

AFW-1

Application Notes



What is the Anti Feedback Workstation?

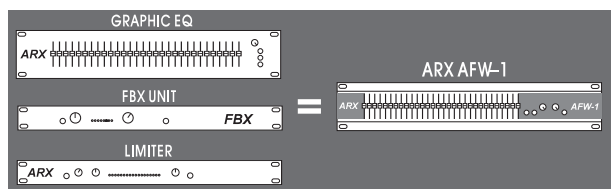
Well, basically it is the best of both worlds!

Graphic Equalizers are great products, and are extremely useful tools for professional audio engineers. But, they do require a fair degree of knowledge to operate them successfully.

Feedback Exterminators are great, too, because they automatically find frequencies that are feeding back and pull them down. But, that's all they do. You can't tune the system with them - for that, you need an equalizer, usually a Graphic Equalizer.

In the ARX AFW-1 Anti-Feedback Workstation, we've combined the two products described above, to give users the best of both worlds. An equalizer, to tune the sound of the room/system, and an FBX Anti Feedback to automatically pull out any feedback.

And, as a very useful added bonus, we've included a fast, smooth sounding Peak Limiter to ensure that the signal stays within the level that you decide.



So, as you can see, although it may look a little like a 30 band Graphic Equalizer, it's a whole lot more. Since it involves a few radical departures from the normal way that we think of equalizers, we've put together these Application Notes to familiarise you with the workings and the concepts behind the ARX AFW-1 Anti-Feedback Workstation.

Let's work our way through the operation of the AFW-1, from start to finish.

The Equalizer Section

The EQ section of the AFW-1 has been designed without compromise as a totally accurate professional third octave equalizer, with innovative 'Constant Q' circuitry. Constant Q is a true WYSIWYG (What You See Is What You Get) design concept that allows far more accuracy in EQ control.

Each of its 30 smoothly damped, centre ground-ing sliders can be adjusted to give a maximum of

10dB cut or boost. The Q of the filter has been specifically optimised to allow easy combining of the filters. This enables you to set up a musical, notch free system curve.

It's quite possible to use this section as a stand-alone EQ, but then you'd be missing out on some of the AFW-1's very exciting features!

Using the EQ section

The idea behind the EQ section is to 'tune' the room to the system, and to 'tweak' the response a little so that it sounds good. We're not going to use it to notch out feedback - we've got the Anti Feedback section for that - but to adjust the overall sound of the system so it doesn't sound 'boomy' or 'harsh'.

So, play a tape or CD that you're very familiar with, and adjust the sliders on the EQ section so that the system sounds 'just right'.

Note that a little EQ is a lot, so use each fader gently. Avoid any sudden dips or peaks - that's not what it's there for. The look of the sliders should resemble a smooth curve. If you don't need to move it, then leave it.

Avoid too much boost at lower frequencies. Very few systems can deliver much response below 30 Hz, so it's pointless pushing those sliders up. It will only waste valuable amplifier power. However 50 to 100Hz can often benefit from a little boost, as can 8 - 12.5KHz. Between those points it should be a smooth succession of gentle curves.

The Anti Feedback section

The Anti Feedback section of the AFW-1 is essentially a computer controlled parametric equalizer which continuously searches for feedback. Once feedback is detected, it extinguishes the feedback automatically by inserting a very narrow notch filter directly on the feedback frequency, only as deep as necessary to control the feedback. It finds and eliminates feedback typically in less than one second.

The result is that the overall program gain is increased 6 or more dB and provides much clearer and more natural sounding speech and music. And since it is fully automatic, no operator is required once it has been set up.

The digital filters inside the AFW-1 are switchable between 1/5th octave and 1/10th octave. 1/5th is recommended for speech applications, such as

conferences, speeches, etc, and 1/10th is recommended for music applications.

Important Note:

Before changing this switch, you must first power down the system. Then switch the filter to the setting required. Power up the system again, and during its turn on self test the AFW-1 will change the filter setting.

The system should be RESET after doing this, by following the Setup procedure detailed in the Owner's Manual.

