A Brief Tutorial on Mixers

Selecting a mixer for your application can be a challenging task but the right mixer, properly gain-staged, will make mixing and recording much easier. PreSonus has put together this brief tutorial to help you pick out the best mixer for your budget and set it up so that you get the best results.

Selecting the Right Mixer

At the most basic level, an audio mixer does exactly what its name implies: mix audio signals. If you have more than one sound source (say, five microphones, an electric guitar, a bass, and a keyboard), you need a mixer to combine these audio signals so that you can control the relative balance between them before sending the summed signal to a loudspeaker system, recording device, etc. Because every signal comes into and out of the mixer, investing in a quality product is crucial and will save a lot of operational headaches.

Here are a few things to consider:

- **Channel count.** Also known as *frame size*, a mixer's channel count determines how many sources can be connected to its channel inputs simultaneously. For example, a 24-channel mixer will allow you to connect at least 24 audio sources, although there may be additional specialized inputs, such as Tape and Talkback inputs. Some smaller format consoles provide stereo channels in addition to mono channels. Stereo channels are counted as two inputs, even if they share a single set of channel controls (fader, mute, solo, etc.). This is important to keep in mind as you make your selection.

- **Connection types.** In addition to knowing how many sources you'll connect to your mixer, it's important to know the types of sources. If you plan to mostly connect microphones, make sure to select a mixer with enough microphone preamps. If you will connect line level sources, make sure your mixer has at least a few line inputs to reduce the need for direct boxes.

- **Aux buses.** Most mixers can send at least one monitor mix to the stage. This is typically done with auxiliary buses—*aux buses* for short. Each channel is equipped with a level control for each aux bus, known as an *aux send*. You build your monitor mix by setting the individual aux-send levels for any channels you want to be heard in that mix. The aux bus output can then be connected to a stage monitor or in-ear system. If you use aux buses exclusively for monitors, the number of aux buses you have determines the number of discrete monitor mixes you can create. Keep in mind that aux buses are usually mono, so a stereo monitor mix for in-ear systems will require two aux buses. Calculate your needs accordingly.

- **Analog or digital.** In general, there are two flavors of mixer: analog and digital. An analog mixer relies on electrical circuits and filters, whereas a digital mixer converts the analog signal into digital audio data that is sent to an onboard processor. After processing, the signal is converted back to the analog domain, where it can be sent out to speakers, personal monitoring

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systems, and so on. While both mixer types will provide basic level and pan control, each has advantages and disadvantages. In general, an analog mixer will be more affordable and simpler to use; digital mixers tend to be more complex but offer more functionality. We'll discuss that in more detail later.

• **Onboard signal processing.** Most mixers will have some onboard signal processing on each channel, on each bus, or both. The more signal processing available on your mixer, the less money you will have to spend on outboard gear. In general, digital mixers provide considerably more signal processing than analog mixers, commonly including at least some dynamics processing and EQ. It's also convenient to have reverb and delay effects built in. Make sure that onboard effects have their own dedicated aux bus, though; otherwise, you may have to sacrifice a monitor mix to add reverb or other effects to vocals and instruments.

• **Recording options.** Many modern mixers provide some level of integrated recording. This can range from a simple 2-track recording of the Main mix to complete multitrack recording, either to an onboard recorder or to a computer. When evaluating computer recording options, look for the bus type (USB, AVB, FireWire, etc.), included software, and recording bit depth and sample rate. Most modern mixers with recording features offer 24-bit recording at 44.1 kHz or higher.

Analog Mixer Basics

At their core, most analog mixers share many of the same features and functions. The biggest advantage of analog mixers is that they're generally less complicated and less expensive than digital mixers of the same frame size. The disadvantage is that analog mixers usually have fewer onboard features than digital mixers, and their sound quality depends entirely on the quality of the analog circuitry.

Figure 1: StudioLive AR8 USB

Some analog mixers, like PreSonus StudioLive AR-series analog mixers use great-sounding analog circuitry, provide EQ on every channel, offer at least a few monitor mixes, and include at least a basic onboard effects processor for reverb and delay effects. StudioLive AR-series mixers also feature PreSonus' unique, flexible Super Channel, which allows you to connect four stereo line level devices, including wireless stereo Bluetooth™ input.

Many modern analog mixers also offer digital recording features. The most common implementation is a simple onboard 2x2 USB interface that allows you to record the main mix. Less common is the ability to record each channel individually. StudioLive AR-series mixers take this further, offering professional 24-bit, 96 kHz multitrack recording (every input channel, plus the main mix) over USB, as well as a separate onboard stereo SD recorder that enables you to quickly record the main mix or play hours of stereo recordings.

