

Master Section

This is the portion of the mixer where everything comes together. Here's where you'll find the master level controls for the main and all the auxiliary mixes, auxiliary return controls, monitor source selection and level controls, meters, and other features that vary from model to model. While channel strips look pretty much alike on all of our mixers, there are a lot of differences in their Master sections.

We'll start with the controls that are common to all mixers and then branch out to the unique features found on the different models.

MAIN (L/R MIX) Fader

This is the dual fader or rotary knob that adjusts the level of the MAIN LEFT and RIGHT outputs together. The fader is fed from the MAIN L/R busses, the fader output is amplified, and it ends up at the MAIN output jacks. If the mixer is equipped with MAIN INSERT jacks, the fader follows them in the chain.

On a mono mixer, everything's the same except the Main fader is a single control fed from a single bus.

The Unity Gain point on the Master is approximately $\frac{3}{4}$ of the way up on a slide fader and 12 o'clock on a rotary knob. All the way up provides 10 dB of boost above Unity gain, and fully down shuts the outputs completely off. This is the fader to pull down gracefully when you want to do that Great Fadeout.

One of the differences among models is whether or not the signal to the Tape output (RCA) jacks is controlled by the MAIN fader. On the CFX and PPM series, the TAPE OUT jacks are ahead of the MAIN fader (you won't hear your fades on tape), but on all the other models, the TAPE outputs follow the MAIN fader.

Meters

On all Mackie mixers, unless you've pressed a SOLO button, the meters read the level of the Main LEFT and RIGHT outputs. On mixers that have CONTROL ROOM SOURCE switches, the meters indicate the level of whatever source is selected (one choice, naturally, is MAIN MIX).

If no CR source is selected and no channel is in SOLO, the meters will just sit there. That's not such a bad thing though, since it will give you a clue as to why you're not hearing anything in the headphones or control room speakers.

Metering and Common Sense

There are two very important points on the meter scale. The top LED (Clip level), and the 0 LED near the middle of the scale.



The CLIP LED illuminates when the main output level reaches +22 or +28 dBu, depending on the model and the output jack. This is the end of the line. The mixer cannot put out any more voltage than this, but it will distort while trying to do so. We guarantee it.



Bear in mind, too, that there's a pretty good chance that whatever's connected to those outputs will be breathing hard at this level. If your amplifier clips at +20 dBu, your sound system will distort before the meters hit +22. Good level management involves knowing the capabilities of every part of the system and setting levels and gains so that nothing clips before the last link in the chain. It does no good to feed a distorted signal to a nice clean amplifier. See Gain Structure in the Tips section for more information and some operating hints that will keep you out of trouble.



The other important point on the meter scale is the 0 LED. It's the target for setting TRIMS using the Level Setting Procedure and it also indicates the nominal output level of the mixer.

When any SOLO switch is pressed, the meter is automatically switched to the Solo bus so that it displays the signal level going into the channel fader (or out of the fader if the SOLO MODE switch is in the AFL position). This includes any boost added by the equalizer, which can be significant.



The SR, 1402-VLZ PRO, 1604-VLZ PRO, 1642-VLZ PRO and Onyx 1620 and 1640 models have two solo modes, PFL and AFL, selectable with the SOLO MODE switch. More about these later, but just a reminder here that you must be in the PFL mode in order to use the meters for setting the TRIMS accurately.

8-Bus Meters

The 8-Bus console has a pair of MAIN meters that display the MAIN and SOLO levels just like the other models, but there's an additional group of eight meters. Located directly above the Bus faders, these indicate the output level of each of the eight subgroups. The calibration of these meters follows

the setting of the output level switches (-10 dBV or +4 dBu). 0 on these meters represents the selected output level.

The reference level for 0 VU on the MAIN/SOLO meters on the 8-Bus console varies depending on whether you're SOLOing a channel or monitoring the outputs. When in SOLO, 0 on the meters represents 0.775 volts (0 dBu), the nominal internal operating level of the console. If you have just one channel assigned to the L/R bus with the faders set so the MAIN meters are reading 0, and then you solo that channel, the meters will jump up by 4 dB. Don't panic, it's supposed to work that way. When not in SOLO, the MAIN meters reference 0 VU to +4 dBu just like the submaster bus meters.

The +22 dBu LEDs at the top of the meters indicate clipping. You should keep levels adjusted so that they never come on.

An accessory meter bridge is available for the 8-Bus console that allows you to meter either all the tape return inputs or the post-fader channel outputs (the same point as the DIRECT OUTPUT).



When a Mackie compact mixer's meter (all models but the 8-Bus) reads 0 VU, the output level at the 1/4" main output jacks is 0 dBu (0.775 V) and +6 dBu at the XLR jacks. For this reason, your mixer's meter and the meter on a recorder connected to the MAIN outputs may not agree. Your recorder probably has a nominal input level of -10 dBV or +4 dBu, which is the voltage level required to make its meters read 0. There's nothing wrong with either unit. You have to understand what the meters are telling you. Trust them, but trust your ears too. Don't become a meter slave and try to fix something that sounds fine but looks a couple of dB off on the meters. Things can get even more confounding when you watch analog and digital meters together. There's more info on metering in the Tips section.

Subgroup Faders

As you might expect, these faders control the levels of the signals sent to the SUB Outputs. When a subgroup fader is turned up, any channel assigned to that subgroup that is not muted and doesn't have its fader pulled completely down will appear at the SUB OUT controlled by that fader.

The SR and 8-Bus series consoles are equipped with Pre-Fader INSERT jacks in the submaster path, allowing you to insert an effects processor, compressor, or equalizer in line with the subgroup and control the processed signal with the subgroup fader.

On consoles with "double bussing", that subgroup fader controls the level of all outputs for its associated bus.

Assigning Subgroups to the Main Mix

One popular use of the subgroup faders is as masters for a group of channels on their way to the MAIN MIX. Let's say you've got a horn section hogging seven channels and you're going to want to fade the horns at a different point or rate than the rest of the band or just shut their mics off when they're not playing. You don't want to use seven hands or seven fingers, so you've un-assigned all the horn channels from the main L-R bus and assigned them to Subgroups 1-2, panning them the way you like them.

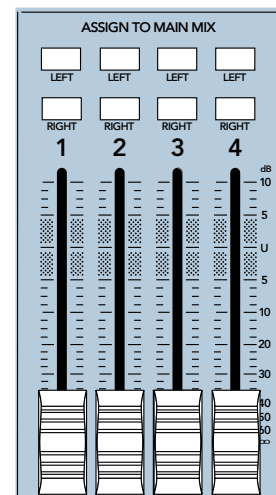
Subgroup-to-main assignments are a little different on the different models, but even though you assign subgroups to the MAIN mix, they're still available as separate outputs should you want to use them for recording.

ASSIGN to MAIN MIX

Here's the subgroup section from a 1604-VLX PRO. The 1642, CFX series, and Onyx 1640 are similar. The LEFT and RIGHT buttons above the subgroup faders assign the fader output to the MAIN Left and MAIN Right outputs respectively.



If you're not clear on the concept of subgroup busses and how to use the PAN pots to assign channel signals to busses, review the Bus ASSIGN section of this book. The PAN pots and BUS ASSIGN switches are keys to understanding this important concept.



