PPM Series PA Applications

These powered mixers make PA setup a piece of cake. There's little more to do than plug in mics, speakers, AC power, and go. Lest you ignore some general precautions that apply to all PA setups, we'll review them here. Most of this is common sense, but it's worth mentioning, since this might be your first experience with professional sound reinforcement equipment.

Thermal Considerations

The PPM Series Powered Mixers contain two powerful built-in amplifiers. All amplifiers produce heat, and the more power the amplifier produces, the more heat it radiates. That heat has to go somewhere, and it's important to get it away from an amplifier's electronic components as quickly as possible.

Heat from the output transistors is coupled to the massive die-cast aluminum heat sink on the rear panel. This draws the heat away from the transistors and out to the radiating fins. Air flows across the fins by a process called convection, drawing the heat away from the fins – just like the radiator in your house.

In order for convection cooling to work effectively, it's important to leave adequate space behind the mixer for the hot air to escape. Providing adequate ventilation around the amplifier will result in increased reliability and longevity for your PPM. When you set up the mixer, we recommend leaving at least six inches between the back of the mixer and a wall or curtain to allow adequate air circulation.

Thermal Shutdown

In the unlikely event that the amplifier overheats, a thermal switch will activate, shutting down the mixer until it cools off. If your mixer shuts down, double-check the speaker connections to be sure you aren't loading either of the power amplifiers with a impedance lower than 2 ohms. Overloading the power amplifiers can cause overheating, even at less than maximum volume.

If the load impedance is okay and the amplifier has plenty of breathing space, overheating may be caused by excessive ambient temperature (is it sitting in the sun?). Try aiming a fan at the heat sink to move air across the fins faster.

AC Power Considerations

Be sure your PPM Series Powered Mixer is plugged into an outlet that is able to supply the voltage specified for your model. While the mixer will operate from 75% below to 110% above its rated line voltage, if the line voltage should drop below 97% of the specified voltage (116 V for USA models, 232 V for European and other 240V countries), the amplifiers will no longer be able to supply rated power, resulting in a loss of headroom.

When setting up for a gig, don't plug the mixer into the same outlet or the same electrical circuit as the beer cooler, air conditioner, or other equipment that draws heavy current intermittently. It's not unusual for a refrigeration compressor, particularly in a building with old wiring, to drag the line voltage down by as much as 20% for several seconds whenever it starts.

Under typical conditions of reproducing music with the musical peaks just below the amplifier clipping level, the powered mixers draw the following average currents:

Average Current (120 VAC Line)		
Speaker Load (per amplifier)	406M, 408M, 408S	808M, 808S
8 Ohms	2.0 A	2.2 A
4 Ohms	3.1 A	3.3 A
2 Ohms	4.8 A	5.0 A

NEVER bypass the AC plug's ground pin. This is dangerous! Find a properly grounded AC outlet.

It is recommended that the PPM be connected to a stiff (robust) supply of AC power because the amplifiers place momentary high current demands on the AC line. It's a good idea to pack a heavy duty extension cord (12-3 wire) along with your mixer. That will allow you to find a "clean" outlet rather than just the closest one, and the heavy extension cord will have minimal voltage drop.

The more AC voltage that is available to the mixer (within the specified limits, of course), the louder the amplifiers will be able to play and the more peak output power will be available for cleaner, punchier bass. The complaint of "poor bass performance" is often a result of a skimpy AC supply to the amplifiers.

AC Power Distribution

The majority of AC outlets encountered in homes and clubs (in the U.S.) are served by a 240VAC center-tapped service entrance transformer. This provides two 120V legs, or phases, of AC power on each side of a neutral conductor.

If lighting is used in a show, it is preferable to power the lights from one leg of the service, and power the audio equipment from the other leg. This will help minimize noise from the lights coupling into the audio, particularly when SCR light-dimmers or switches are used.

When setting up for a show, oftentimes you are plugging into a wiring system you know nothing about. You may even be faced with 2-wire outlets that are missing the third safety ground pin. It's a good idea to have a three-wire AC outlet tester in your toolbox so you can check the outlets yourself, making sure they are wired correctly. These testers will tell you if the polarity of the hot and neutral wires is reversed and if the safety ground is disconnected. Don't use an outlet if it is wired improperly! This is to protect yourself as well as your equipment.