Digital Mixer Basics

Digital mixers include the basic functions provided by their analog cousins and add many tools that save you money by eliminating the need for expensive outboard equalizers, compressors, noise gates, multi-effects units, and the like. While you don't need these processors just to mix audio, they are essential for producing better sounding, more polished mixes. All these tools are done courtesy of an onboard processor, known as a DSP (Digital Signal Processor). This processor is responsible for routing, level control, etc. Full-featured digital mixers provide equalizers, dynamics processors, and more.

Traditionally, the complexity of digital mixers made them more difficult to learn but PreSonus StudioLive digital mixers changed that, providing a wealth of onboard signal processing without forcing you to dive into multiple layers and menus. The StudioLive's surface-driven workflow has made them one of the most popular mixers in the world. Because the parametric EQ, compression, noise gate, and limiter are available on every input and output, you save the cost of outboard gear and mountains of cables, as well as the hassle of connecting it all.

Digital mixers also provide tools to address the problem of managing complex mixes. Population groups reduce the channels you're viewing at one time. DCAs (Digitally Controlled Amplifiers) control the overall level of a group of channels.

StudioLive Series III consoles and StudioLive RML rack-mount mixers combine the best aspects of these solutions with Filter DCAs. A Filter DCA can contain any combination of available input channels and effects returns, and you can create at least 24 Filter DCA groups per mix scene. StudioLive Series III and RML mixers allow you to include the same channel in multiple Filter DCAs so you can manage

mixes in multiple ways. Each group is given a master level control so you can control the overall level of the group while maintaining each channel's relative balance in the mix. In this way, for example, you can create a single fader to control every drum in a monitor mix and maintain the relative level of the drum mix that you created. You can even create a custom User fader bank that includes individual channels and Filter DCA group masters to simplify mixing even further. This is especially useful if a member of your band also doubles as your front-of-house engineer.

Both analog and digital mixers have long been available as traditional consoles and in rack-mount format. Rack-mount analog mixers and older digital rack mixers are usually controlled with knobs and perhaps small faders. But today's digital rack mixers are more often controlled with a laptop, a tablet, a smartphone, or a networked hardware controller.

Let's take a closer look at these two approaches:

Digital Console Mixers

Digital console mixers, such as the StudioLive Series III mixers, typically look like their analog cousins, in that the analog front end and mixing controls are housed in the same chassis. Many modern consoles allow some level of modular capability, allowing you to network stage boxes and other mixers so that your inputs and outputs can be closer to the sources and destinations.

Figure 2: StudioLive 16

The benefit of a networked system is that you save quite a bit of money, time, and frustration with long cable runs and traditional stage boxes, using a single CAT5 or CAT6 cable to carry literally dozens of audio streams back and forth. Another advantage is flexibility, as the channels on your mixer can be sourced locally or from the network. This allows you customize and reorient your system as your needs change.

StudioLive Series III mixers take networking one step further by included AVB audio networking onboard. While AVB has many applications and uses, the biggest advantage in a StudioLive Series III system is that a StudioLive Series III rackmount mixer can be used as a digital stagebox for a StudioLive Series III console mixer. Because both mixers sit on the same audio network, local inputs on the console mixer can be accessed from the rackmount mixer and vice versa.

Additionally, StudioLive Series III rackmount mixers offer three modes:

- **Stagebox.** In Stagebox mode, the StudioLive Series III rack mixer's outputs mirror the mixes on the StudioLive Series III console mixer.

- **Monitor Mix.** In Monitor Mix mode, the StudioLive Series III rack mixer's FlexMix outputs work independently.

- **Monitor Mix** + **Preamps.** This mode is just like Monitor Mix Mode, but the StudioLive Series III rack mixer's preamps can also be controlled from UC Surface.

In all modes, the preamps on the rack mixer can be remotely controlled from the surface of the StudioLive Series III console mixer.

Digital Rack Mixers

As their name indicates, many newer digital rack mixers, including the StudioLive RML series and StudioLive Series III rack mixers, are designed to sit in an equipment rack onstage with the musicians. This makes connections more convenient and reduces the need for long cable runs that can introduce noise into your system. This also saves cost on expensive snakes and stage boxes.

Figure 3: StudioLive 32R

Digital rack mixers typically have few, if any, onboard controls. This type of mixer relies on two methods of control: mobile devices and hardware controllers.