If you have a stereo submix (as in the above horn section example), assigning SUB 1 and SUB 2 to the Left and Right Main buses respectively preserves the left-right positioning that you've established with the channel PAN pots.

Pressing both the LEFT and RIGHT buttons on the same subgroup assigns the subgroup to both the Left and Right Main outputs equally, putting the subgroup mix smack in the center of the stereo field. If you're doing a mono mix (a small club PA for example) you could simply assign everything in a submix to a single subgroup and save a fader.

For example, assign all the background vocals to Sub 3 by pressing the 3-4 ASSIGN buttons on each background vocal channel and panning all of those channels to the left. Pressing the LEFT and RIGHT Assign to MAIN MIX buttons above the SUB 3 fader will put the background vocals into both channels of the mix equally and allow you to control the overall background vocal level with the SUB 3 fader.

When you assign a subgroup to both LEFT and RIGHT Main busses as in this example, a few dB of attenuation is automatically added to keep the apparent loudness constant, just like our PAN pots do.

8-Bus Subgroup Assign – MONO L+R

The 8-Bus console has a variation on this theme. In addition to the L (eft) and R (ight) MIX assignment buttons directly above the Subgroup faders, there's one labeled ASSIGN MONO L+R.

The MONO L+R switch works in conjunction with the L and R assignment buttons and functions only when the L or R button below it is also pressed. In the illustration, pressing L MIX and L+R above it assigns the SUB 7 signal equally to the L and R MAIN busses, putting its signal in the center.



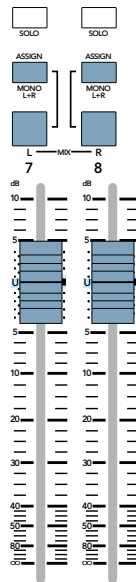
Notice that the odd numbered busses have only a L MIX assign button,

while even numbered busses have only a R MIX button. Stereo subgroups work in pairs, like the ASSIGN buttons in the channel strip. Odd numbered subgroups of a pair are assignable to the LEFT and even numbered subgroups are assignable to the RIGHT. You can't directly assign an odd numbered subgroup to the RIGHT Main output

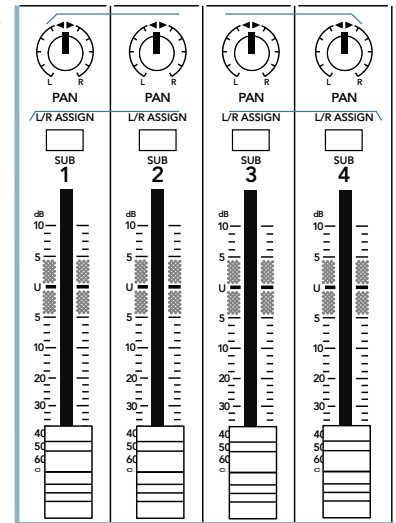
For more flexibility in panning of mono submixes on the 8-Bus console, patch a subgroup output into a vacant channel, assign the channel to L-R, and use the channel's PAN pot to fling that drum kit around the room.

Subgroup PAN and L/R ASSIGN (SR series only)

The SR series consoles provide more flexibility in routing the subgroup outputs by replacing the LEFT and RIGHT buttons with a single ASSIGN button and an associated PAN pot.



Pressing the L/R ASSIGN switch above a subgroup fader assigns the fader to the PAN pot above it. The outputs of the PAN pot go to the L-R MAIN mix, allowing you to pan a whole subgrouped section to the desired position in the mix.



If you have several channels of keyboards and you want them all to appear, for example, a bit left of center in the stereo mix, assign all the keyboards to SUB 1 (ASSIGN 1-2, PAN fully left), then engage the L/R ASSIGN switch for Subgroup 1 and set its PAN pot to about 10 o'clock.

If you have a subgroup that you want to spread across the stereo field in your mix (for example, a large choir or string section) assign the inputs to a pair of subgroups, pan accordingly, and then assign that pair of subgroups to the MAIN outputs, with the SUB pan pots on the odd numbered SUB turned fully left and on the even numbered group turned fully right. If the stereo field is too wide, you can narrow it by turning the pan pots on the SUBs toward the center.



There's no law that says a stereo submix or instrument must be exactly centered between the left and right channels. If you want to mix the string section in stereo but left of center where they'd be in an orchestra, set the SUB pan pots for the string channels at, say, 7 o'clock and 11 o'clock.

Subgroup SOLO

The 8-Bus and SR consoles are equipped with SOLO buttons for the subgroups to allow you to hear the subgroup signal in the headphones and control room outputs as well as check its level on the meters.

On the SR series, the Subgroup SOLO is normally pre-fader. If you want to solo a subgroup post-fader, you must have the SOLO MODE button pressed (IN-PLACE AFL) and have the subgroup's L/R ASSIGN switch engaged. This will allow you audition the subgroup as it appears in the mix.

On the 8-Bus console, the SOLO button above the subgroup fader sends the post-fader subgroup signal to the solo bus. If you have not pressed a subgroup's MONO L+R switch, SOLO sends the odd-numbered subgroups to the left speaker and the even-numbered subgroups to the right, whether or not the L or R buttons have been pressed. But if you've pressed MONO L+R, the subgroup SOLO will appear in both speakers, right smack in the middle.

SOLO Lights and Knobs

As you've probably surmised by now, SOLO can be a very useful function. It's handy for checking the presence and quality of individual inputs (and outputs on some models) when setting up, recording, and mixing.



Here's a reminder that you can press as many SOLO buttons as you want. All the selected channels will be mixed on the Solo bus and come out the headphone and control room outputs. So, you can have a duet or a trio as well as a solo. This is handy if you have a "section" playing and want to check their balance.



SOLO is intended for more than just "soloing." It's **THE** way to set levels for best noise and headroom performance.

You're probably tired of reading it by now, but here's just one more reminder about the Level-Setting Procedure.

There are a few extra goodies in the Solo section of some of the Mackie consoles that affect how SOLO functions, so stand by.

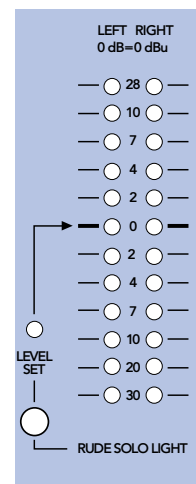
RUDE SOLO LED

This is a Mackie trademark. Every one of our mixers (with exception of the PPM series, which has no Solo functions at all) has a RUDE SOLO light. It's the biggest, brightest, reddest light on the mixer and it flashes when ANY SOLO button is pressed. (OK, so it's green on the Onyx series, but it's still big and it still flashes.) If you can't hear anything because you've accidentally pressed a SOLO button on a channel, this light will rudely remind you to look over the buttons and lights to find the problem.

LEVEL SET LED

To quote Step 4 of the Level-Setting Procedure: "... Some of our mixers have a SOLO MODE switch in the output section. If applicable, select the LEVEL SET (PFL) mode - the LEVEL SET LED will light."