If you must plug into a two-wire outlet, use a two-wire to three-wire adapter (and this is the only proper use for such an adapter!). These adapters have a metal tab or a wire with a lug attached, which you should secure underneath the screw that holds the AC outlet faceplate in place. NO CHEATING!! This center screw is grounded (it's the law – the electrical code) and will provide a safety ground for your mixer. Verify proper grounding by connecting the adapter to the outlet and then plugging in your handy-dandy AC outlet tester.

Electromagnetic Interference (EMI and RFI)

The PPM mixers have been designed to reject electromagnetic interference floating through the air. You won't hear taxi cab radios or TV broadcast coming from your PA speakers, but sometimes EMI can come from some unexpected sources and cause annoying buzzes in your system.

Neon signs are frequent offenders. If the club stage is right behind the front window, and there's a bright red neon "BEER" sign flashing on and off, find another place for the mixer other than on a table right behind the sign.

Another common source of EMI is a light dimmer. If you're using lights with dimmer controls, keep your lighting cables separated from your mic and speaker cables, and, as we suggested earlier, try to connect the lights to a different circuit than the mixer. Many cheap wall mounted dimmers found in homes are pretty noisy when the lights are anywhere between full on and full off. While you aren't likely to encounter one of those on a gig, you might have one in your basement rehearsal space.

Oh, and don't leave your cellular telephone next to the mixer. Even when you're not talking, they're letting the system know where they are, radiating RF all the while.

