

# Users Guide for Feedback Frequency Counter

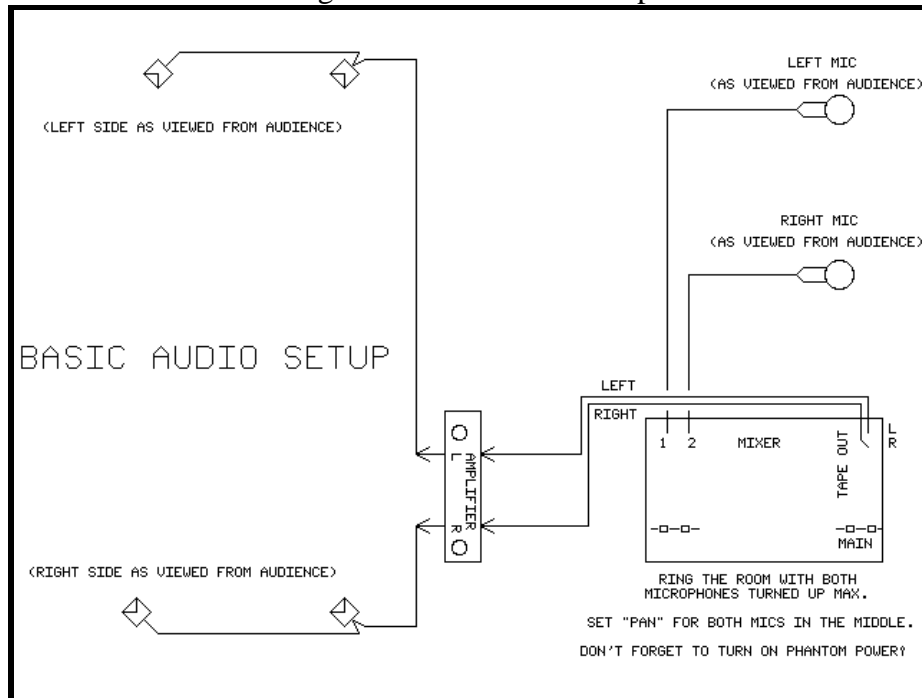
**Background:** When ringing out the feedback frequencies from an amplified audio setup, it is necessary to determine which frequencies are causing trouble and to reduce the gain of those frequencies. This allows the overall gain of the system to be increased for louder, clearer sound presentation. A graphic equalizer (GEQ) is an ideal tool for reducing the gain of those particular frequencies, however a means of determining which frequencies are being fed back is critical to using a GEQ correctly. There are three tools available for measuring a feedback frequency:

- 1) Spectrum Analyzer
- 2) Automatic Feedback Destroyer
- 3) Frequency Counter

A spectrum analyzer will show, in real time, all the frequencies in an audio signal, particularly the strongest frequency. This tool is, however, rather expensive. Automatic Feedback Destroyer's, like Behringer's Feedback Destroyer Pro, are pretty good at automatically finding the frequencies and reducing their gain to destroy those feedbacks. However, the unit only has 12 filters per channel in stereo mode. This only allows 12 frequencies (in stereo mode, 24 in mono mode) to be controlled. A frequency counter shows the frequency of only the most prevalent feedback in an audio stream, and displays the frequency on a digital display. This, combined with a GEQ, allows an audio operator to be able to quickly identify and snub the offending frequencies at minimal cost.

**Setting up:** You should first hook up all the microphones, mixers, power amplifiers, and speakers. Position the microphones and the speakers first. This will result in a setup approximating the following diagram shown in figure 1.

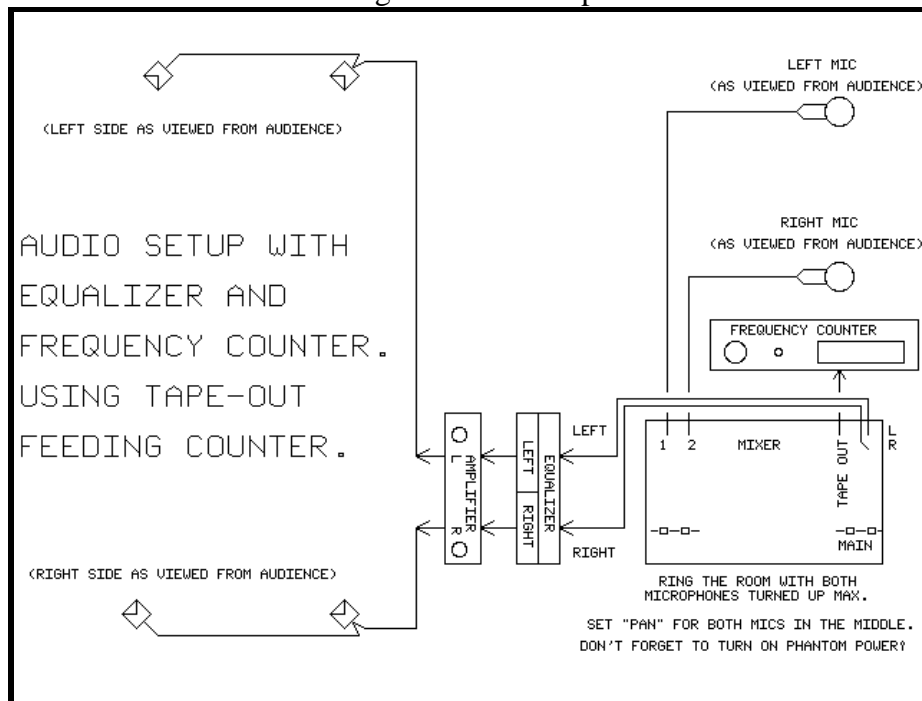
Figure 1: Basic Audio Setup



Ensure that everything basically works and the microphone(s) are being sent out to all the speakers. Then insert the GEQ into the audio chain, and connect the Feedback Frequency Counter to the TAPE-OUT output

