

Introduction



At the heart of every sound system is the mixer (also sometimes referred to as a “mixing board”, “board”, “desk”, or “mixing console”). This device serves as the primary control center for the sound system, so it’s important to have a clear understanding of how things work, and the “ins and outs” of working with a mixer.

One of the reasons that a mixing board can be so intimidating is the sheer size of the device. All those knobs, faders, and buttons—what do they do? And what are we supposed to do with them? The funny thing is, on most analog mixers, all of the other channels *are simply a carbon copy of the first channel*. This is even more evident on digital mixers, where a common set of controls (Gain, EQ, Dynamics, Aux Sends, etc.) are shared by ALL of the channels, and you simply select the channel you want to adjust before adjusting the controls. So, if you learn and understand how to use the controls properly for that first channel, *you will be able to operate the entire board*.

Section I. The Controls

The Channel Strips

A “channel strip” is the arrangement of controls (knobs, faders, and switches) that operates a single channel of the mixer. On an analog mixer, these controls are arranged vertically and the same set of controls is repeated for each channel. On a digital mixer, you use a Select button to select the desired channel, and then make any adjustments to the controls. These controls are typically arranged along the top of the mixer with the faders for each channel beneath them. In addition to the individual channels, a mixer also includes a so-called “Master” section, usually located at the far right side of the board that gives you control over the main outputs, monitor outputs, aux sends, and subgroups. Let’s start by looking at the controls of an individual Channel Strip:

- **Gain/Trim Knob** – sets the initial input level of the signal being fed to a channel (mic, instrument, etc.) to provide a good signal-to-noise ratio. If a signal is too weak, you may experience noise. If the signal is too strong, you may experience clipping/distortion. So setting the input gain on each channel is very important. Note that once this knob has initially been set, you would normally not make major adjustments to it, unless you change to a different microphone on that channel, or change the instrument being fed to the

channel (e.g., you plug the mic for a snare drum into a channel that was previously used for vocals).

- **Low Cut** – this switch helps to eliminate any low-frequency rumble that might be picked up by a microphone, such as when someone walks across the stage or handles a microphone. This switch should normally be engaged on all mixer channels except for instruments with a lot of low-frequency energy (e.g., bass guitar, piano, and kick drum).
- **EQ (equalizer)** – these controls are used to help shape the *tone* of the channel in the overall mix. These knobs are not unlike the EQ controls on a home or car stereo. The “Hi” knob controls the boost or cut of the high (treble) frequencies. The “Low” knob controls the boost or cut of the low (bass) frequencies. The “Mid” control often has an extra “Freq” knob. This allows you to adjust the center frequency at which the boost or cut occurs, while the “Mid” knob controls the amount of boost or cut (just like the Hi and Low knobs). On some digital consoles (such as the Behringer X32), a parametric EQ is available on each channel. A parametric EQ gives you greater control than the standard “3 knob EQ” found on most analog (non-digital) mixers, in that it allows to choose the specific frequency, the amount of boost/cut, and the Q-factor (width of the boost/cut) that is being applied.
- **Aux Sends** – Aux (auxiliary) Sends are used to control the level of the channel being fed to either a Monitor Mix or to an Effects Device (Reverb, Delay, Chorus, etc.). For Monitor Sends, the Aux is normally set to “Pre-Fader”. For Effects, it is set to “Post-Fader”. “Pre-Fader” means that any changes to the channel’s Fader WILL NOT affect the level of the Aux Send. “Post-Fader” means that any changes WILL affect the level of the Aux Send. By setting the Aux to Pre-Fader for the Monitor Sends, you are able to control the Monitor Mix independently of the Main Mix (which is determined by the settings of the Faders).
- **Pan Control** – the Pan knob controls the position of the channel in the Left-to-Right stereo mix. If turned fully to the left, the channel would only be audible in the Left speaker. If turned fully to the right, the channel would only be audible in the Right speaker. If turned to the center, it will be audible in both the Left and Right speaker equally.
- **Mute Switch** – the Mute switch can be used to temporarily mute, or silence a channel, without having to move the channel’s fader or Aux Send knobs.
- **Meter/Clip LED** – the meter on each channel gives a visual indication of the strength of the signal being fed to the channel. The clip LED will illuminate when a channel overloads. If you see the Clip LED lighting up on a channel, you should reduce the input gain using the Gain/Trim control.
- **Solo Switch** - the Solo switch acts sort of like a "reverse mute"--it silences all of the other channels except for the one/s for which the Solo switch is depressed. This can be very helpful when setting the initial levels of the board. We'll see more about this later. On some boards, the Solo switch only affects a certain send, such as a headphone mix, but doesn't affect the main mix.

