between the minimum distance is presumed to be caused by frequency drifting and will be controlled by the automatic TRACKING function discussed previously.

LANGUAGE: The ADF can be set to interface in either English or German.

The A/B switch on the ADF-2400 allows you to toggle between Channel A and B FBX configuration settings.

The ADF-1200/2400 password provides a mechanism for you to prevent unauthorized persons from accessing the MAIN MENU or sub-menus and changing the ADF's configurations. Enter Main Menu Selection 8 to move to the PASSWORD screen shown below. Type in the new password and press ENTER. ALT takes you back to the MAIN MENU.

**MENU ITEM 8:
PASSWORD**

PASSWORD MENU

Password Change
Enter New Password: - - - - -

Your unit's factory default settings will be flashing

BACKGROUND: When the ADF is first powered up, the system automatically config-

ures itself to the same settings as when the system was last powered down. If a password was previously assigned, the first ADF screen will be a request to input the password. Entering the correct password brings up the MAIN MENU and access to all sub-menus. If the current PASSWORD is the factory default password (00000), the password screen will be skipped and anyone can have access to the MAIN MENU and subsequent sub-menus.

The password must be 5 numbers long. Use the + or - keys to change the number.

Back Door Password: In addition to the regular user-assigned password, each ADF has a second password that will give the user access to the MAIN MENU. This "back door password" will be useful in case the regular password is lost. The second password is the first five digits of the quotient of the serial number divided by 39. Ignore decimal points.

There are millions of different combinations of user-selectable parameters in the ADF-1200/2400. As may be expected, some of these combinations can cause less than desirable side effects. So far, we have identified the following:

A FINAL WORD

1. If a long digital delay has been assigned, and you change a parametric filter's frequency from below 50 Hz to a very high frequency such as 15,000 Hz, a loud popping sound may occur.
2. If several boost parametric filters are clustered together in the same frequency range, oscillation may occur.
3. Two boost filters close together add together, resulting in a net boost far greater than either filter alone. This will greatly reduce the headroom before clipping.
4. The clip light indicates clipping anywhere in the system. If no clipping occurs, the LED ladder indicates input level relative to the input clip level.

ENGINEERING SPECIFICATIONS

Filters

Twelve independent digital notch filters per channel which can be controlled automatically or parametrically from 20 Hz to 20 KHz

High pass filter with cutoff frequency, user-controllable in 1/3-octave intervals between 20 Hz and 1 KHz, 12 dB/octave roll-off

Low pass filter with cutoff frequency, user-controllable in 1/6-octave intervals between 3 kHz and 20 kHz, 12 dB/octave roll-off

Parametric filter depth: user-controllable in 1 dB steps from +12 dB to -84 dB (parametric mode), 3 dB steps from 0 dB to -80 dB (FBX mode)

Parametric filter width: user-controllable from 1.00 octave to .01 octave

FBX filter width: user-controllable from 1.00 octave to .05 octave

Resolution: 1 Hz from 20 Hz to 20 KHz in FBX mode; 1 Hz from 20 Hz to 20 KHz in parametric mode

Number of parametric filters per channel: user-selectable, 0 - 12

Number of FBX fixed filters per channel: user-selectable, 0 - 12

Number of FBX dynamic filters per channel: user-selectable, 0 - 12

Number of shelving filters per channel: 2

Total number of combined filters active per channel: user-selectable, 0 - 12; plus low and high pass shelving filters

Digital Delay

ADF-1200 — 340 msec total; ADF-2400 — 170 msec total per channel

Programmable in milliseconds, feet or meters. 0.1 msec resolution

Noise Gate

Dwell time: 100 to 999 msec

Threshold: -1 to -95 dB (relative to peak amplitude)