The LEVEL SET LED comes on when the SOLO MODE switch is in the PFL/Level Set position and a SOLO button is pressed. The arrow connecting the RUDE SOLO, LEVEL SET, and 0 VU LED (your target for level setting) will remind you of the association. The arrow tying the LEVEL SET LED to the 0 VU LED is there to remind you of the Level-Setting Procedure target level.



You must have the PFL/LEVEL SET mode selected in order to accurately read and set the channel signal level. If you try to set the TRIM level in AFL Mode, the meter will follow the fader, and that's not the level you want to set. So, what's this PFL/AFL business? Read on.

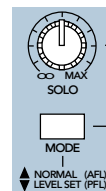
SOLO MODE (PFL/AFL)

Pre-Fader-Listen (PFL) and After-Fader-Listen (AFL) are old British studio terms that came over on the Mayflower and stuck around. When we (in the US) say "Solo," we usually mean PFL – hearing the signal before it hits the fader and pan pot. In other circles, "Solo" means AFL, not only after the fader, but after the pan pot, too. This allows you to hear both the relative level and position in the stereo field. Because AFL comes after the pan pot, it's often called "solo-in-place" to distinguish it from just plain old solo.

For setup, troubleshooting, and cueing in a live mix (psssst . . . don't forget TRIM setting, too), PFL is the way to go. You can hear the signal when nobody else can. You can solo a channel with its fader down and hear what'll come up in the mix when you push up that fader.

For mixing, it's sometimes helpful to hear the signal as it appears in the mix – that's where you might use AFL.

The SOLO MODE switch in the Master section of some Mackie mixers selects whether the SOLO buttons function as PFL or AFL. On mixers without this



switch (1202, CFX, Onyx 1220), solos are pre-fader. On the 8-Bus, they're post-fader, but there's a modification to change them to post-fader. (See the 8-Bus owner's manual).

Which mode is normal? That's a function of the mixer's primary application and what flavor coffee Greg had on the morning he picked the labels for the switches.

On the SR and Onyx series mixers, which are slanted toward sound reinforcement applications, the normal (button up) mode is PFL, and pressing the Solo MODE button switches to AFL. On the other models, the normal (button up) mode is AFL, and you must press the button for PFL SOLO and Level Setting. On some mixers, we even remind you by labeling the PFL Solo Mode LEVEL SET.

SOLO LEVEL

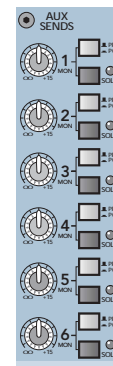
It's handy to have a separate level control for the SOLO signal so you can hear the soloed channel at a comfortable level without changing the overall monitor level. Most Mackie mixers have a SOLO Level control located near the Solo MODE switch. This adjusts the level of the solo signal fed to the phones and control room outputs, but it doesn't change the level going to the meter. You wouldn't want that anyway since you want to read the actual signal level.

SUB and AUX SOLO LEDs

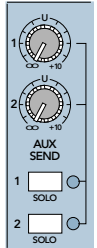
The SR series consoles have a couple of extra SOLO LEDs along with the RUDE SOLO light to help you locate a stray SOLO button. They're located just below the Solo MODE switch. The AUX LED blinks whenever the SOLO switch for any AUX SEND MASTER or GLOBAL AUX RETURN SOLO is engaged. The SUB LED blinks whenever a subgroup solo is engaged.

AUX Send Masters

The AUXiliary section is a mixer within the mixer (several of them, actually) and the AUX Send Master controls are the masters for those mixers. This is one of those areas where you'll find substantial differences among models as to how many controls are provided.



Not all models have a Master for every AUX bus. That's an Onyx AUX Send Master section on the left and a 1604-VLZ PRO section on the right.



Sends without Master controls (AUX 3-6 on the 1604) send the AUX mix to their respective AUX OUT jacks at Unity Gain, relying on the individual channel AUX send levels and the input level adjustment of the effect device or monitor amplifier receiving the AUX signal for overall level adjustment. The manual, the block diagram, or your mixer's control panel is the place to look to see just what your mixer has.

You'll probably want a master level knob handy to adjust the overall volume of AUX mixes used for stage monitors or studio headphone cues. If your mixer doesn't have a Master for every AUX Send, reserve those unity gain AUXs for effects that don't need level tweaking once they're set.

Just a reminder – AUX Send signals can be tapped off either before or after the channel fader, as selected by the PRE/POST switches or determined by controls that are permanently assigned pre- or post-fader. As a rule of thumb, PRE-fader sends are used for monitor feeds, POST-fader sends are used for effects.

You'll note that on the Onyx Aux Send Master section, each individual send has a Pre/Post switch as well as a Solo button, so the entire Aux Send group is selected pre- or post-fader with a single switch. On our other series of mixers, Pre/Post selection (for those sends where it's offered) is in the channel strip, so Aux 1 can be pre-fader on one channel and post-fader on another.

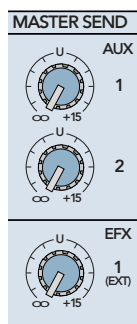
The SR and 8-Bus consoles also have individual Master level controls and SOLO switches for each AUX bus. The Unity Gain setting is straight up, with up to 15 dB of boost available. Of course they go all the way off. ("Our knobs go to zero" – Mike Rivers, retired Mackie tech writer.)

The 1202-VLZ PRO has a Master only for AUX 1, but there's a switch below it that selects whether AUX 1 is pre- or post-fader. For a stage monitor, select PRE and you'll have a handy knob to turn when the lead singer cups his hand to his ear, frowns, and points down at the monitor speaker (the universal signal for "I can't hear myself. TURN IT UP!!!!").

Other VLZ PRO mixers have Masters for AUX 1 and 2 which can be switched PRE or POST at the channel strip.

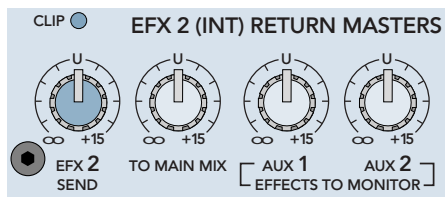
CFX and PPM AUX Masters

The CFX and PPM series mixers with their built-in EMAC effects processor, treat the AUX Masters a bit differently. Like the SR and 8-Bus, there's a Master for each AUX bus, but they don't look quite the same on the panel as the other mixers.



On the CFX series, Masters for AUX 1, AUX 2 and EFX 1 (EXT) are grouped next to the Graphic Equalizer. These control the level of their respective OUT jacks.

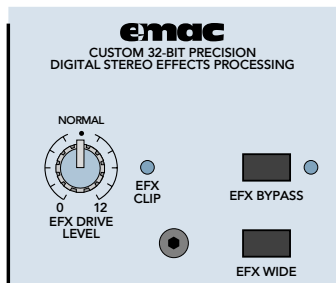
Since the EFX 2 (INT) bus is internally normalled to the EMAC processor, its Master, labeled EFX 2 SEND, is located along with the EMAC controls.



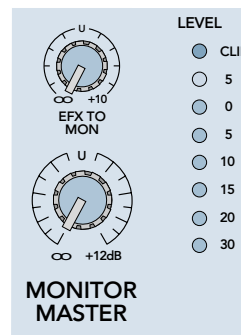
If you're using an outboard effects processor or using the EFX SEND 2 output for an additional monitor feed, the EFX 2 control will adjust its level.