of the mixer, or insert it into one of the audio lines going to the GEQ or the amplifier. Using the tape output might be easier, and would result in the connection diagram as shown in figure 2 below.

Figure 2: Full setup



Make sure that the GEQ is turned on and all the controls are set to midpoint (0 dB). Ensure that the feedback counter is on and shows “---” in its display. Alternatively, you can insert just the GEQ into the audio stream, and use the TAPE OUTPUT jack from the mixer to feed the feedback frequency counter. This may give you more flexibility in setting the levels feeding the feedback counter.

### Features of the Feedback Frequency Counter:

2 audio jacks on the back panel - These are interchangeable and are usually used as an input and a “through” connection into the audio stream. This is a single channel counter and counts from only one audio stream.

Minimum Level Knob - This knob, marked off in dB, sets the minimum required signal strength to activate the frequency counter. The counter will not even consider the incoming audio for counting if the input level is not greater than the knob setting. Normally, you would set this knob at the -21 dB position. If there is a LOT of ambient noise in the room, and the light occasionally comes on even when there is no feedback present, turn the knob up until the light stays off. This knob is used to adjust for excessive noise in the room.

Minimum Signal Light - this red light on the front panel, indicates, when lit, that an audio signal is high enough to get past the minimum level knob, and that the frequency counter is attempting to count the feedback frequency in the audio stream. If this light is not on, the counter will not even try to count audio frequency.

Three digit display - this display either shows “---” if there is no audio to process, or if the input frequency is not stable enough to get an accurate frequency reading. When a sufficiently strong frequency occurs, and it is stable to 1 percent between readings, the frequency will be displayed on the three digits. The frequency range

of the counter is from 20 Hertz (Hz or cycles per second) up to over the limit of human hearing (over 20,000 Hz or 20 kHz). The display of frequencies takes three forms:

## or ### two or three digits shown without a decimal point is used for the range of 20 to 999 Hz  
#.## three digits with a decimal point after the first digit is used for the range of 1.00 to 9.99 kHz  
##.# three digits with a decimal point after the second digit is used for the range of 10.0 to 65.5 kHz

When a stable, strong feedback is detected, the frequency counter calculates the frequency, and when the frequency is stable within 1% or 4 counts, whichever is the larger error, it shows the frequency on the digital display. When audio disappears or becomes otherwise unstable, the display holds the last reading for 2 seconds, then reverts to the idle display of “---”. The counter updates the display every quarter second.

**Preparing the mixer output levels:** With the power amplifier turned off, start raising the microphone and master gains until you are getting a strong 0 dB signal coming out of the mixer when normal sound levels are present at the microphones. You want the output from the mixer to be as strong as possible without exceeding 0 dB. You also want to ensure that the amplitude levels are strong enough to cause the feedback frequency counter’s detection light to come on when there is strong feedback. If you are using the tape output, be sure that the tape level output is set high enough.

**Ring out the Room:** Turn down the gain on the power amplifier and turn on the amplifier. Repeat the following procedure until one channel of the GEQ is at its minimum setting (about -20 dB):

- 1) Slowly turn up the power amplifier’s gain until a feedback frequency starts to develop. Control the volume so it sings and not screams.
- 2) Allow the frequency to build (use more gain if necessary) until you hear one pure feedback tone, and the frequency counter detection light comes on and the frequency reading on the display is stable and seems accurate.
- 3) Read the frequency from the counter (20 to 999, or 1.00 kHz to 9.99 kHz, or 10.0 kHz to 20.0 kHz)
- 4) Locate the GEQ channel that is nearest to the indicated frequency and turn that channel down 3 dB (one notch or whatever). This will stop that feedback frequency.
- 5) Repeat from step 1 to find and stop more offending frequencies.

Once one of the GEQ channels is turned down to -15 or -20 dB, that is as far as you should ring it out. You should probably turn the master gain down 2 dB or so for a bit of extra insurance during a performance.

A properly rung-out audio setup provides about six to 10 dB more amplification without feedback problems.

**Quick Reference Sheet (located on the top of the unit):**

- 1) Insert GEQ and Feedback Counter into audio stream.
- 2) Set and fix all speaker positions and microphone positions.
- 3) Ensure 0 dB output signal strength for normal audio levels.
- 4) Set the Feedback Counter level knob to about -21 dB.
- 5) Set GEQ channel levels all to midpoint (0 dB).
- 5) Raise amplifier gain until a feedback develops.
- 6) Note the feedback frequency and reduce the closest GEQ channel by 3 dB to kill that frequency.
- 7) Repeat from step 5 until one channel is turned down 20 dB.