- **Subgroups Assignments** – these switches (labeled “1-2” and “3-4”) route the channel’s signal to the Subgroups (see the Subgroups section below).
- **Main Switch** – this switch routes the channel’s signal to the Main Left & Right stereo outputs of the mixer.
- **Fader** – the fader is used to control the strength of a channel’s signal in the Main Left & Right stereo outputs (and Subgroup outputs) of the mixer.

The Master Section

The “Master Section” is the group of controls (usually) positioned at the far right of the mixer, which are the last set of controls before the signal leaves the outputs of the mixer. Let’s take a look at the individual components of the Master section.

- **Buses on an Analog Mixer**– a “bus” is simply a pathway for signals to flow through a mixer. On an analog mixer, these are typically fixed: you might have 4 Aux Sends that can be used either as monitor or effect sends. And then you might have some Subgroups (usually either 4 or 8, depending on the size of the mixer) that you can use to create groups of channels—for example, you might have a “vocals” group, “drums” group, etc.
- **Buses on a Digital Mixer** - on the X32, there are 16 buses that can be freely assigned as Monitor sends (pre-fader), Subgroups (post-fader), or an Effects sends (post-fader). A Monitor send is simply the master fader for a specific monitor mix (e.g., the floor wedges on the stage). A subgroup is used to create a “sub-mix”, or smaller grouping of channels within the overall main mix. An effects send is used to send a certain amount of a signal to an effects processor, such as a reverb, echo, or delay.
- **Main Fader** – the Main Fader feeds the Main Left & Right stereo outputs of the mixer, and serves as the “Master Volume” control for the main speakers of the sound system. In most cases, this Main Fader should be set at or just below Unity Gain/Zero. This will ensure that an adequate level signal is being sent from the mixer to the main Amplifier/s. Then, you will use the individual Channel Faders to make adjustments to the voices and instruments in the mix. **IMPORTANT NOTE:** If the Main Fader is set too low, you will have a tendency to try and compensate by turning the individual Channel Faders up too high, which can cause clipping and distortion in the mix, which can eventually ruin your speakers!

Section III. Operating the Mixing Board

One of the most important steps in preparing for a live performance is to properly set the levels on the mixing board. If the signals going to the board are too weak, you’ll get too much noise and not enough of the desired sounds. If the signals are too strong, you’ll get clipping and distortion, which can ruin your speakers and your audience’s ears. Let’s not be naïve—setting up a mixer can be a daunting task. But if

you'll follow these steps for setting up, you can rest assured that this aspect of your next gig will go off without a hitch.

Zeroing Out the Board

If you're setting the sound system up from scratch, the first step is to "zero out the board". This basically amounts to setting all of the Faders and knobs to zero, or to their fully "off" position. For faders, this means pulling them all the way down. For Aux/Monitor sends, turn the knobs fully counter-clockwise. For EQ knobs, this usually means turning the knob straight up to 12 o'clock, where no boost or cut (0 db) is being applied. This gives you a clean starting point from which to begin. Please note that with an installed sound system (e.g., a church) that has already been set up, this procedure will not be necessary. To zero out the board, do the following:

1. Turn the Fader for each Channel Strip all the way down, to the off position.
2. Set the Trim knob for each individual channel fully counter-clockwise, to the off position.
3. Set the Auxiliary send knobs on each channel fully counter-clockwise, to the off position.
4. Set the EQ knobs for each channel to 12 o'clock (pointing straight up), so that no boost or cut is being applied to any part of the frequency spectrum.
5. Set the Main Master Fader/s to Unity Gain/Zero. "Unity gain" means the strength of the output signal is equal to the strength of the input signal—in other words, no boost or cut is being applied to the signal. On some boards, instead of a separate main fader for Left and Right, there's a single "Main" fader that controls both the Left & Right output channels.
6. Set the Monitor (Aux) Send faders or knobs to Unity Gain, and set the Auxiliary Send Master knobs (for effects) to Unity Gain.

Setting the Levels for a Channel Strip

To set the levels for an individual channel on the board, take the following steps:

1. Mute all of the other channels except for the one for which you're going to set the levels. This will prevent extraneous sounds from being picked up by the other mics and feeding into the main mix.
2. Set the Trim knob for the channel fully counter-clockwise, to the off position.
3. Turn the Pan knob for the channel hard Left or hard Right. Doing this before attempting to set the level on the channel will help to leave enough "headroom" so that if you need to increase the level of this channel in the mix using the channel's Fader, you'll have enough room to do so without causing the signal to overload and clip/distort the channel's input.
4. Set the channel's Fader to Unity Gain/Zero.