On the PPM series, the Master for the EFX bus is located in the EMAC section and is labeled EFX DRIVE LEVEL.

Normally this controls the master level to the EMAC processor (the EFX Clip light next to it will tell you when you're driving it too hot), but if you plug an outboard processor into the EFX SEND jack, the level to that processor will be controlled by EFX DRIVE.



The MONITOR MASTER for the PPM series is located between the upper graphic equalizer and meter. Normally it controls the level to the internal power amplifier that's assigned to the monitors, but it also adjusts the level at the MONITOR LINE OUT jack so it can control the level going an external monitor amplifier.



AUX Master SOLO

Some models have SOLO switches for the AUX masters. The 1604 and 1642-VLZ PRO have SOLOS for AUX 1 and 2 only, while the 8-Bus, SR series and Onyx 1640 have SOLOS for all the Auxiliary sends. When using the AUXs to feed stage monitors, soloing them in the headphones is a good way to check the mix to the monitor speakers.

The AUX SOLOS are pre-fader (OK, so the rotary knob isn't exactly a fader) on all but the 8-Bus and the Onyx, where they're post-fader. Since the 8-Bus and Onyx were designed with recording applications in mind, the post solo will be most useful for checking the level going to an outboard effects processor. As studio effects are often installed in a rack out of easy reach and view of the engineer, it's handy to be able to check their input level right from the console. Calibrate the setting of the input level control on the processor so that that 0 VU on the processor's meter (or around -16 if it's a digital processor with 0 dB at the top of the meter scale) corresponds to 0 VU on the console meter and you can always check your processor send level right from the console.

Since the SR is designed with live sound in mind, the pre-fader solos allow you to check a monitor mix before you turn it up in the musicians' ears.

There are a few extra reminders in addition to the RUDE SOLO light, to help you figure out just what the heck you've soloed. On the VLZ and Onyx, there's an LED next to each AUX SOLO button. On the SR, there's an AUX SOLO light near the SOLO LEVEL control, and on the 8-Bus, you'll find a single Solo LED below the group of AUX SEND Masters.

AUX RETURNS

All Mackie Auxiliary Returns come in pairs since most effects devices and auxiliary line-level sources have stereo outputs (the PPM series is the exception – stay tuned).

Signals from the AUX inputs are returned through level controls to the MAIN bus where they're mixed with the channel signals. On some models, Aux Returns can be routed to subgroup busses. There are also some neat tricks for adding effects to monitors at the press of a button.

AUX RETURN Level Controls

Each pair of stereo AUX RETURNS is controlled with a single knob. With all Mackie mixers, unless you have another button pressed (which we'll get to real soon), signals passing through these controls will proceed directly to the MAIN MIX bus.

When using the AUX RETURNS as inputs from a parallel-connected effects processor driven from an AUX Output, the RETURN Level controls can generally remain at their Unity Gain (center) position. You'll usually get the right level into the mix with the effects processor's output level set for whatever that manufacturer calls unity gain. Mackie AUX RETURN controls can provide up to 20 dB of gain to accommodate effects with lower output levels (such as those designed to work in line with electric guitars) and of course, you can turn the level of the effect down by going below the Unity gain point.

Yes, you can use a favorite stomp box as an effect with your Mackie mixer. You'll probably need to back down the level of the AUX MASTER that's feeding it, since units with low level outputs are generally designed to work with lower-level inputs.



The nominal output level of effects processors covers a pretty wide range, depending on their intended application and era of manufacture. Old effects processors can be pretty cool! Some of them can be pretty darned noisy, though. With proper gain management you can minimize the amount of noise creeping into your mix from these devices.

Using Noisy Effect Units

While this deviates from the Level-Setting Procedure that we keep pushing, sometimes your ears can be a better guide than the meters. If your effect is too noisy at Unity return gain, try this:

First get a pretty good mix going without the effect. If the effect unit has an Output Level control, turn it up about $\frac{3}{4}$ full. With the multitrack recorder stopped (or the band, if you're working live), raise the AUX RETURN level until you just start to hear noise from the effect, then back it down just a touch. Now, with the music playing, raise the SEND level to

the effect until you hear as much of the effect as you want in the mix. Be careful not to overdrive it. Listen for distortion.

PPM Series AUX RETURN Level Controls

The PPM series mixers have AUX RETURN level controls too, but like the Sends, they're not quite so obvious – their names have been changed to protect the innocent. Normally the EMAC processor is the source for the effect return input, so the EFX TO MAIN and EFX TO MONITOR controls serve as the AUX RETURN Level controls to the main and monitor busses.

Mono PPM mixers have only a single EFFECTS RETURN jack. The stereo models have two, but unlike the other Mackie mixers, they aren't normalised to accommodate a mono source. EFFECTS LEFT RETURN goes to the LEFT MAIN bus and RIGHT RETURN goes to the RIGHT MAIN bus. Plugging into the RETURN jacks disconnects the output of the EMAC processor, but the level controls are still active.

When using a mono effects processor, in order to send its output to both channels, you'll need a Y-Cable to split its output to the two jacks. Don't confuse this with the Insert cable we described previously, which also has one plug on one end and two plugs on the other but is wired differently.

On the PPM mixers, the EFX TO MAIN is the AUX Return level control. The EFX TO MONITOR control sends a mono sum of the left and right returns to the Monitor bus.



It's possible to use an external processor and the EMAC at the same time. If the outboard processor will be used only on a single channel, it can of course be patched in line through the channel INSERT jacks, but that's too simple. You already know that.

The EFFECTS SEND output is a TRS jack wired just like the INSERT jacks, so you can use it to patch a "serial connected" processor in line ahead of the EMAC unit. The outboard processor will receive the EFX mix, and its processed output will become the input to the EMAC.

Another way to skin this cat is to take the "parallel" route. Plug a TS plug halfway into the EFFECTS SEND jack (to the first click) and you now have the Effects bus output, which you can connect to the outboard processor while still leaving the normal feed to the EMAC intact. Bring the outputs of the outboard effects processor into the mix through a pair of mono

or stereo line-level channel inputs and you can blend in the desired amount of the outboard effect.

Remember that the EFX control on the channel to which you're returning the effects processor is still active, so you can actually send the processor's output back into the processor. This often results in an undesirable feedback loop, but at times, particularly with delays, it can be cool. Don't be afraid to experiment – but only at times when the audience won't hear your bad mistakes.



Don't plug an outboard effects processor's output into the EFFECTS RETURN jacks if you also want to use the EMAC.

Doing this will disconnect the EMAC output from the mix.

While you won't have much control, if you're running a stereo PPM in the mono/monitor mode it's possible to plug a mono effect output into one of the Effects Return jacks and have both one channel of the EMAC and the outboard effect going to the main mix. Just in case you were wondering.

CFX AUX RETURN Level Controls

On the CFX series mixers, you'll find EFX 1 RETURN just to the left of the meter. It works just like a normal AUX RETURN Level control, with the Return signal going to the Main mix bus.

The CFX mixers are similar to the PPM series, with the built-in EMAC processor normally connected to the EFX 2 send, and the processed signal returning to the main and monitor busses through the EFX TO MAIN and EFX TO MONITOR (AUX 1 and AUX 2) controls.