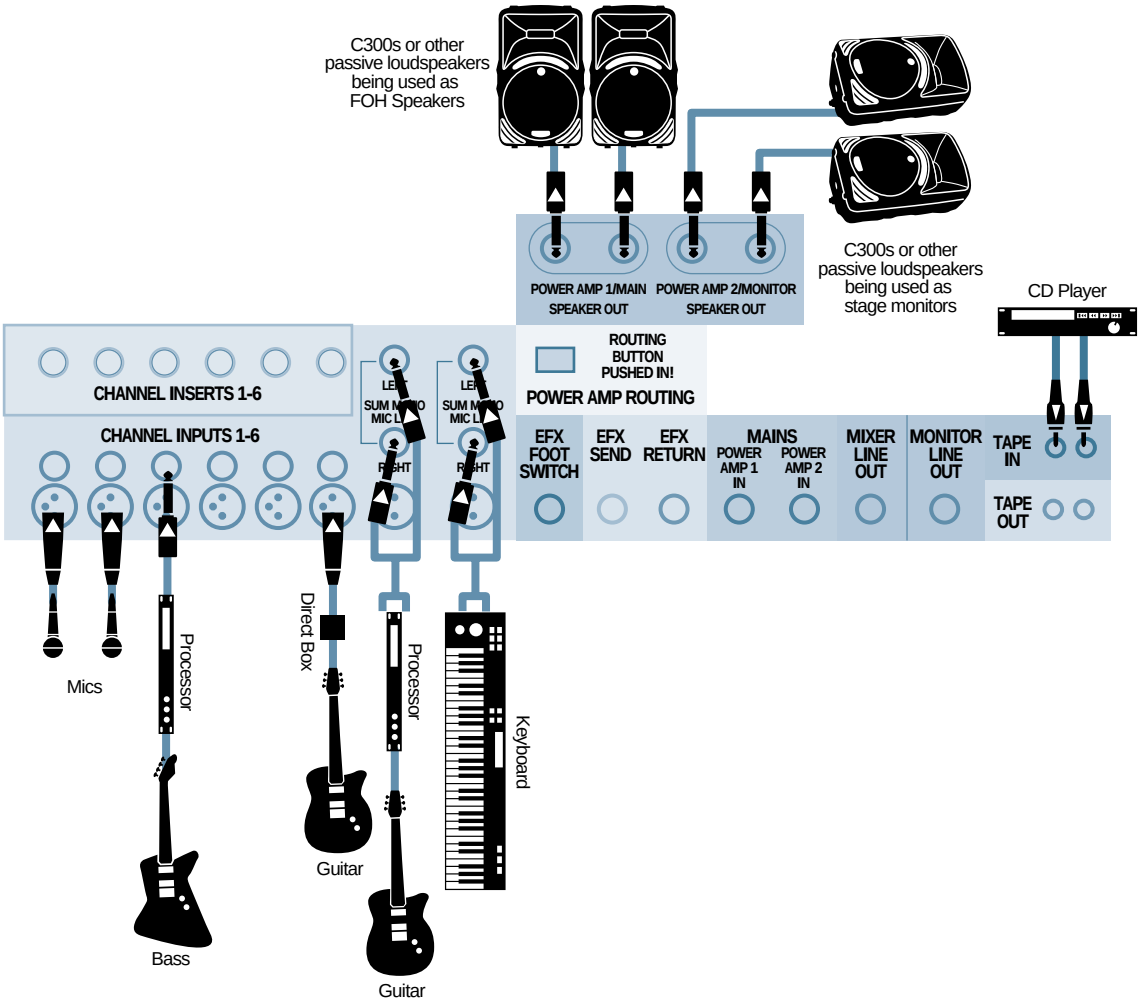
Your Roadie Toolkit

So you won't be caught short-handed at a gig, be sure to pack:

- A two-to-three-prong AC adapter.
- A common and a Phillips screwdriver (to ground your 2-wire adapter).
- A real heavy big orange extension cord, 14 gauge minimum, 12 gauge preferred.
- A multiple outlet strip – you're bound to have more than just the mixer to plug in.
- A volt-ohm meter (VOM) for checking AC line voltage and finding shorted or open cables.

You'll find several applications on the following pages that should cover most of your working situations, or at least give you a good start.