Figure 4: UC Surface

Control applications, such as PreSonus UC Surface for Apple iPad®, Android™ tablet, Mac®, and Windows® provide wireless access to all mixing functions. These control apps are very flexible and highly mobile, enabling you to mix anywhere within wireless range of your mixer. However, for people who are accustomed to a traditional mixer, this may be disorienting at first.

For those who want to control their digital rack mixer using hardware, without running a long copper snake from the stage to front-of-house, hardware controllers like the StudioLive CS18AI provide the best of both worlds. The StudioLive CS18AI connects to the StudioLive RM/RML digital rack mixers with a relatively inexpensive, lightweight Ethernet cable, enabling very long cable runs with no signal degradation.

Figure 5: CS18AI with StudioLive RML32AI

Connection Types

Once you've selected the type of mixer, the next consideration is the type of connections you'll need. In general, most mixers feature the following types of connections:

- **XLR microphone inputs.** For the most part, XLR input connectors are used for microphone preamplifier inputs. Usually, they can accept both dynamic and condenser microphones. On some mixers, XLR inputs can be switched between mic and line level signals. If this is the case, you will not need a direct box to connect a line-level source.

- **¼" TRS Line Inputs.** TRS or Tip-Ring-Sleeve line inputs are balanced connections used for line level devices like synthesizers and outboard processors.

- **Aux Inputs.** Most mixers provide the ability to connect additional sources to your mixer. These inputs typically are not equipped with processing and are intended for use with consumer electronics, like DVD players. Examples of unbalanced connections are RCA and 1/8-inch TRS connections.

Bus Types

Auxiliary Buses

As its name implies, an aux mix allows you to create an alternate, or "auxiliary," mix that can be routed to an output separate from the Mains. Aux buses have many applications, the two most common of which are creating monitor mixes and inserting external effects processors into the mix. When you turn up the aux send level on a channel, its signal is sent to the corresponding aux output at the level you choose. In this way, the same channel can be used to create several alternate mixes to the main mix.
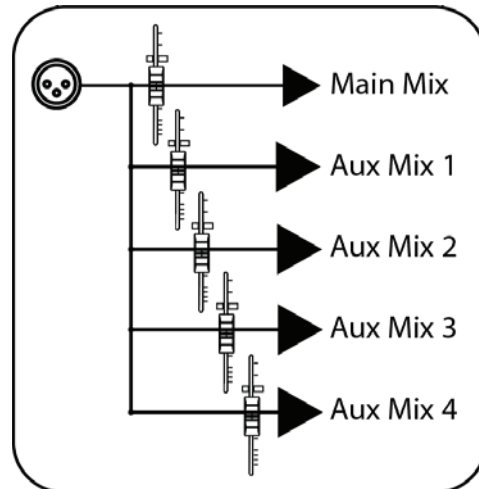
Figure 6: Aux Mix Example

Most mixers have some ability to send at least one monitor mix to the stage. This is typically done with auxiliary buses (aux buses for short). Let's say a mixer has one aux bus. On a mixer like this, each channel would have an aux send level control. This control adjusts the volume of each channel in the aux bus mix. You build your monitor mix by setting the individual aux-send levels for any channels you want in that mix. The aux mix output can then be connected to a stage monitor, a wireless in-ear system, or a headphone distribution amplifier. In this way, your musicians can listen to a monitor mix that can be controlled separately from the main mix going out to the audience.

If you're thinking an aux send sounds a lot like a channel fader, you're way ahead of the game. Just as each channel fader allows you to create a mix for the main output, each aux send allows you to create a mix for the corresponding aux bus output. (Aux sends can also be used for other things like routing controlled amounts of signals to outboard effects.)

A Note about Phantom Power: Phantom power provides voltage (usually 48V) over the XLR connection to provide DC electric power to active microphones and other devices that require it. Most commonly, condenser microphones and active Direct Boxes require phantom power to function, although some dynamic microphones require it as well. Phantom power can damage some microphones, sometimes beyond repair, so you should always consult the documentation that came with your microphone before engaging it. Because of this, some mixers, like StudioLive digital mixers, provide phantom power for each channel individually. Not only does this allow you to use phantom power for just the channels on which you want to use it, it also provides more consistent voltage than phantom power that is provided in banks or globally.

If you're using aux buses exclusively for monitors, the number of aux buses determines the number of discrete monitor mixes you can create. Most lower-cost mixers have one or two. Two aux buses provide two separate mixes, six aux buses provide six separate mixes, and so on. Note that aux buses and their sends are typically mono, so a performer who needs a stereo monitor mix (such as a keyboardist using stereo in-ear monitors) will need two aux buses: one for the left side of the mix and one for right. Keep this in mind when determining how many aux buses you need.