Plugging into the EFX 2 RETURN jacks disconnects EMAC processor output signal and replaces it with whatever you've connected to those RETURN jacks. The EFX TO MAIN MIX control on the EMAC panel becomes the Return Level for the EFX 2 signals. EFX TO MONITOR controls send the return signal to the AUX 1 and AUX 2 busses.

Like the PPM (and unlike the other compact mixers), the STEREO EFX RETURN jacks aren't normalised to accommodate a mono return signal. They're strictly stereo. If you want to connect a mono source to the EFX RETURNS, you'll need a Y-cable to split its output to the two jacks.

Unlike the PPM, the RETURN 2 jacks aren't wired as inserts, so you can't patch a processor in line with the EMAC outputs, nor can you use the EFX SEND 2 as a direct output from the EFX 2 mix. If you want

to use a second processor along with the EMAC, you must do it through the EFX 1 connections.

The EFX BYPASS switch and foot switch will kill the output of the EMAC, but not the output of a processor plugged into the EFX RETURN 2 jacks.

EFFECTS TO MONITORS

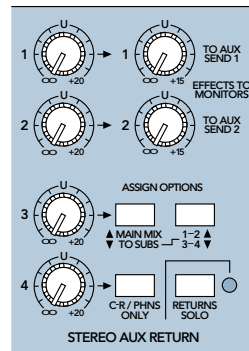


We're about to get into a very cool feature here, but in order to keep from getting confused, you need to understand something that's not intuitive. It would seem logical that AUX SEND 1 and AUX RETURN 1 go hand in hand – send out a signal on 1, and bring its return back on 1, right? Well, in reality there's no logical or electrical connection between the two. They're just names, like two people named Fred.

You can connect the output of an effects processor to any RETURN, regardless of which SEND is feeding the processor. It's easier to dig this if you remember that a Return signal can come from any line-level source (like a CD player or a drum machine), not just a reverb unit fed from a SEND on the mixer.

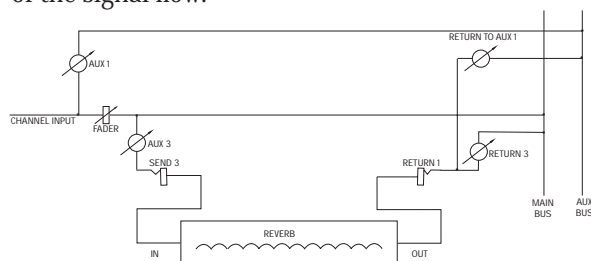
VLZ PRO, Onyx, and SR Mixers

If you want to put some reverb or delay in the stage monitors or headphones, this knob's for you. Here's the 1604-VLZ PRO AUX RETURN section as an example:



The TO AUX SEND 1 and 2 controls are like AUX 1 and AUX 2 Send controls on the main channel strip. The difference is that instead of tapping a signal off the channel input, they get their signal from the AUX RETURN 1 and 2 jacks.

Typically, you'd feed a reverb unit from a post-fader send (3-6). By connecting the reverb outputs to RETURN 1, you can add reverb to the main mix using the AUX RETURN 1 Level control, plus add the same reverb to a monitor fed from the AUX SEND 1 jack. Same for RETURN 2 going to SEND 2. Here's a simplified block diagram of the signal flow:



The EFFECTS TO MONITORS controls are fed ahead of the AUX RETURN controls, so if the singer in the studio wants to drown his ego in reverb but the producer in the control room wants to hear how well he's articulating the words, you can send just a tad of reverb to the control room mix and give the singer as much reverb as he wants.

The Onyx mixers, depending on the model, have different variations on this theme. The 1640 can send Aux Returns 1 and 2 to Aux Sends 5 and 6 respectively. The 1620 sends Aux Return 3 to Aux Send 1, and the 1220 can send Aux Return 2 to Aux Send 1. It can get confusing, so don't try this for the first time on a gig.

Since the RETURNS are stereo but the SENDS are mono, the left and right returns are summed to mono before hitting the EFFECTS TO MONITORS controls.



Some chorus and flange effects achieve a wide stereo spaciousness by throwing one channel completely out of phase from the other channel. This can sound cool in stereo, but when the two channels are added together and become a mono source, the effect can practically disappear because one channel will nearly cancel the other. If you're hearing a nice rich and spacious chorus in the stereo mix and the person on the other end of the monitor chain isn't hearing it, that's likely what's happening. (Of course you hooked things up right!) One solution is to use only a single output from the chorus unit as the effect return. It won't have the luscious stereo wash, but everyone will hear it. Another solution is to select a different patch that works in mono.



You can create a feedback loop if you use AUX SEND 1 to an effects processor that you return to AUX RETURN 1, and then send that to the monitor. It's best to try to avoid this connection. Return the effects processor you want to share with the monitor to RETURN 2 and you'll be safe.

CFX and PPM Mixers

The CFX and PPM mixers also have the ability to send an effect to the monitors. On these mixers, the EFX TO MONITOR controls are fed from the EMAC or an outboard processor plugged into the EFX RETURN 2 (EFFECT RETURN on the PPM) jacks. The two EFX TO MONITOR controls on the CFX send the same effect (from the EMAC or the RETURN 2 jacks) to AUX 1 and AUX 2 through independent controls so you can give the singer a lot of reverb and the drum-

mer just a little. The PPM has a single EFX TO MON control.

Other AUX RETURN Routings

Since subgroup busses can carry their own independent mixes, doesn't it make sense that those mixes should have access to effects, too? How about sending an effect return to only the headphones or control room monitor without adding it to the MAIN mix? Can do.

Assign Options – Main Mix/To Subs (1604 and 1642 -VLZ PRO, Onyx 1640)

Don't make the mistake of reading this button as "Main mix to subs." We learned that lesson and on the Onyx, labeled the button simply SEND TO. While there may be an occasion to send the main mix to the SUB OUTs, that's not what this switch does — it tells RETURN 3 where to go. Its two positions are MAIN MIX (up) and TO SUBS (down). Make more sense?

With this switch up, AUX RETURN 3 behaves like all the other RETURNS — it delivers a stereo signal, controlled by its Level knob, to the MAIN mix. When you engage this switch, RETURN 3 is removed from the MAIN busses and goes to the subgroups, either 1-2 or 3-4, depending on whether the button is up or down.

With this switch in the MAIN MIX (up) position, the 1-2/3-4 switch does absolutely nothing. It's only functional in the TO SUBS (down).

Let's say you have a drum submix on subgroups 1-2 that's assigned to the MAIN mix. You have a reverb for the drums returning to the mixer on RETURN 3.

You could get the drum reverb into the mix simply by letting RETURN 3 go directly to the MAIN mix (MAIN MIX/TO SUBS switch up), but there's a better way. Instead, switch Return 3 TO SUBS and set the 1-2 / 3-4 switch up. Now the reverb return will be blended into the drum mix on SUBS 1-2. As you ride the SUB 1-2 faders, the reverb level will follow.