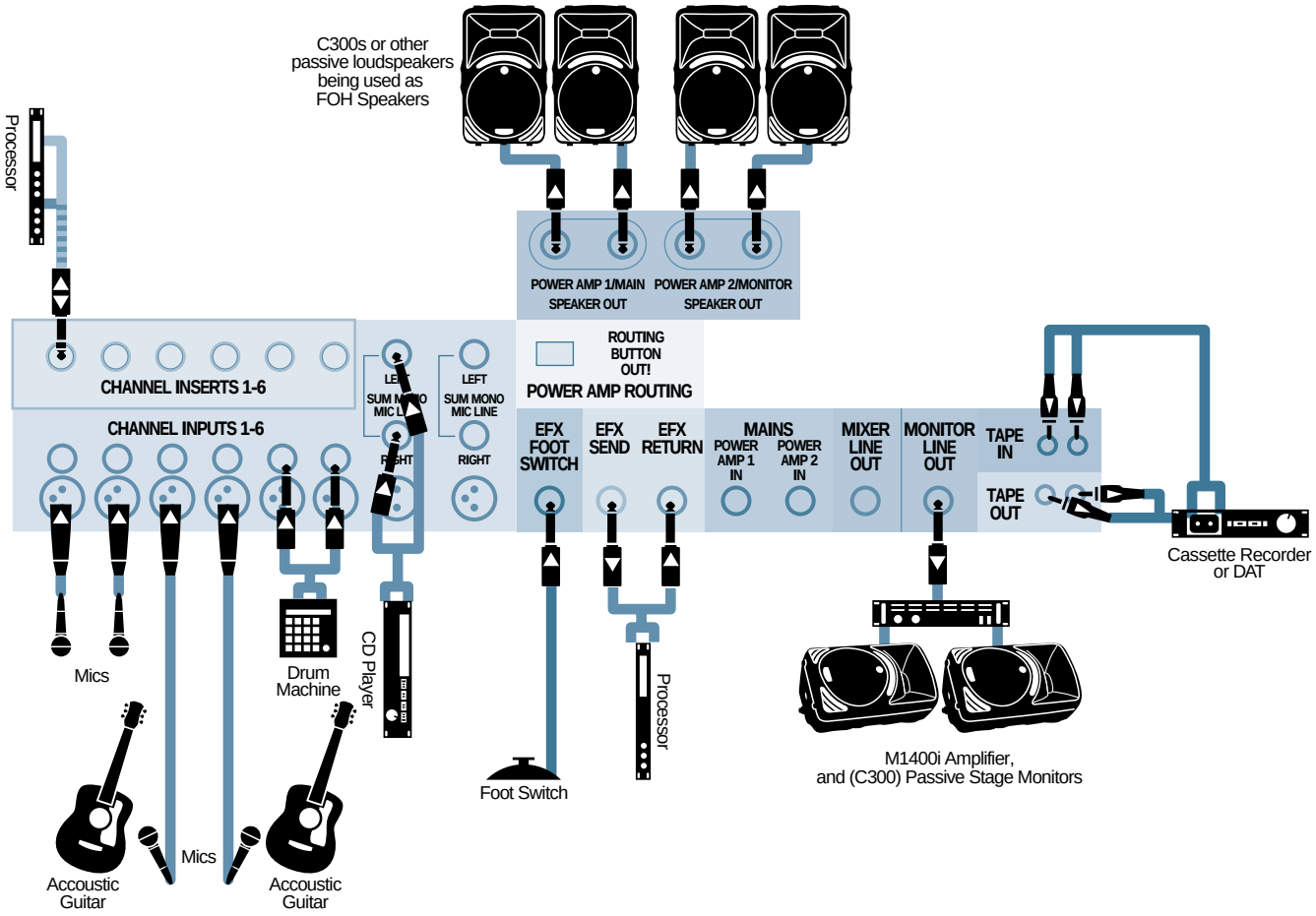
408M Small Club Mono PA



This is how to power the main Front of House (FOH) and the stage monitors with the built-in amplifiers. Press the POWER AMP ROUTING button in, so power amp 1 can power the FOH speakers, and power amp 2 can power the stage monitors.

Note: as each amplifier channel is running two speakers in parallel, the speaker impedance must be 4 ohms or greater to prevent overloading the amplifiers.