Creating custom monitor mixes is critical. If musicians can't hear themselves or their bandmates, their performance will suffer. A monitor mix can be mono or stereo. Most often, an individual live monitor mix is mono and is sent to a floor-wedge or sidefill monitor (the obvious exception being in-ear monitor systems). A studio monitor mix is usually stereo because it is sent to a headphone amplifier that requires both a left- and a right-channel input. In both cases, the function of the aux bus is the same.

Another use for an aux mix is to send selected channels to an external effects processor. The processed signal is then patched back to the mixer, usually using an aux input. There are at least two main advantages to creating an effects mix instead of inserting an effect on a channel. First, several channels can be sent to a single processor. In addition to greatly simplifying the number of parameters you must control, this can help to create a cohesive sound for your mix. Second, you can vary the level sent from each channel to the processor, rather than patching the output directly into the effect. This allows you to add a lot or a little of an effect to any given channel.

Subgroups

A subgroup allows you to combine multiple channels into a single bus so that the overall level for the entire group is controlled by a single fader and can be processed as a mix, in addition to the processing available for each channel. Subgroups can also be soloed and muted. You will find many uses for subgroups that will make mixing more convenient and will provide better control of your mix.

Grouping individual instruments that create a section in your mix has obvious advantages: The entire group can be muted or soloed, brought up or down in a mix, and faded in or out for a more polished intro or outro. Because subgroups can also be processed, some common groups are drums, backing vocals, horn sections, and string sections.

Another use for a subgroup is to route specific channels to a subwoofer or a front fill, using the same mix as the main front-of-house system. This is especially useful for subwoofers because you can route only the sources that can be reproduced by the subwoofer, allowing you to run your system more efficiently.

Matrix Mixes

On the simplest level, a matrix mix is a mix of mixes. A matrix mix allows you to combine any bus on your mixer, along with input channels. Matrix mixes can be a Swiss Army knife for solving some of the most problematic audio routing issues.

Common uses for matrix mixes are:

- Feeding the house mix to multiple locations (i.e. the lobby, a webcast feed)

- Creating a front fill mix

In some venues, the house PA doesn't cover the front rows effectively. This can be especially problematic when the band on stage is using in-ear monitors instead of floor wedges. Without floor wedges the people seated in the first few rows may actually be "behind" the PA because they will hear more stage volume from the instruments on stage than from the front-of-house system. This problem can be solved by placing a few low-profile fill speakers on the front edge of the stage to cover the first few rows of the audience and using a matrix mix to blend the main left/right mix at a low level with source signals that may be difficult to hear, like the vocal and direct bass channels. StudioLive Series III mixers make this easy by allowing you to mix inputs and outputs for each matrix mix.

Solo Bus

When mixing live, or when recording multiple musicians at once, it is often necessary to quickly listen to just one instrument or group. The solo bus can be used with the monitor bus (if available) to provide the front-of-house engineer with a way to isolate channels in a dedicated mix, without affecting what the audience and musicians hear.

In general, there are three different types of solo options: AFL, PFL, and SIP.

- **AFL (After-Fader Listen).** AFL sends the channel or subgroup signal to the solo bus post-fader so that you can control the level of the soloed signal with the fader.

- **PFL (Pre-Fader Listen).** PFL sends the channel or subgroup signal to the solo bus before it reaches the fader so the fader does not affect the soloed signal.

- **SIP (Solo In Place).** This is also known as "destructive solo." When channels are soloed in this mode, every channel that isn't soloed will be muted, and only the soloed channels will be sent to their assigned outputs. While useful for dialing in dynamics during soundcheck, this mode is dangerous during a live show.

Remote Mixing from Anywhere

Although the mixer is the core of a good PA system, it is often tucked out of the way because of space constraints, to hide the cables and the mixer's flashing lights, and to keep the mixer safe from curious or inebriated audience members. The problem is, hiding the mixer usually means locating the

sound person away from what is known as the "sweet spot." The sweet spot is the middle position between the two sides of a sound system where sound reproduction is the most accurate, making it easier to dial in a great mix.

When the mix position is not centered within the optimal listening area, you'll get a lot of exercise running to the ideal listening position, listening for problems, running back to the mixer to correct the problems you heard, and then running back to the sweet spot to verify the problems were corrected. The traditional alternative is to send an assistant out to listen in those locations and report back. Obviously, neither is a desirable way to mix.