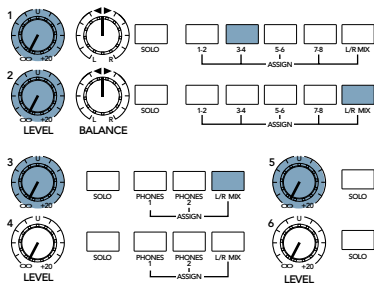
Why would we want to do it this way? Because if you had simply sent the reverb directly to the MAIN mix and did a drum fadeout using the SUB faders, the reverb wouldn't know anything about that fade and would just go on sending "wet" drums to the mix as long as the drums were playing. While that might be a cool effect sometimes, normally it's not what you want. And that's why we threw in those switches.

ASSIGN TO SUB (SR consoles)

On the SR series, we named this pesky switch ASSIGN TO SUBS. Its companion switch is labeled SUB, with positions 1-2 (up) and 3-4 (down). These two switches serve the same function as those described in the previous paragraph only they work on RETURN 4 rather than 3. Same train, different time.

8-Bus

The 8-Bus console has some very flexible AUX RETURN routing options.



RETURNS 1 and 2 can be assigned to the Main L/R MIX and/or any of the four pairs of subgroup busses by pressing the button for that bus pair.

RETURNS 1 and 2 also have a BALANCE control that can be used to adjust the position of a stereo return in the mix. If a stereo effect is used for overall ambience, the BALANCE control will normally be set to the center, distributing it equally to both busses. If an effect is being used as an integral part of a sound, you can use the BALANCE control to move the apparent position of the effect return to coincide with the panned position of the source – wailing sax on the left, sax-drenching reverb on the left, sax reverb stays out of the way of the articulately tinkly mandolin on the right.

RETURNS 3 and 4 can be assigned to the PHONES 1 or 2 outputs in addition to the L/R MIX by pressing the appropriate ASSIGN button(s). Returns 5 and 6 are just plain vanilla, going only to the L/R MIX.

RETURNS SOLO

You can solo the channel inputs, so it's logical to be able to solo the returns, too. You can on some models.

Individual Returns Solo

Each of the RETURNS on the 8-Bus has its own SOLO button. Pressing it sends the RETURN signal to the headphone and control room outputs. These solos are post-fader, so the solo level will change as you adjust the Return Level pot.

Global Returns Solo

The 1604-VLZ PRO and 1642-VLZ PRO and the SR series mixers have a single Returns SOLO button. On the VLZs, it's called RETURNS SOLO, while on the CR it's labeled GLOBAL AUX RETURNS SOLO.

All of the return signals are summed and sent to this switch, so when you have more than one RETURN signal, what you hear can be confusing. The effect returns solo function follows the PFL/AFL SOLO MODE switch, so by selecting AFL and turning the Return Level control down for all but the return you want to hear, you can solo a single return signal.

RETURNS to CR/PHONES ONLY

Remember, the default for all the STEREO AUX RETURNS is to feed them directly into the MAIN MIX. You've learned about diverting one of the AUX RETURNS to the subgroup busses, but the 1604 and 1642-VLZ PRO and Onyx 1640 provide another option for routing RETURN 4.

Engaging the C-R/ PHNS (CR/PHONES ONLY on the Onyx) switch removes AUX RETURN 4's stereo signal from the MAIN MIX and sends it directly to the CTL ROOM/PHONES monitor bus.

Let's say you're doing a direct-to-stereo recording of a live performance, and the drummer wants to play to a click track in the headphones, which you've plugged into the PHONES jack. If the click track went directly into the MAIN MIX, then the recorder and audience would hear it – not very cool. By gum, this is the switch for you. If you connect the metronome to RET 4 and engage the CR/PHONES ONLY switch, the click will only go to the phones or the Control Room monitor speakers, not the MAIN L/R outputs.

Similarly, this switch can be used to add reverb to the headphone and control room mix when tracking, while still allowing you to record dry, and process later.

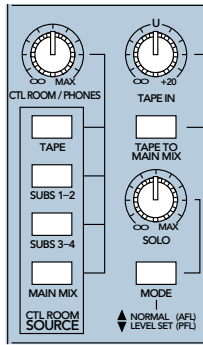
CONTROL ROOM SOURCE SWITCHES (Matrix)

Normally you want to hear the MAIN MIX in the control room, but sometimes you want to hear something else – tape playback of that song you just mixed, or a subgroup that you're sending to the recorder. We've provided a handy set of pushbuttons to select your monitor source.

1604/1642-VLZ PRO CR Source Matrix

Here's the CTRL ROOM SOURCE section from the 1604-VLZ PRO:

The four SOURCE buttons send the MAIN MIX, SUBS 1-2 or 3-4, or the TAPE IN to the CONTROL ROOM OUT and headphone jacks. Normally, you monitor the MAIN MIX, but there are times when you want to hear other sources.

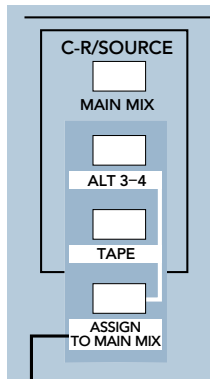


To play back the mix from a stereo mixdown recorder connected to the TAPE IN jacks, de-select MAIN MIX and select TAPE. Normally you'll hear the playback at the same level as the mix if the TAPE IN control is set to its Unity gain position. If you need to match the playback level to the mix level (and you should, so you aren't thrown off by the difference in levels), use the TAPE IN control.

You can also select the SUBS to hear what you're sending to them.

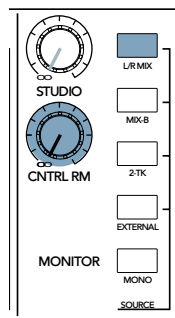
1202/1402-VLZ PRO CR Source Matrix

The 1202 and 1402-VLZ PRO mixers are similar, with ALT 3-4 replacing the two SUB buttons. Pressing the ALT 3-4 button in the CR/SOURCE group routes any channels assigned to the ALT 3-4 bus (MUTE switch pressed) through the CTL ROOM/SUBMIX fader to the headphone jack and Control Room output. Note that with this button (or the TAPE button below it) pressed, the meters read the ALT/TAPE level, not the MAIN MIX level.



8-Bus Control Room/Studio MONITOR Switch Matrix

In the 8-Bus monitor source selection matrix, the TAPE IN source is labeled 2-TK (2-Track). In addition, there's an EXTERNAL button which could come from a second stereo recorder, cassette, or CD player. There's no separate level control for the 2-TK or EXTERNAL sources, so you may have to re-



adjust the CNTRL RM MONITOR Level control for a comfortable playback level if your recorders don't have playback volume controls. It's right handy.

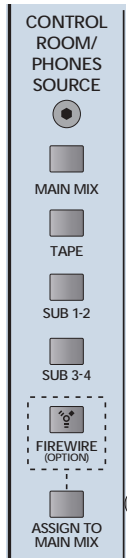


The MONO switch in this group combines the left and right channels of the selected monitor source, allowing you to hear your mix in mono. While this might not seem very important, think of how many people wake up to a clock radio or hear television audio in mono. Sometimes a stereo source or effect can become weak or drop out of the mix in mono due to the phase relationships between the channels. It's a good idea to check any mix in mono. On the 8-Bus, we've made it very convenient.