808M Large Club or Auditorium Mono PA



This system uses the higher powered 808M, with two speakers per side, to provide more power and coverage for a larger club, hall, or auditorium. (The ROUTING button is out.)

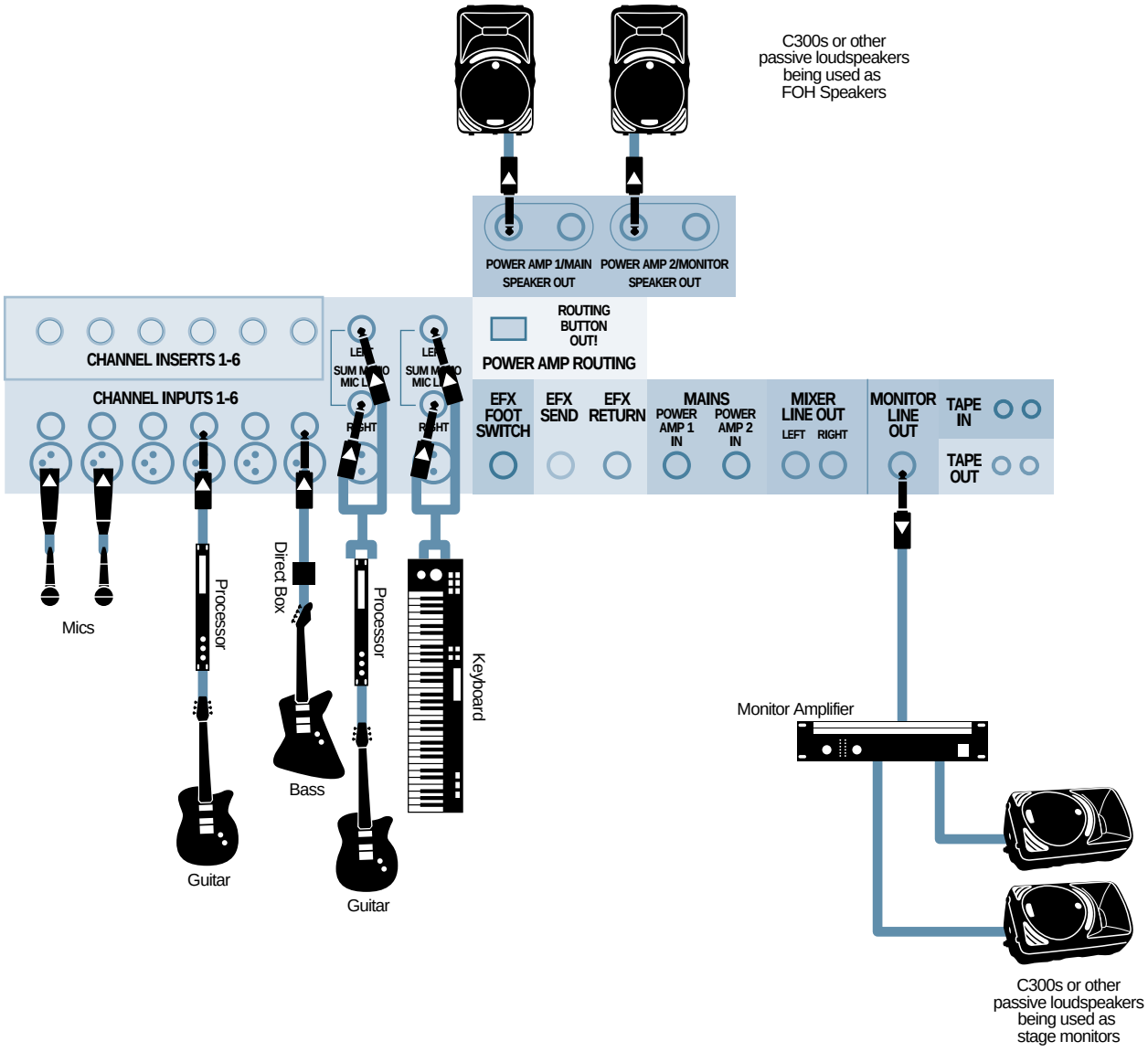
It shows an external amplifier and passive speaker (or powered speaker) for stage monitors.