Real-Time Analyzer

31 band, 20 Hz — 20 KHz

Password Configuration

5 alpha-numeric characters

Multiple Configurations Stored in Memory

1 factory default

1 most recent configuration

LCD Display

User selection menus

Graphic filter placement screen

RTA display

Filter edit/status screen

Input/Output

Input impedance: Balanced > 10K Ohms, PIN 2 high

Output impedance: Balanced 10 Ohms nominal, PIN 2 high

Input/Output maximum signal levels: Balanced +29 dBV peak

Bypass: true power-off bypass

Headroom: +25 dBV peak @ 4 dBV nominal input

I/O connectors: XLR-3

Performance*

Spectral variation < 0.25 dB, 20 Hz to 20 KHz

SNR: > 100 dB typical (with Noise Gate)**

THD: < 0.02% @ 23 dBV at 1 KHz

Dynamic range: > 100 dB

Power Supply

Dual 20 VAC, 50/60 Hz available in 100 V, 120 V, 220 V, or 240 V; 22 Watts

Memory battery life: 10 years

Dimensions: 2-U rack mount 19 x 3.5 x 7.5 in. (48.3 x 9 x 18.3 cm) 9 lb. (3.9 Kg) nominal w/o power supply

Options

I/O Transformer isolation

RS 232/RS 422 serial interface; delivery to be announced

AES/EBU; S/PDIF digital interface; delivery to be announced

* Tests performed using an Audio Precision System One model 322 or equal

** Signal-to-noise ratio is the ratio of the maximum undistorted signal by specification (26 dBV RMS sinewave) to the noise floor

One-year limited warranty

All FBX Feedback Exterminators conform to all Year 2000 (Y2K) standards.

CAUTION

EXPOSURE TO EXTREMELY HIGH NOISE LEVELS MAY CAUSE A PERMANENT HEARING LOSS. INDIVIDUALS VARY CONSIDERABLY IN SUSCEPTIBILITY TO NOISE INDUCED HEARING LOSS, BUT NEARLY EVERYONE WILL LOSE SOME HEARING IF EXPOSED TO SUFFICIENTLY INTENSE NOISE FOR A SUFFICIENT TIME. THE U.S. GOVERNMENT'S OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) HAS SPECIFIED THE FOLLOWING PERMISSIBLE NOISE LEVEL EXPOSURES:

DURATION/DAY IN HOURS	SOUND LEVEL IN dBA, SLOW RESPONSE
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
1/2	110
1/4 or less	115

ACCORDING TO OSHA, ANY EXPOSURE IN EXCESS OF THE ABOVE PERMISSIBLE LIMITS COULD RESULT IN HEARING LOSS. EAR PLUGS OR PROTECTORS IN THE EAR CANALS OR OVER THE EARS MUST BE WORN WHEN OPERATING THIS DEVICE IN ORDER TO PREVENT A PERMANENT HEARING LOSS. IF EXPOSURE IS IN EXCESS OF THE LIMITS AS SET FORTH ABOVE, TO ENSURE AGAINST POTENTIALLY DANGEROUS EXPOSURE TO HIGH SOUND PRESSURE LEVELS, IT IS RECOMMENDED THAT ALL PERSONS EXPOSED TO EQUIPMENT CAPABLE OF PRODUCING HIGH SOUND PRESSURE LEVELS SUCH AS THIS DEVICE BE PROTECTED BY

HEARING PROTECTORS WHILE THIS UNIT IS IN OPERATION.