The monitor source that you select for the Control Room also goes to the STUDIO OUTPUT jacks, which have their own level control.

Onyx CR/Phones Source Matrix

The Onyx series accommodates an optional FireWire digital interface to connect the mixer's mic preamp outputs directly to a computer for multitrack recording. With a computer as your recorder, you'll need to hear playback, just like when you're working with tape. We've provided a button in the control room source selection matrix to route a stereo return from the computer via FireWire to the control room and headphone output. With the optional FireWire card installed in the mixer, pressing the FireWire button is the equivalent of selecting a TAPE input except the input is digital. It's converted to analog for monitoring right in the mixer.



None of these buttons are interlocking, so you can press more than one at once. If you're using the ALT 3-4 outputs to feed a sound card for recording on a computer, when overdubbing you can combine the sound card playback returned to channels assigned to the MAIN mix, with the ALT 3-4 output that you're recording. This is one way of monitoring what you're singing or playing, while overdubbing to previously recorded tracks. See the Applications section page 97 for details.

ASSIGN to MAIN MIX

You'll find an ASSIGN TO MAIN MIX button in the control room selection matrix. On mixers that have an ALT 3-4 bus, this button can be used to send ALT 3-4 bus to the mix, allowing it to function as a subgroup.

When both the ALT 3-4 and ASSIGN TO MAIN MIX buttons are pressed, the CTL ROOM/SUBMIX (CONTROL ROOM on the Onyx) control becomes the master for channels assigned to the ALT 3-4 bus. Raising the control brings the submix of those channels into the MAIN mix.

Tape to Main Mix

All Mackie mixers have stereo TAPE INPUTS that can be routed to the Main mix, but the way the tape signal gets there and how its level is controlled differs among models.

Since we're talking about the Control Room assignment matrix here, let's first talk about tape returns that are controlled in this section of the mixer. You'll find this arrangement on the Onyx 1620 and 1220, and 1202, 1402, and 1604-VLZ PRO. On those mixers, selecting TAPE and pressing the ASSIGN TO MAIN MIX button sends a tape or CD connected to the TAPE IN jacks to the MAIN outputs.

As with the ALT 3-4 busses when assigned to the main mix, the Control Room level control adjusts the level of the tape in the Main mix. This function is handy in a PA application for playing recorded music during a break, or for using recorded music in a show.



You have to keep your wits about you when assigning the tape returns or ALT 3-4 bus to the Main mix with this switch.

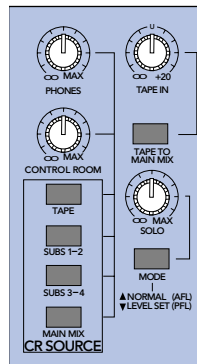
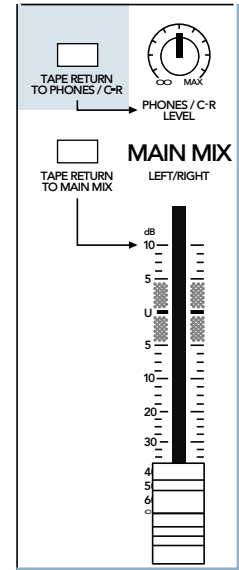
Normally you have the Main mix selected as the control room/phones source, but when you use the control room matrix switches to assign something else to the main mix, it removes the main mix from the control room and headphone outputs even if the Main Mix is still selected as the CR/Phones source. Until you realize what's happening, this can get you going around in circles checking cables.

CFX and PPM Tape In Routing

On the CFX and PPM mixers, the TAPE IN can go to only one place – the MAIN mix. Nothing fancy here. The TAPE inputs are active regardless of the setting of the BREAK switch (coming up shortly).

SR and 1642 Tape In Routing

On the SR series mixers, the TAPE INPUTS don't go anywhere until you've assigned them. The two TAPE RETURN assignment switches are located in the vicinity of the MAIN MIX fader. The TAPE RETURN level control is stashed up in the Aux Send/Return section, adjacent to the meters. The TAPE RETURN TO PHONES/CR switch sends the tape to the control room and phones outputs. It's equivalent to the TAPE switch in the Control Room Matrix of the VLZ mixers. The TAPE RETURN TO MAIN MIX switch assigns the TAPE INPUTS to the MAIN mix, just like it says. This is how to feed intermission music to the house speakers or bring a tape playback into the mix without eating up a channel.

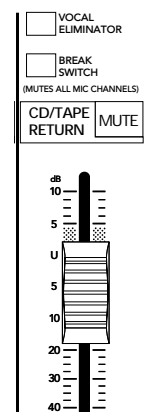


The general theme here is that mixers whose design leans toward recording applications have the tape returns easily routed to the monitor section, while mixers oriented toward live sound have a more direct path from the tape returns to the main mix output. The 1642 is sort of a hybrid. It has a TAPE button in the Control Room assignment matrix which sends

the tape returns to the headphones and control room output. In addition, there's a separate TAPE TO MAIN MIX button that does exactly that. A TAPE IN control adjusts the level of the tape return signal to either destination (or both if that's what you want).

Sing Along With DFX

The DFX series of mixers has a unique built-in processor that works only on the tape inputs. This is a vocal eliminator, which cancels or reduces the level of whatever's in the center of the mix going into it. It's useful (to a greater or lesser extent, depending on the program material) to take the vocal out of a recording so that you can sing along, karaoke style. The tape



return (and we've labeled this TAPE/CD so you'll get the hint that it's not just for tape decks) is permanently assigned to the Main mix, but it goes through its own fader, mute switch, and, if selected, the Vocal Eliminator. The input to the Break switch also picks up the tape returns so you can play recorded music during a break.



WARNING: Assigning the TAPE to the MAIN MIX can create a feedback path between TAPE INPUT and TAPE OUTPUT.

If you're using the tape deck for playback only (intermission music), this is not a problem, but watch out if you're recording your mixes. Make sure your tape deck is not in record, record-pause, or input monitor mode when you engage this switch, or make sure the TAPE IN level knob is fully counterclockwise (off).

BREAK Switch

No, we don't want you to break anything, nor does this switch dial Mackie's toll-free phone number when your mixer breaks (that'll be never). But the band gets a break now and then, and if you're lucky so do you, the sound engineer. Walking away from the mixer in a crowded club with live mics on stage can be embarrassing. What if a drunk (called a customer in polite circles) walks up to the stage and starts singing into a mic? Or someone starts fooling with the knobs and pushes the system into feedback?

To avoid such disasters, we've provided a handy BREAK switch on the CFX, DFX, and PPM mixers.

CFX and DFX BREAK Switch

On the CFX and DFX mixers, pressing the BREAK switch disconnects the L/R bus from the final output section of the mixer and switches it safely to the TAPE IN jacks. Pressing the BREAK switch kills all the mics in the MAIN, SUBWOOFER, and UTILITY outputs. Start up a CD or tape connected to the TAPE IN jacks (or sometimes silence is nice, too) and you can take that needed pause for the cause.

The BREAK switch kills all the mics, so it's handy for when you have to move mics around on stage. On the DFX-12, line inputs 9 through 12 aren't muted by the BREAK switch, so you can still use alternate line-level sources (like a DJ's turntables) while the band is off stage.