It also shows how to connect a serial processor to a channel INSERT jack, an external (parallel) processor using the EFFECTS SEND and RETURN jacks, and a recorder to the TAPE IN and OUT jacks.

Note: as each amplifier channel is running two speakers in parallel, the speaker impedance must be 4 ohms or greater to prevent overloading the amplifiers.

To prevent feedback when the tape deck is in Record mode, turn down the TAPE IN Level control, or better yet, disconnect the TAPE IN jacks at the mixer.

408S (Stereo Powered Mixer) Small Club Stereo PA

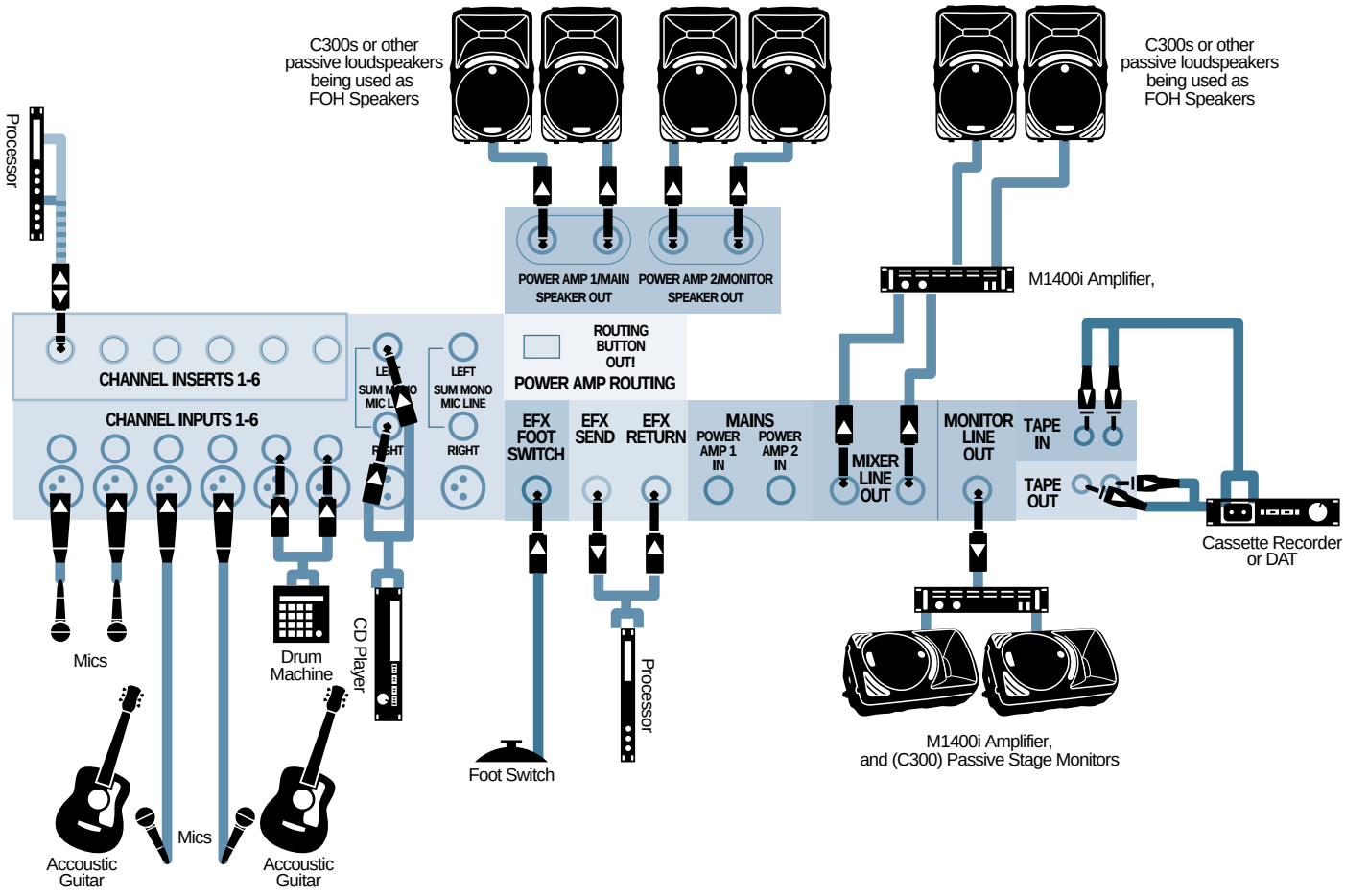


This is a typical setup using both built-in amplifiers for the main Front of House (FOH) speakers and an external amplifier for the monitor speakers.

