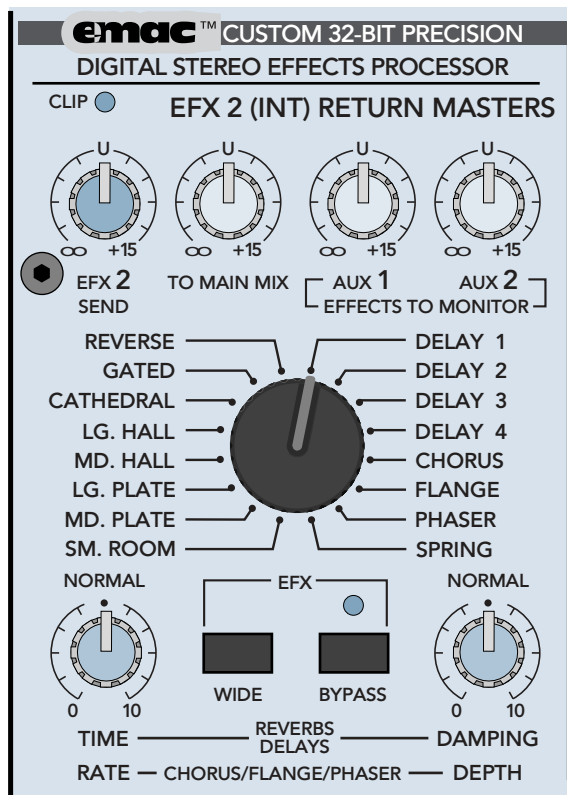


EMAC Effects Processor

EMAC™ stands for Extended Multiply and Accumulate, which is a proprietary 32-bit digital stereo processor developed by the Mackie Digital Engineering Group. It provides the CFX, DFX, and PPM mixers with 16 preset digital effect algorithms to enhance your mix. In addition to the presets, there are two tweaking controls (CFX and PPM only), which adjust parameters appropriate for the type of effect you've selected. On the DFX, the effect parameters are fixed.



In this section, we'll describe the effects and how to adjust them. We've already explained how signals get into and out of the EMAC processor, but we'll review those controls in case you jumped in here.

All of the Effects mixers have the same EMAC functions, the only difference being how the input and output controls are labeled and where they're located. The illustration above shows the EMAC section from a CFX mixer.

EMAC Level Setting

On the CFX, the input level to the EMAC is controlled by EFX 2 SEND. It's like a Master to the EFX 2 controls on the channel strip. On the PPM, this control is called EFX DRIVE LEVEL and on the DFX, it's Aux2/EFX send. To get started, set the input and

output levels to Unity gain (NORMAL or straight up). Generally you'll be able to leave these controls alone as this setting will usually give you the best signal-to-noise ratio, but they're available for tweaking if you need them.

The EMAC processor has a single stereo output, but can go in several different directions. On the CFX, there's level controls to send the effect TO MAIN MIX, to AUX 1 and AUX 2. These three controls are grouped together and labeled EFX 2 (INT) RETURN MASTERS. Since AUX 1 and AUX 2 are conventionally used for monitors, those controls are grouped as EFFECTS TO MONITOR.

On the PPM, outputs go to the EFX TO MON and EFX TO MAIN controls located above the MASTER knobs, next to the meters.

The two outputs of the effect processor in the DFX go to a rotary pot labeled EFFECTS TO STAGE MONITOR and a fader with an associated MUTE button labeled Aux2/EFX RETURN. This controls the effect level to the Main mix. The MUTE button is handy for when you're talking between songs and don't want to sound to the audience like you're standing in the Taj Mahal.

Adjusting the Effect Drive Level

Use the EFX2 (EFX) controls on the individual channels to adjust the amount of each channel's signal you want to go to the EMAC. If you find that you're not getting enough of the effect in the main mix, make sure that the MAIN MIX effect return control is turned up at least to unity. It's okay to turn up the EFX DRIVE LEVEL some more if you need to. Just make sure the EFX CLIP LED never lights more than occasionally.