Most modern digital mixers solve this by allowing you to remotely control the mixer from a tablet, smartphone, or laptop. This allows the mixer to be placed pretty much anywhere in the venue. This can also be useful when a member of the band also has to act as the audio engineer because they can mix from the stage.

Figure 7: UC Surfaces on multiple devices

Applications like PreSonus UC Surface allow you to wirelessly control both the front-of-house and monitor mixes, input and output processing, routing, and more from anywhere in the venue. Whether an audio engineer or crew member wants to walk around the venue and onstage to check the mixes, or the bass player is dialing in the front-of-house mix, they can do so with complete wireless control of the mixer.

Remote Monitor Mixing

Large venues and major touring acts generally employ a separate monitor mixer near the stage, in addition to the main mixer at front-of-house. The front-of-house engineer handles the main mix, while the monitor engineer focuses on the needs of the band. This is a luxury that most bands and smaller venues can't afford. Digital mixers like the StudioLive Series III and StudioLive RML series solve this with an application that runs on a mobile device connected wirelessly to the mixer. The app gives each musician onstage control over their own monitor mix.

Figure 8: QMix-UC

For example, PreSonus QMix®-UC gives up to 16 musicians control over the relative mix levels of their own monitor mixes and makes creating these mixes easy with the Wheel of Me view. This lets you select multiple "Me" channels and turn them all up in your monitor at the same time, while controlling the relative balance between "Me" and the rest of the band.

More advanced users can have complete control of the aux-mix send level and panning (for linked auxes) for each channel from the Aux view. These users can also create four custom groups. This allows them to divide complicated mixes into something more manageable by providing a master fader for a group of channels, while still maintaining the relative balance between them. This is especially useful for drums.
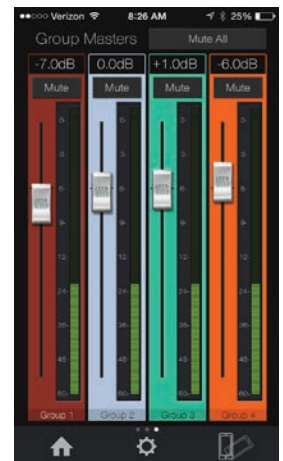

Figure 9: Group View in QMix-UC

Recording in the Studio and Live

The professional solution for recording to a computer is an audio interface, such as the PreSonus Studio 192 series and Quantum series. An audio interface converts analog signals to digital and vice versa, routing digital audio to and from a computer, most often via USB or Thunderbolt. If you're recording live in front of an audience, you already have all your instruments and microphones connected to a mixer, so the problem becomes figuring out how to get the signals into your audio interface at the same time. This isn't impossible, but it involves advanced setup, cabling, and more than a little audio know-how.

Many modern mixers, including all PreSonus mixers, remove this hurdle by building in a professional audio interface that allows you to simply connect the mixer to your computer and hit record in your favorite DAW application — no analog cabling involved.

Figure 10: Capture

PreSonus mixers make this even easier by including both Capture™ and Studio One® for free. Using Capture is especially easy because the software knows which StudioLive mixer you've connected to your computer and automatically creates a track for every input channel and a stereo track for recording your main mix. Capture makes recording even easier with its unique Record Now feature. This button creates a new session, arms all tracks for recording, and starts recording instantly with one mouse click.

StudioLive Series III console mixers take this one step further by providing an onboard 34x34 SD recorder with Capture built in, allowing you to create multitrack recordings without a computer. These consoles can simultaneously record to a computer over USB or AVB. StudioLive AR USB series and StudioLive Series III rack mixers provide an onboard stereo SD recorder that lets you capture the main mix.
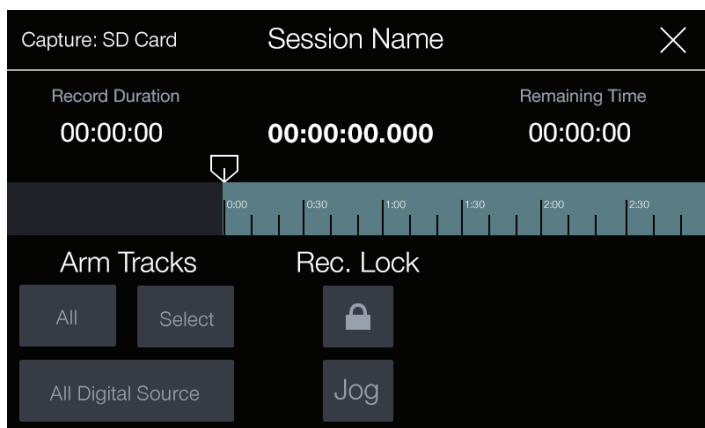