About the Filters

The Anti Feedback section has two types of filters - fixed and dynamic.

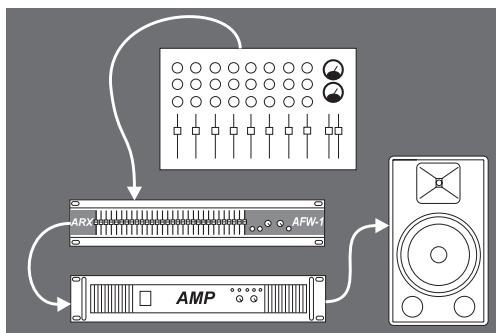
The fixed filters retain their frequency centre points in memory until the unit is reset by the user. These filters are set in the AFW-1 initialization procedure by the strongest resonating frequencies to provide the system's gain before feedback.

Dynamic filters control intermittent feedback that comes and goes throughout the performance, such as feedback from moving wireless microphones, getting too close to speakers, monitors, that sort of thing. They are automatically reassigned to new frequencies as feedback occurs on a first in - first out protocol.

The Anti Feedback section circuitry has a total of 9 filters; 6 fixed and 3 dynamic filters. This has proven to be the best combination for most applications.

Where To Install The AFW-1 In The Signal Path.

The AFW-1 can be placed anywhere in the system that a line level signal is available. However, for most purposes the best results are obtained if it is placed last in the signal chain before the power amplifiers.



If you are using a 2 or 3 way or more system, with an active crossover before the amps; or any kind of speaker processor, then naturally the AFW-1 will go before the crossover or processor.

The AFW-1 has Balanced Inputs and Outputs on both XLR and jack connectors. On the XLRs, Pin 2 is Hot (+). The jacks are Balanced TRS (Tip Ring Sleeve) type, and are wired so the Tip is Hot (+), the Ring is

Cold (-) and the Sleeve is Ground. This means that you can use whichever connector your system is set up for, and you can also use the AFW-1 Unbalanced if necessary. The latter is useful should you want to use the AFW-1 as an Insert into a console channel.

The Limiter Section

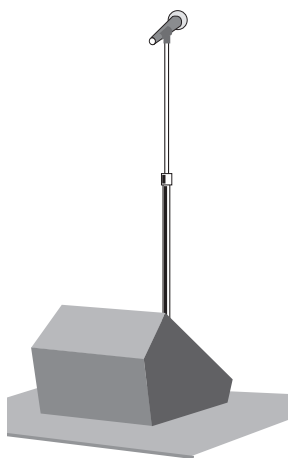
The Peak Limiter in the AFW-1 has been included to let you set an absolute ceiling on the output level.

Its attack and release times are program dependent and have been optimized to appear as transparent to the ear as possible.

However, remember that it *is* a Limiter, and should be set at a level that coincides with the onset of clipping in the system, where ideally it is not going to be active for the bulk of the time.

Setting up the system

As we mentioned before, the AFW-1 is a few radical departure from normal equalizers. Its feedback suppressing filters are a lot more accurate in targeting feedback than a typical 30 band EQ, and consequently the setup positioning is also different.



When 'ringing out' the system, it's best if you position the mics where they would normally be during the performance.

Because the AFW-1 filters target feedback frequencies **exactly**, there is no need to point the mic towards the speakers as you probably do with a normal EQ.

The degree of 'fail safety' that you might need with a normal EQ is much less with the AFW-1. As a result of this the sound is more natural, with less holes in it.

It's also louder, since you haven't pulled out as much from the signal.

There is an extensive discussion of system setup information contained in the AFW-1 Owner's Manual. We strongly suggest that you read and absorb it as it will make using the AFW-1 much easier.

FBX Feedback Exterminator is a Registered Trademark of Sabine, Inc, and is the brand name of its line of automatic feedback controllers. Covered by US Patent No. 5,245,665, Australian Patent No. 653,736, and Canadian patent No. 2,066,624-2. Other patents pending. ARX® is a Registered Trademark of ARX Systems Pty Ltd. All other trademarks are the property of ARX Systems.