EFX CLIP (PPM & CFX), LEVEL SET (DFX)

The CLIP LED indicates when the signal going to the EMAC is 6 dB below clipping. This LED should only light occasionally. If it blinks frequently, you should turn down the input to the EMAC a little. Digital clipping is not a pleasant sound to behold.

The DFX has the same indicator, calibrated to the same 6 dB below clipping level, but we named it a more positive and friendly LEVEL SET indicator.

EFX BYPASS

Pushing in this button causes the EFX BYPASS indicator to light and mutes the effects signal. It affects both the internal EMAC effects and, on the PPM (but not the CFX), any external effects processor you may have connected to the EFFECTS RETURN jack.

The DFX, being designed to be operated by a performer on stage who may not be able to find a button in the dark, doesn't have a bypass switch on the panel but does have a jack for a bypass foot switch. The BYPASS LED illuminates when the EMAC is bypassed.

Tweak Controls (PPM/CFX only)

TIME/RATE, DAMPING/DEPTH, and EFX WIDE allow you to fine tune the basic parameters selected by the Preset selector. These have different functions depending on the type of effect you've selected. We'll explain them in detail when we explain the effects.

Effect Preset Selector

Rotate this big detented knob to select the preset effect you want to use. Effects fall under the general category of Reverbs, Delays, and Modulation Effects. Take your choice:

Reverb Programs

These reverbs are designed to provide a wide variety of reverberation sounds for vocal and instrument applications.

REVERSE

Standard reverse reverb, simulating a tail-first effect, starting quiet and increasing in volume until cut off. Swell range is adjustable with the TIME/RATE control from 35 ms to 515 ms. No pre-delay.

GATED

Standard gated reverb where the reverb tail is cut off sharply after preset decay length. Decay range adjustable from 35 ms to 515 ms. No pre-delay.

CATHEDRAL

Dense, smooth reverb with a very long tail, long pre-delay, and late reflections. Tails are very warm with some additional high-end reflections, imitating the stone walls of a cathedral. A very dramatic effect that works well with wind instruments such as flute, slow finger-picked acoustic guitar, and quiet vocal group harmony and choirs. Also works well with keyboards

and drums using short decay. Decay range adjustable from 2 seconds to 10 seconds. Pre-delay fixed at 75 ms.

LARGE HALL

Dense, smooth reverb with long tail, long pre-delay, and some early reflections. Tails are warm with more apparent high-end. Works well with vocals and electric and acoustic guitar. Decay range adjustable from 1 second to 5 seconds. Pre-delay fixed at 75 ms.

MEDIUM HALL

Dense, smooth reverb with normal tail, normal pre-delay, and increased early reflections. Tails are warm with more apparent high-end. Works well with vocals and electric and acoustic guitar. Decay range adjustable from 750 ms to 2.5 seconds. Pre-delay fixed at 65 ms.

LARGE PLATE

Good early reflections and no pre-delay. Tails are normal and warm with strong high-end for increased presence. Perfect for vocals and snare. Decay range adjustable from 1 second to 5 seconds.

MEDIUM PLATE

Good early reflections and no pre-delay. Tails are short and warm with strong high-end for increased presence. Perfect for tight vocals and snare. Decay range adjustable from 750 ms to 2.5 seconds.

SMALL ROOM

Reverb featuring very fast and scattered early reflections with a short pre-delay. Tails are very short and warm with normal high-end imitating absorbent wall materials and audience. Good for tight vocal effects. Decay range adjustable from 250 ms to 1 second. Pre-delay fixed at 30 ms.

SPRING

Mimics the vintage 60's-style spring reverb effect. Tails are normal with strong high-end and a slight waver imitating the slow flutter of a mechanical spring system but without the boinnng! when you bump the cabinet. Very good with acoustic guitar. Decay range adjustable from 1 second to 5 seconds. No pre-delay.

Reverb Parameter Tweaks – TIME, DAMPING, WIDE Switch

When Reverb effects are selected, the TIME/RATE knob controls the reverberation decay time (length of

the tail). The range of values adjusted by the control is scaled to be appropriate for the preset you've selected and is different for each preset. 0 is the shortest time (never actually zero seconds) while 10 is the longest time. See the description of the programs for the time ranges.