Note: If you have a 406M, 408M, or 808M, there is no stereo output, because these are mono versions. The Main Mix bus is routed to both internal amplifiers in these models.

808S Large Club Stereo PA

(with auxiliary amplifier to reinforce Front of House)



This system uses the higher powered 808S, with two speakers per side, to provide more power and coverage for a larger club, hall, or auditorium. (The ROUTING button is out.) The left and right line-level MIXER OUTPUTS are used to feed an external amplifier and increase the overall power.

It shows an external amplifier and passive speaker (or powered speaker) for stage monitors.

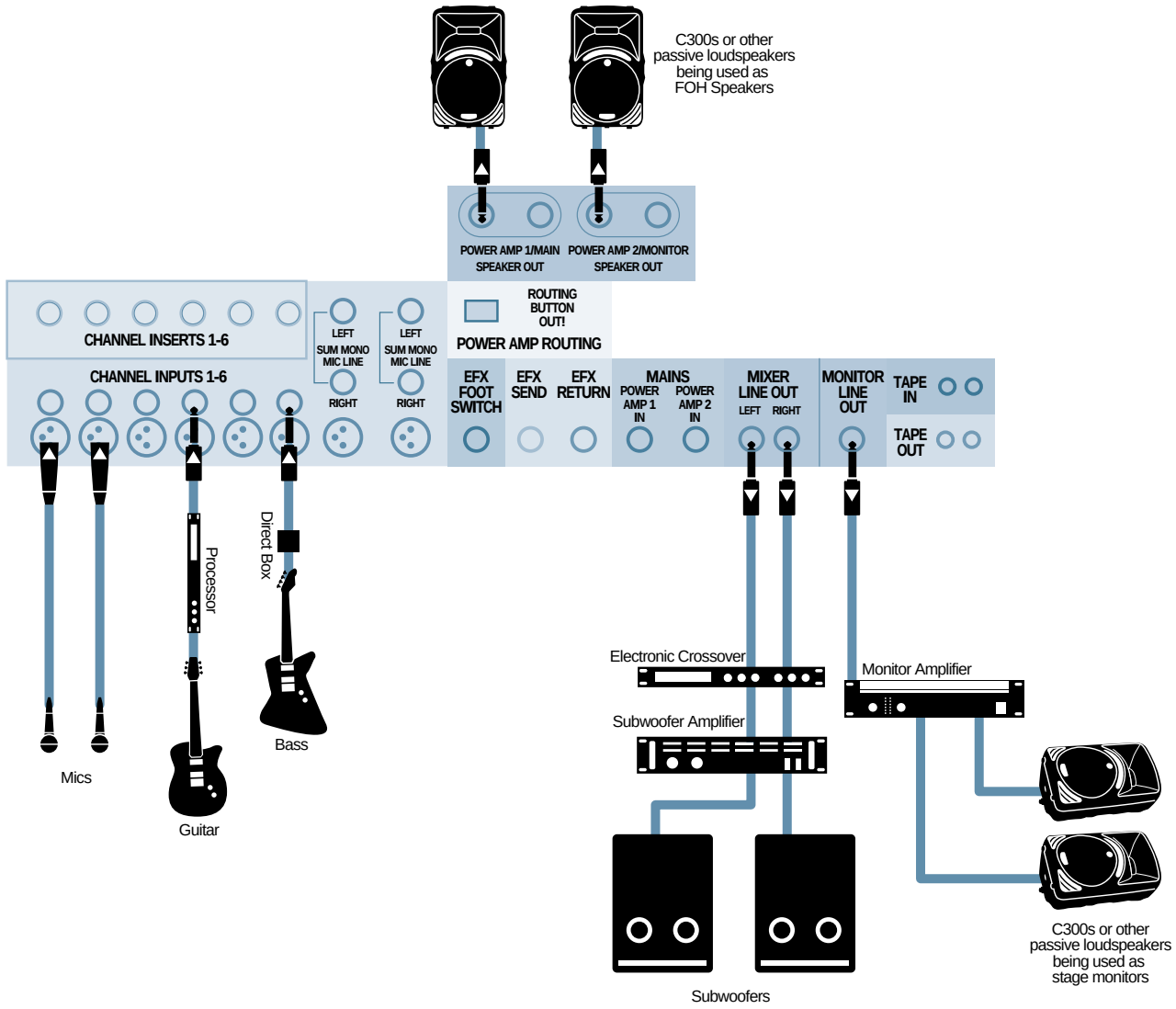
It also shows how to connect a serial processor to a channel INSERT jack, an external (parallel) processor using the EFFECTS SEND and RETURN jacks, and a recorder to the TAPE IN and OUT jacks.