Figure 11: Capture on StudioLive Series III

Whether recording live or in the studio, the next step is to mix in a controlled environment. This allows you to add processing, remove microphone handling noise, and level out fluctuating signals. To do this, you'll need a digital audio workstation (DAW) application. To this end, PreSonus StudioLive mixers include Studio One, a powerful, yet easy-

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to-use, professional recording and mixing application for Mac and Windows. Of course, StudioLive mixers are compatible with other DAWs that support Core Audio (Mac) or ASIO (Windows) but Studio One offers many advantages, including tight integration with StudioLive mixers.

For example, StudioLive scenes that have been saved with a Capture session can be opened natively in Studio One. This means that your mix gets recalled on the Studio One console! Studio One also includes preamp control for StudioLive Series III and RML-series digital mixers. Even better, the Fat Channel XT plug-in can remote control your StudioLive Fat Channel or run on your computer's CPU with no audible change, making StudioLive mixers a seamless part of your Studio One environment.

Get a Good Soundcheck, Even if the Drummer's Stuck in Traffic

Another great way to use your recordings is to soundcheck before the whole band arrives. This is where virtual soundcheck can save time and frustration. As its name implies, virtual soundcheck allows you to check the band's sound without the band. Many modern digital mixers provide some way to do this—some more complex than others—but very few have a true virtual soundcheck that is completely integrated into the mixer. StudioLive mixers provide this amazing experience through Capture's unique Virtual Soundcheck mode.

Once Capture is launched, just click the Virtual Soundcheck button and pick one of the recorded live performances you have stored on the computer. This will load the recorded audio onto the tracks in Capture, complete with track names, and engage all digital returns on the StudioLive mixer. You can now play back audio through the system and dial in the mix before the band arrives. StudioLive Series III mixers take virtual soundcheck to the next level by allowing you to use a recording on an SD card, enabling soundcheck without a computer.
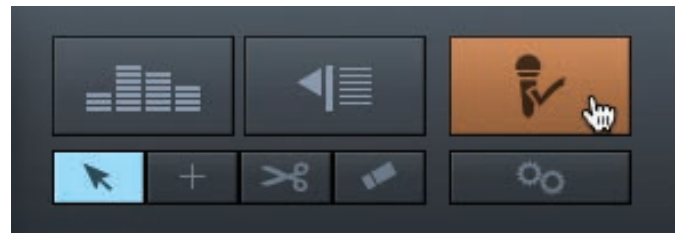

Figure 12: Virtual Soundcheck in Capture

Virtual soundcheck also comes in handy when musicians are running late, enabling you to dial in a great mix while you're waiting. When everyone has arrived, simply click the Virtual Soundcheck button again to remove the audio from the Capture session, disengage all the digital returns on the mixer, and arm every track in Capture for recording so you can record the rehearsal or service. Track names in Capture are broadcast throughout the StudioLive network, so when

virtual soundcheck is done, the channels on your StudioLive mixer, UC Surface, and QMix-UC are labeled and ready to go.
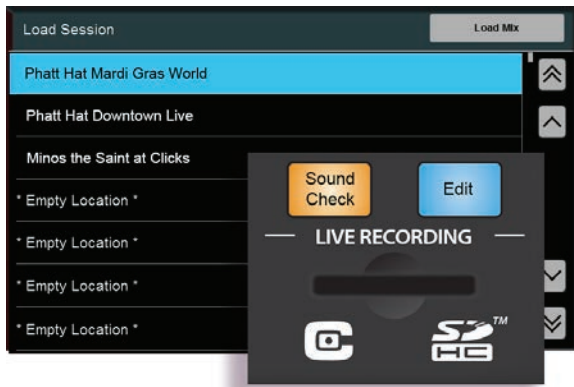

Figure 13: Virtual Soundcheck on StudioLive 32

Using Background Tracks

Large touring acts use background tracks to sound arena-sized and to replicate the sound of their albums. If your mixer provides digital returns from your computer, as with StudioLive mixers, this is easy even for the smallest bands. The first step is to record backing tracks in advance. For playback, press the appropriate Digital Return buttons on the StudioLive to route the tracks back through channels on the mixer. These tracks can be as simple as a full stereo mix or as advanced as individual tracks that members of the band have previously recorded to embellish a performance. The keyboardist, for example, might prerecord some orchestral tracks and play the main piano part live.