Be aware that the BREAK switch doesn't kill the AUX outputs, so your stage monitors will still be live. If you're going to be out of shooting range of the console during a break or you're doing a lot of mic stand thumping, turn the AUX MASTERS that feed

the monitors down, too. Be sure to note where they were set so you can return them to the proper level when the band starts the next set. You know the first thing they say after "Thank you" will be "More monitors, please," but you might as well start where you last left off.



The BREAK switch on the CFX doesn't kill the signal going to the TAPE OUT jacks. If you're recording the show and leave the tape deck running, you'll get a nice recording of the noise during the break. While this might seem like a big waste of tape, if you're thinking of releasing a live album, blending in some club "atmosphere" when editing down the recording is a useful technique to make your listener feel more "there."

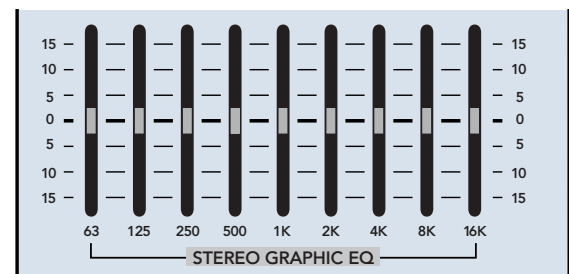
PPM BREAK Switch

The BREAK switch on the PPM mixers serves the same purpose as on the CFX and DFX, but it works a little differently. Pressing the BREAK button mutes Channels 1-6, the MONITOR output, and the EFX.

The switch doesn't affect the TAPE IN or stereo Channels 7 and 8, so you can play intermission music and also leave a mic live on stage for the MC or the comedian (the one the club booked, you hope).

Master Section Graphic EQ

In sound reinforcement applications, it's fairly common to connect a graphic equalizer between the mixer output and the speaker system so that the overall mix can be fine tuned to the room acoustics. The PPM, DFX and CFX mixers provide graphic equalization on their outputs.



The name "Graphic" comes from the appearance of the equalizer controls. A graphic EQ is a collection of several fixed-frequency filters (nine on the PPM and CFX, five on the DFX) with the amount of boost or cut at each frequency adjusted by vertical sliders. The knobs on those sliders form a graph of the frequency response through the equalizer.

The frequencies of the nine-band equalizer are spaced at intervals of one octave, giving it the name

“Octave-band equalizer.” The five-band equalizer bands cover roughly two-octave intervals. Bet you didn’t know you were going to get a short music appreciation lesson in a mixer manual! Other graphic equalizers use narrower band filters spaced at intervals of one-third or one-half octaves.

Graphic equalizers are often used to reduce feedback by reducing the gain at the frequency at which the system is ringing. See the Tips section to learn how (and how not) to do this.

CFX Graphic EQ

The graphic equalizer on the CFX mixers is stereo – each knob controls two filters. Equalizer inputs come from the BREAK switch (either the MAIN L/R mix or a tape player for intermission music) and the equalizer outputs go to the MAIN LEVEL controls.

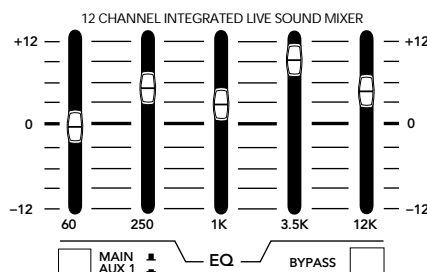
PPM Graphic EQ

The PPM mixers, both the mono and stereo versions, have two graphic equalizers, one for the MAIN output, the other for the MONITOR output.

The MONITOR EQUALIZER is the last thing in the signal chain prior to the MONITOR LINE OUT jack. If you’re operating with the POWER AMP ROUTING switch pressed in, and the Right power amplifier feeding the monitor speakers, this EQ will adjust the frequency response in the monitor speakers connected to the RIGHT (stereo PPM) or POWER AMP 2 (mono PPM) jacks. If you’re using an outboard monitor amplifier or powered speakers connected to the MONITOR LINE OUT jack, the MONITOR EQUALIZER will tweak it.

The MAIN-STEREO/MONO EQUALIZER operates on the MAIN outputs. It’s the last thing in the chain before the MIXER LINE OUT (mono) or L and R MIXER OUT (stereo) jacks. The MAIN equalizer on the stereo PPM models is stereo, so with the AMP ROUTING switch set to STEREO MAINS, both power amplifiers will receive an equalized signal.

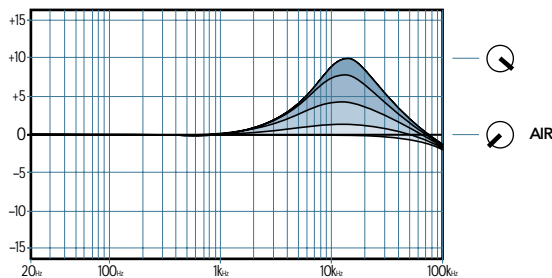
DFX Graphic EQ



The DFX has a stereo graphic equalizer that normally applies the same equalization to the left and right Main outputs. If you’re using the mixer’s AUX 1 output to feed a stage monitor, you may want to equalize the monitor in preference to equalizing the main output. Pressing the MAIN/AUX 1 switch bypasses the equalizer in the Main left and right outputs and routes the AUX 1 signal through the equalizer. The BYPASS switch bypasses the equalizer entirely.

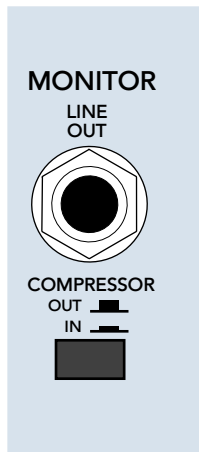
AIR Equalizer (SR Only)

AIR is a high frequency peaking equalizer. It’s independent of the main channel strip equalization and can be applied to the output of each of the four subgroups. It’s centered around 16 kHz and provides a maximum boost of 10 dB. It’s boost-only, so turning the AIR knob fully counterclockwise leaves the frequency response (but not your beer) flat.



Note that a small AIR boost gives a gentle rise in frequency response at the top end of the vocal range. If a vocal is assigned to a submaster, AIR can give it a little, well . . . air. Be careful with large amounts of AIR boost. It can add a crystalline quality to certain sounds, particularly synthesizers, but if the synth is noisy, a healthy shot of AIR will also boost the hiss.

COMPRESSOR (PPM Only)



The PPM mixers are equipped with a compressor at the input of each of the two power amplifiers. The COMPRESSOR IN/OUT switch is located just below the MONITOR LINE OUT jack. Pushing this switch activates the compressor that senses the signal level going into the power amplifiers and reduces high-level signals to reduce the possibility of driving the amplifier into clipping. Clipping is nasty distortion that not only sounds bad, but can

actually damage your loudspeakers.

Keeping the compressor engaged is a good precaution, but when it's really working hard it can contribute its own flavor of distortion to your mix. Pay attention to what's coming out of the speakers, and if you hear the compressor in action, back off. The amplifiers aren't going to get any louder, so they might as well play cleanly.

Compressors can get pretty complex (see the Tips section), but this is one is simple and unobtrusive if it doesn't have to work too hard.

Notes