1. Read all safety and operating instructions before using this product.
2. All safety and operating instructions should be retained for future reference.
3. Obey all cautions in the operating instructions and on the unit.
4. All operating instructions should be followed.
5. This product should not be used near water, i.e. a bathtub, sink, swimming pool, wet basement, etc.
6. This product should be located so that its position does not interfere with its proper ventilation. It should not be placed flat against a wall or placed in a built-in enclosure that will impede the flow of cooling air.
7. This product should not be placed near a source of heat such as a stove or radiator.
8. Connect only to a power supply of the type marked on the unit adjacent to the power.
9. Never break off the ground pin on the power supply cord.
10. Power supply cords should always be handled carefully. Never walk or place equipment on power supply cords. Periodically check cords for cuts or signs of stress, especially at the plug and the point where the cord exits the unit.
11. The power supply cord should be unplugged when the unit is to be unused for long periods of time.
12. Care should be taken so that objects do not fall and liquids are not spilled into the unit through the ventilation holes or any other openings.
13. This unit should be checked by a qualified service technician if:
 - A. The power supply cord or plug has been damaged.
 - B. Anything has fallen or been spilled into the unit.
 - C. The unit does not operate correctly.
 - D. The unit has been dropped or the enclosure damaged.
14. The user should not attempt to service this equipment. All service work should be done by a qualified service technician.

Limited Warranty

THIS LIMITED WARRANTY VALID ONLY WHEN PURCHASED AND REGISTERED IN THE UNITED STATES OR CANADA. ALL EXPORTED PRODUCTS ARE SUBJECT TO WARRANTY AND SERVICES TO BE SPECIFIED AND PROVIDED BY THE AUTHORIZED DISTRIBUTOR FOR EACH COUNTRY.

Ces clauses de garantie ne sont valables qu'aux Etats-Unis et au Canada. Dans tous les autres pays, les clauses de garantie et de maintenance sont fixées par le distributeur national et assurées par lui selon la législation en vigueur. Diese Garantie ist nur in den USA und Kanada gültig. Alle Export-Produkte sind der Garantie und dem Service des Importeurs des jeweiligen Landes unterworfen. Esta garantía es válida solamente cuando el producto es comprado en E.U. continentales o en Canada. Todos los productos que sean comprados en el extranjero, están sujetos a las garantías y servicio que cada distribuidor autorizado determine y otorga en los diferentes países.

ONE-YEAR LIMITED WARRANTY/REMEDY

SABINE MUSICAL MANUFACTURING CO, INC. ("SABINE") warrants this product to be free from defects in material and workmanship for a period of one (1) year from date of purchase PROVIDED, however, that this limited warranty is extended only to the original retail purchaser and is subject to the conditions, exclusions and limitations hereinafter set forth:

CONDITIONS, EXCLUSIONS AND LIMITATIONS OF LIMITED WARRANTIES

These limited warranties shall be void and of no effect if:

- a. The first purchase of the product is for the purpose of resale; or
- b. The original retail purchase is not made from an AUTHORIZED SABINE DEALER; or
- c. The product has been damaged by accident or unreasonable use, neglect, improper service or maintenance, or other causes not arising out of defects in material or workmanship; or
- d. The serial number affixed to the product is altered, defaced or removed; or
- e. The power supply grounding pin is removed or otherwise defeated. In the event of a defect in material and/or workmanship covered by this limited warranty, Sabine will repair the defect in material or workmanship or replace the product, at Sabine's option; and provided, however, that, in any case, all costs of shipping, if necessary, are paid by you, the purchaser.

THE WARRANTY REGISTRATION CARD SHOULD BE ACCURATELY COMPLETED, MAILED TO AND RECEIVED BY SABINE WITHIN FOURTEEN (14) DAYS FROM THE DATE OF YOUR PURCHASE.

In order to obtain service under these warranties, you must:

- a. Bring the defective item to any AUTHORIZED SABINE DEALER and present therewith the ORIGINAL PROOF OF PURCHASE supplied to you by the AUTHORIZED SABINE DEALER in connection with your purchase from him of this product. If the DEALER is unable to provide the necessary warranty service, you will be directed to the nearest other SABINE AUTHORIZED DEALER which can provide such service.