In some situations, you'll want one or more members (usually at least the drummer) playing to a click track. A click track is basically just a metronome that makes it easy to sync the live performance with the prerecorded tracks. Since you don't want the audience to hear the click, mute the corresponding mixer channel in the main mix and just send the click to the aux sends for the appropriate performers' monitors.

Integrating your computer into your live performance, also allows you to use plug-ins live. A plug-in is software that provides processing such as reverb, delay, compression, and EQ within a host recording application. For example, if you need a guitar amp but don't have the space for one, you can insert Studio One's Ampire XT plug-in on the guitar player's track in Studio One. Engage the digital return on the guitar player's mixer channel, and you can use the processed signal while your guitar player is playing live and being recorded in Studio One!

For more information about PreSonus and its products, please visit www.presonus.com

PreSonus StudioLive Series III Consoles Compared

	StudioLive 16	StudioLive 24	StudioLive 32
Inputs			
Preamps	16 Remote XMAX	24 Remote XMAX	32 Remote XMAX
Line Inputs	8 Balanced 1/4" TRS	12 Balanced 1/4" TRS	16 Balanced 1/4" TRS
Aux Inputs	2 Stereo Balanced 1/4" TRS	2 Stereo Balanced 1/4" TRS	2 Stereo Balanced 1/4" TRS
Tape Input	2 RCA	2 RCA	2 RCA
Digital Inputs	Stereo wireless Bluetooth™ 4.1 55 AVB	Stereo wireless Bluetooth™ 4.1 55 AVB	Stereo wireless Bluetooth™ 4.1 55 AVB
Outputs and Buses			
FlexMixes	16 (Aux, Subgroup, or Matrix)	16 (Aux, Subgroup, or Matrix)	16 (Aux, Subgroup, or Matrix)
FlexMix Outputs (Analog)	6 XLR, 4 1/4" Balanced TRS	8 XLR, 8 1/4" Balanced TRS	12 XLR, 4 1/4" Balanced TRS
Filter DCAs	24	24	24
Subgroups	4	4	4
Subgroup Outputs (Analog)	0	0	4 Balanced 1/4" TRS
Tape Output	2 RCA	2 RCA	2 RCA
Digital Outputs	1 AES, 55 AVB	1 AES, 55 AVB	1 AES, 55 AVB
Main Outputs	Stereo XLR, Mono XLR	Stereo XLR, Mono XLR	Stereo XLR, Mono XLR
Headphone Output	1 1/4" TRS Stereo	1 1/4" TRS Stereo	1 1/4" TRS Stereo
Monitor Outputs	Stereo 1/4" Balanced TRS	Stereo 1/4" Balanced TRS	Stereo 1/4" Balance TRS
Processing			
Compressor	Standard, Tube Leveling Amplifier, Class-A FET Leveling Amplifier	Standard, Tube Leveling Amplifier, Class-A FET Leveling Amplifier	Standard, Tube Leveling Amplifier, Class-A FET Leveling Amplifier
Parametric EQ	Inputs (4-Band): Standard, Passive Program, Vintage 1970s Outputs: 6-Band Standard	Inputs (4-Band): Standard, Passive Program, Vintage 1970s Outputs: 6-Band Standard	Inputs (4-Band): Standard, Passive Program, Vintage 1970s Outputs: 6-Band Standard
Graphic EQ (Outputs)	8 31-band (assignable)	8 31-band (assignable)	8 31-band (assignable)
Other	High Pass Filter, Noise Gate, Limiter, Input Delay, Output Delay	High Pass Filter, Noise Gate, Limiter, Input Delay, Output Delay	High Pass Filter, Noise Gate, Limiter, Input Delay, Output Delay
Reverb	Digital XL, 335 Digital, Vintage Plate	Digital XL, 335 Digital, Vintage Plate	Digital XL, 335 Digital, Vintage Plate
Delay	Mono, Stereo, Ping Pong	Mono, Stereo, Ping Pong	Mono, Stereo, Ping Pong
Recording			
SD	34x34	34x34	34x34
USB 2.0	38x38	38x38	38x38
AVB	55x55	55x55	55x55