5. Apply the source signal to the channel input by asking the guitar or bass player to play, the drummer to hit the individual drum, the singer to sing, etc. for the channel for which you're setting the level.
6. While looking at the main Level Meter, slowly turn up the channel's Trim knob, so that when the input signal is at maximum strength, it should peak at Zero on the Level Meter. If the meter reads below zero (or doesn't read at all), adjust the Trim knob until you have enough gain to make it peak at Zero.
7. If there is already sufficient gain without adjusting the Trim knob at all (the meter is already at or above Zero), simply adjust the Fader to give the desired volume. This will usually only happen if you're dealing with a strong line-level signal, such as a keyboard or direct-out of a guitar or bass amp. If you're dealing with a microphone, though, you most likely need to adjust the Trim. If a signal is too hot/strong from the start, you might need to engage the "Pad" switch, if the channel is equipped with one.
8. After the Trim and Fader are set, adjust the Pan knob back to the center position.
9. Adjust the Auxiliary Send/s for the Monitor Mix/es or Effects for the channel.
10. Disengage the Solo button on the channel, or Mute the current channel and un-mute the next one for which you're going to set the levels.
11. Repeat steps 1-9 for each channel being used.

Adjusting Monitor Mixes on the X32

On standard analog mixers, the monitor/aux send knobs are present on every channel, so to adjust a monitor send for a given channel, you just choose the correct knob. On the X32 digital mixer, you can adjust a monitor send in one of two ways:

Using the Bus Sends

1. Press the Select button for the channel you wish to adjust.
2. In the Bus Sends section of the channel strip at the top, press the 1-4 button. This will ensure the knobs are displaying the monitor sends. At FBC, we use Bus 1 for the Left Floor Wedge, Bus 2 for the Right Floor Wedge, and Bus 3 for Steve's In-Ear Monitor (IEM) system.
3. Turn the knob to increase/decrease the level of the channel in the correct mix.

Using the "Sends on Fader" Feature

1. Press the Bus 1-8 button (the button near the middle of the board, between the two sets of faders) if it's not already illuminated.
2. Select the monitor mix bus that you wish to adjust--Wedge Left, Wedge Right, or Steve IEM (In Ear Monitors).
3. Press the "Sends on Faders" button. The faders on the left of the board will move to display the selected monitor mix.

4. Make any adjustments to the mix that are requested by the singer/musicians.
5. Press the "Send on Faders" button again. The faders on the left will return to their normal position to display the Main LR mix.

The Finished Product

After setting the levels for each channel, ask the entire band to play a song or part of a song together. While the band is playing, make any fine adjustments to the volume using the channel faders. If a particular instrument or voice sounds like it's lacking or is too strong in a certain part of the frequency spectrum (lows, mids, highs), the channel EQ can be used to boost or cut that part accordingly. Ask the performers if they need to hear any more or less of a particular voice or instrument in the monitor mix/es and adjust the channel's Aux Send accordingly. Also make any fine adjustments to the Aux sends being used for any effects (reverb, delay, etc.).

In short, properly setting up a mixing board can be quite a task. But hopefully this article has removed some of the mystery from the process. By following the simple steps outlined herein, your next live performance can hopefully be your best ever.

Section IV: Recording a Service

Many churches record their worship services by connecting the outputs of their mixer to an input on a recording device or to their computer (via a recording interface, or perhaps a USB cable, if the mixer is so equipped). This works great for recording *sermons*, but not necessarily so great for recording the song service. I've chosen NOT to do it this way at our church for two reasons:

1. During the song service, we use our computer to run the Easy Worship presentation software, so I don't want to risk creating any glitches or hangs that could arise from simultaneously running some kind of recording software (which can be resource-intensive on a computer system).
2. Some of the instruments (namely the drums) are already loud enough in the room that we run very little, if any, of them through the sound system. If I were to simply take a feed from the mixer to a recorder, it would only record the voices/instruments *that are being amplified through the system*. That wouldn't tell us what things sounded like in the room, which is what we really want to know.

For these reasons, I use a Tascam DR-40 portable recorder with built-in microphones to record our band rehearsals and song services. After the service, I will import the recorded Wav file/s into some audio editing software (lately I've been using Reaper, although in the past I have normally used Samplitude). In the software, I can chop the Wav into individual songs and export each one as an MP3. Then, I can e-mail the MP3's to the members of the band and tech people so we can evaluate how we're doing: does the mix sound ok? Is something too loud? Is

something not loud enough? Are we nailing our parts, or are there some rough spots that need more practice? As you can imagine, listening back can be very eye-opening, and can be a tremendous help in assessing areas of improvement during the worship service.