OR

- b. Ship the defective item, prepaid, to:

SABINE, INC.
13301 HIGHWAY 441
ALACHUA, FL 32615-8544

including therewith a complete, detailed description of the problem, together with a legible copy of the original PROOF OF PURCHASE and a complete return address. Upon Sabine's receipt of these items:

If the defect is remedial under the limited warranties and the other terms and conditions expressed have been complied with, Sabine will provide the necessary warranty service to repair or replace the product and will return it, FREIGHT COLLECT, to you, the purchaser.

Sabine's liability to the purchaser for damages from any cause whatsoever and

regardless of the form of action, including negligence, is limited to the actual damages up to the greater of \$500.00 or an amount equal to the purchase price of the product that caused the damage or that is the subject of or is directly related to the cause of action. Such purchase price will be that in effect for the specific product when the cause of action arose. This limitation of liability will not apply to claims for personal injury or damage to real property or tangible personal property allegedly caused by Sabine's negligence. Sabine does not assume liability for personal injury or property damage arising out of or caused by a non-Sabine alteration or attachment, nor does Sabine assume any responsibility for damage to interconnected non-Sabine equipment that may result from the normal functioning and maintenance of the Sabine equipment.

UNDER NO CIRCUMSTANCES WILL SABINE BE LIABLE FOR ANY LOST PROFITS, LOST SAVINGS, ANY INCIDENTAL DAMAGES OR ANY CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, EVEN IF SABINE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THESE LIMITED WARRANTIES ARE IN LIEU OF ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE; PROVIDED, HOWEVER, THAT IF THE OTHER TERMS AND CONDITIONS NECESSARY TO THE EXISTENCE OF THE EXPRESS LIMITED WARRANTIES, AS HEREINABOVE STATED, HAVE BEEN COMPLIED WITH, IMPLIED WARRANTIES ARE NOT DISCLAIMED DURING THE APPLICABLE ONE-YEAR PERIOD FROM DATE OF PURCHASE OF THIS PRODUCT.

SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THESE LIMITED WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

THESE LIMITED WARRANTIES ARE THE ONLY EXPRESS WARRANTIES ON THIS PRODUCT, AND NO OTHER STATEMENT, REPRESENTATION, WARRANTY OR AGREEMENT BY ANY PERSON SHALL BE VALID OR BINDING UPON SABINE.

In the event of any modification or disclaimer of express or implied warranties, or any limitation of remedies, contained herein conflicts with applicable law, then such modification, disclaimer or limitation, as the case may be, shall be deemed to be modified to the extent necessary to comply with such law.

Your remedies for breach of these warranties are limited to those remedies provided herein, and Sabine gives this limited warranty only with respect to equipment purchased in the United States of America.

INSTRUCTIONS-WARRANTY REGISTRATION CARD

1. Mail the completed WARRANTY REGISTRATION CARD to:

SABINE, INC.
13301 HIGHWAY 441
ALACHUA, FL 32615-8544

- a. Keep the PROOF OF PURCHASE. In the event warranty service is required during the warranty period, you will need this document. **There will be no identification card issued by Sabine Musical Mfg. Co., Inc.**

2. IMPORTANCE OF WARRANTY REGISTRATION CARDS AND NOTIFICATION OF CHANGES OF ADDRESS:

- a. Completion and mailing of WARRANTY REGISTRATION CARDS - Should notification become necessary for any condition that may require correction, the REGISTRATION CARD will help ensure that you are contacted and properly notified.
 - b. Notice of address changes - If you move from the address shown on the WARRANTY REGISTRATION CARD, you should notify Sabine of the change of address so as to facilitate your receipt of any bulletins or other forms of notification which may become necessary in connection with any condition that may require dissemination of information or correction.
3. You may contact Sabine directly by telephoning (904) 371-3829.
 4. Please have the Sabine product name and serial number available when communicating with Sabine Customer Service.

MADE IN USA

ADF-1200/2400.0G5.9/30/93

Manufactured by: Sabine, Inc. • 13301 Highway 441 • Alachua, FL 32615-8544 USA • Phone: (904)418-2000 • Fax: (904)418-2001

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