PreSonus StudioLive Series III Rackmount Mixers Compared

	StudioLive 16R	StudioLive 24R	StudioLive 32R
Inputs			
Preamps	16 Remote XMAX	24 Remote XMAX	32 Remote XMAX
Line Inputs	16 Balanced 1/4" TRS, 2 RCA	24 Balanced 1/4" TRS, 2 RCA	32 Balanced 1/4" TRS, 2 RCA
Outputs and Buses			
FlexMixes	6 (Aux, Subgroup, or Matrix)	16 (Aux, Subgroup, or Matrix)	16 (Aux, Subgroup, or Matrix)
FlexMix Outputs (Analog)	6 1/4" Balanced TRS	12 1/4" Balanced TRS	16 1/4" Balanced TRS
Filter DCAs	8	24	24
Subgroups	0	4	4
Digital Outputs	32 AVB	55 AVB	55 AVB
Main Outputs	Stereo XLR	Stereo XLR	Stereo XLR
Headphone Output	1 1/4" TRS Stereo	1 1/4" TRS Stereo	1 1/4" TRS Stereo
Processing			
Compressor	Standard, Tube Leveling Amplifier, Class-A FET Leveling Amplifier	Standard, Tube Leveling Amplifier, Class-A FET Leveling Amplifier	Standard, Tube Leveling Amplifier, Class-A FET Leveling Amplifier
Parametric EQ	Inputs (4-Band): Standard, Passive Program, Vintage 1970s Outputs: 6-Band Standard	Inputs (4-Band): Standard, Passive Program, Vintage 1970s Outputs: 6-Band Standard	Inputs (4-Band): Standard, Passive Program, Vintage 1970s Outputs: 6-Band Standard
Graphic EQ (Outputs)	8 31-band (assignable)	8 31-band (assignable)	8 31-band (assignable)
Other	High Pass Filter, Noise Gate, Limiter, Input Delay, Output Delay	High Pass Filter, Noise Gate, Limiter, Input Delay, Output Delay	High Pass Filter, Noise Gate, Limiter, Input Delay, Output Delay
Reverb	Digital XL, 335 Digital, Vintage Plate	Digital XL, 335 Digital, Vintage Plate	Digital XL, 335 Digital, Vintage Plate
Delay	Mono, Stereo, Ping Pong	Mono, Stereo, Ping Pong	Mono, Stereo, Ping Pong
Recording			
SD	Stereo (Main Mix)	Stereo (Main Mix)	Stereo (Main Mix)
USB 2.0	18x18	38x38	38x38
AVB	32x32	55x55	55x55

NOTE: All StudioLive Series III Mixers come with Capture, Universal Control, UC Surface, and QMix-UC. StudioLIve 32 users receive Studio One Pro and all associated content. StudioLive 24 and StudioLive 16 users receive Studio One Artist and all associated content.

PreSonus StudioLive AR-series Analog Mixers Compared

	StudioLive AR8USB	StudioLive AR12USB	StudioLive AR16USB	StudioLive AR22USB
Analog Inputs	12	16	20	24
Microphone Preamps	4	8	12	16
Balanced Line Inputs	6	12	16	20
Unbalanced Inputs	2 RCA, 1 1/8" TRS	2 RCA, 1 1/8" TRS	2 RCA, 1 1/8" TRS	2 RCA, 1 1/8" TRS
Instrument Inputs	2	2	2	2
Inserts	2	2	2	4
Monitor Mixes	1	2	2	2
FX Buses	1	1	1	1
Main L/R Output	Stereo XLR	Stereo XLR	Stereo XLR	Stereo XLR
Monitor Mix Output	1 1/4" TRS	2 1/4" TRS	2 1/4" TRS	2 1/4" TRS
FX Mix Output	1 1/4" TRS	1 1/4" TRS	1 1/4" TRS	1 1/4" TRS
Control Room Outputs	2 1/4" TRS	2 1/4" TRS	2 1/4" TRS	2 1/4" TRS
Parametric EQ	3-band semi-parametric EQ	Mono channels: 3-band semi-parametric EQ with mid-sweep Stereo channels: 3-band semi-parametric EQ	Mono channels: 3-band semi-parametric EQ with mid-sweep Stereo channels: 3-band semi-parametric EQ	Mono channels: 3-band semi-parametric EQ with mid-sweep Stereo channels: 3-band semi-parametric EQ
SD Recording	Stereo (Main Mix)	Stereo (Main Mix)	Stereo (Main Mix)	Stereo (Main Mix)
USB Recording	8 x 4 (24-bit, 96 kHz)	14 x 4 (24-bit, 96 kHz)	18 x 4 (24-bit, 96 kHz)	22 x 4 (24-bit, 96 kHz)
Bluetooth	Yes	Yes	Yes	Yes
Bundled Software	Studio One Artist, Capture	Studio One Artist, Capture	Studio One Artist, Capture	Studio One Artist, Capture

A Brief Tutorial on Mixers

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