Note: If you have a 406M, 408M, or 808M, there is no stereo output, because these are mono versions. The Main Mix bus is routed to both internal amplifiers, and there is just one MIXER LINE OUT in these models.

Note: As each PPM amplifier channel is running two speakers in parallel, the speaker impedance must be 4 ohms or greater to prevent overloading the amplifiers.

To prevent feedback when the tape deck is in Record mode, turn down the TAPE IN Level control, or better yet, disconnect the TAPE IN jacks at the mixer.

808S Club Stereo PA with Subwoofers (using electronic crossover)

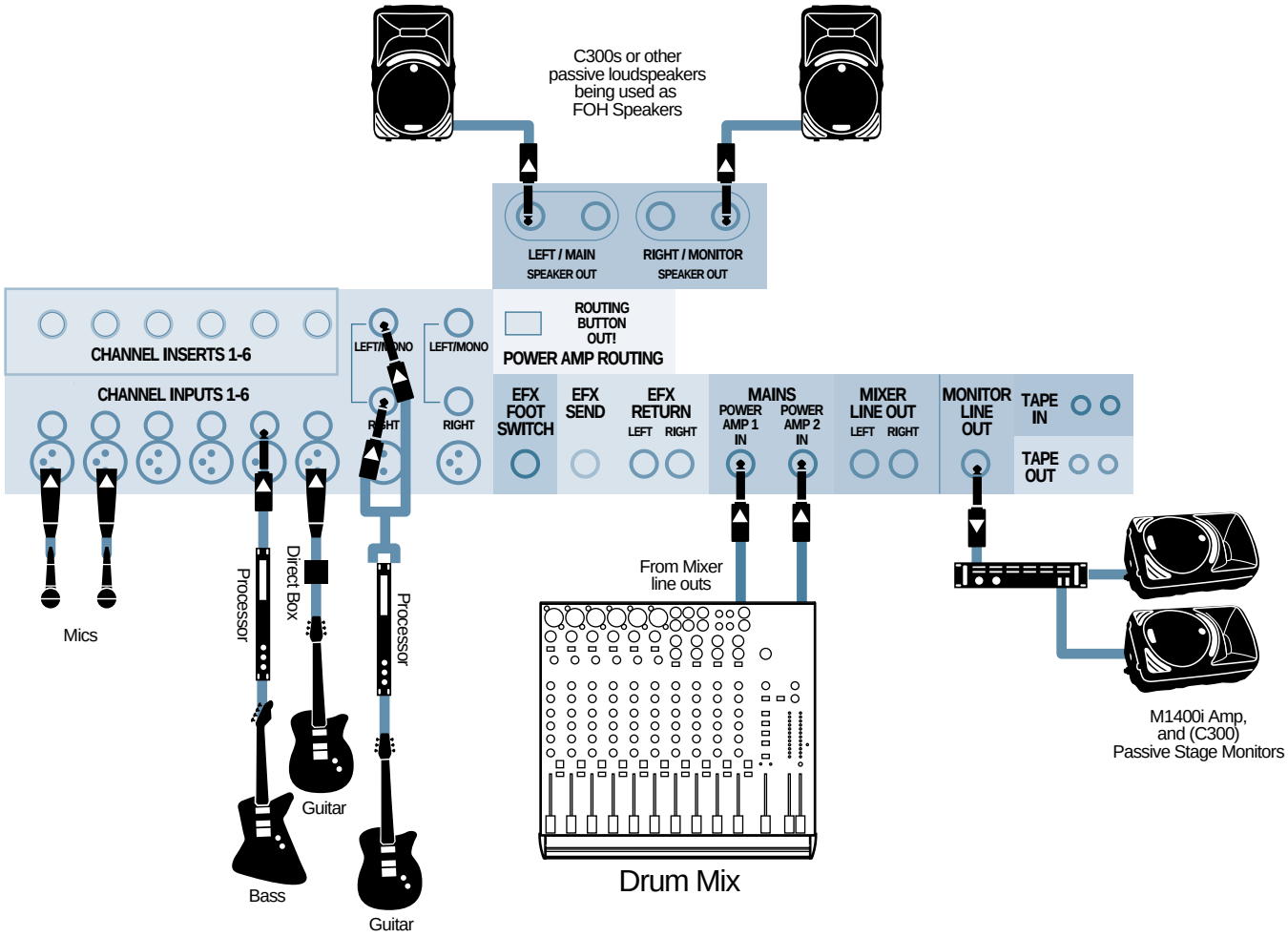


The MIXER LINE OUTs are routed to an electronic crossover, which splits the signal into highs and lows. The low frequency (LF) outputs from the crossover are connected to an external amplifier that powers the subwoofers. The crossover's high frequency outputs are not used, since the FOH speakers are already getting the full frequency range.

Note: If you have a 406M, 408M, or 808M, there is no stereo output, because these are mono versions. The Main Mix bus is routed to both internal amplifiers, and there is just one MIXER LINE OUT in these models.

Adding More Inputs to the PPM

808S With an External Mixer



This shows how to connect a mixer to an earlier-model PPM (built before 2002) using the POWER AMP IN connections. This adds the left and right main mix from the bottom mixer to the top mixer, and increases the number of channels available.

For later model PPM mixers, if something is plugged into the POWER AMP INs, then the PPM internal mixer is disconnected from its power amps, so you will not hear the guitars or mics etc,—just the external mix. So in this case, you would connect the outputs of your external mixer to two unused inputs of the PPM.

Two 808S' Stacked for More Inputs

This shows how to connect two earlier-model PPMs using the MIXER LINE OUT and the POWER AMP IN connections. This adds the left and right main mix from the bottom mixer to the top mixer, and doubles the number of channels available.

See the notes on the next page for later model PPM mixers.

To combine Monitor signals, connect the MONITOR LINE OUT from the top PPM to an unused channel on the bottom PPM (with its ROUTING button in).

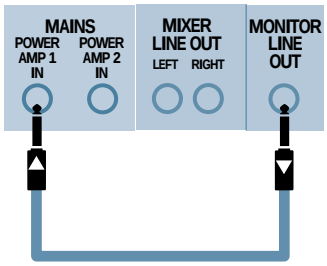
If you have an early mixer, then plugging something into the POWER AMP INs like this will not cut the connection between the top PPM's inputs and its power amps.

On later mixers (2002 onwards), connect these to the top PPM's input channels instead.

Another Approach

In the previous example, the Left/Main power amplifier is unused and an external power amplifier drives the second set of monitor speakers.

By patching the MONITOR LINE OUT on the lower mixer to the L POWER AMP IN, you'll send the monitor signal to the LEFT power amplifier. A second pair of monitors can be connected to the LEFT/MAIN SPEAKER jack. The POWER AMP ROUTING switch should be in the Main/Monitor position (in).



This illustrates the flexibility of the PPM series.

Power Amp INSERTs

On later powered mixers, the POWER AMP IN jacks are wired in the "normalled through" configuration, allowing you to use an Insert cable for patching in an outboard 1/3 octave graphic equalizer, or limiter. Or use the PPM in a bi-amplified speaker system with an electronic crossover.

Note: On PPM mixers (2002 onwards), plugging the output of mixer #1 into the POWER AMP IN of mixer #2 breaks the "normalled" connection from the mixer #2's MIXER OUT to its POWER AMP IN, so you'll lose the output of mixer #1. If you have a newer PPM, you'll need to sacrifice one (or two for stereo) line inputs on mixer #2 to connect the outputs of mixer #1.