The DAMPING/DEPTH knob controls the amount that the simulated reflecting surfaces reflect the high frequencies. The darkest tone (greatest absorption of highs) is at 0 and the brightest tone (greatest reflection of high frequencies) is at 10.

The EFX WIDE switch is very effective at increasing the stereo image of the reverb effect in the stereo versions and enhancing reverb density in mono versions.

Delay Programs

There are four delays available. They differ in the amount of delayed signal fed back into the delay processor. With no feedback, you get just straight delay – one repeat of the input after the selected amount of delay time. When the repeat is fed back into the delay processor, you get a repeat of the repeat... and a repeat of the repeat of the repeat. You get the idea...idea...idea...idea.

Delay 1 has one repeat after the original note. Delay 2 has two repeats, Delay 3 has three, and Delay 4 has four. These are four fixed amounts of feedback, which provide good variety of effects without running the risk of getting into an infinite feedback loop.

The TIME knob adjusts the delay time. The DAMPING knob adjusts the high-frequency response of the delayed signal, just like it does for Reverb programs.

DELAY 1

One repeat. Works best for the slapback delay used in country and swing guitar, and for rockabilly and some country vocals. Delay range is adjustable from 5 ms to 524 ms.

DELAY 2

Two repeats. Provides a fuller, more dramatic effect for rock and gospel vocals, acoustic guitar, and wind instruments such as flute. Especially effective for some finger-picking styles. Delay range adjustable from 5 ms to 524 ms.

DELAY 3

Three repeats. An excellent delay for slow, bluesy vocals and melodic flute music. This delay usually

works best when the channel EFX send is set at less than halfway. Delay range adjustable from 5ms to 524 ms.

DELAY 4

Four repeats. This is for very dramatic delay effects, particularly for enhancing long vocal notes and dramatic instrumental note-chopping effects. Be sure to set the channel EFX send at about halfway. Delay range adjustable from 5 ms to 524 ms.

Delay Parameter Tweaks – TIME, DAMPING

When Delay effects are selected, the TIME/RATE knob controls the time between repeats, with the fastest repeats at the 0 position (5 ms) and the slowest repeats at 10 (524 ms).

Adjust this control to match the tempo of the music for the most dramatic effect. Try delaying for a quarter-note or half-note. Delays of triplet length can be pretty cool, too.

The DAMPING/DEPTH knob controls the high frequency response of the delayed signal, with the darkest tone at 0 and the brightest tone at 10. For an analog tape delay sound, use a darker setting so that each subsequent repeat is darker than the prior one. For a crisp digital delay sound, use a brighter setting so the tone retains its high-end on each subsequent repeat.

Since the delay effect is not stereo, it is not affected by the EFX WIDE switch.

Modulation Effects

These effects include Chorus, Flange and Phaser, and are generally used for enhancement of instrumental music. However, Chorus adds a dramatic effect to vocals as well.

Unlike reverbs and delays where once parameters are set they stay put, in a Modulation effect, some parameter is constantly changing or modulated, hence the name.

CHORUS

Provides a soft, ethereal sweeping effect. Perfect for enhancement of electric and acoustic guitar and bass. Also adds a dramatic effect to vocals, particularly group harmonies and choirs. The channel EFX send should be set halfway or higher. The sweep rate is adjustable from 0.5 Hz to 30 Hz. Depth of the effect is adjustable from 0 % to 100 %.

FLANGE

Creates a strong sweeping effect, particularly effective on rock electric guitar, lead, and rhythm. The channel EFX send should be set halfway or higher. Sweep rate is adjustable from 0.5 Hz to 20 Hz. Depth adjustable from 0 % to 100 %.

PHASER

This effect is perfect for enhancing strummed acoustic guitar or electric guitar power chords. The PHASER effectively duplicates the popular 70's phase shift effect used for guitar. Sweep rate is adjustable from 0.5 Hz to 35 Hz. Depth adjustable from 50 % to 100 %.

**Modulation Effects Parameter Tweaks
– RATE, DEPTH, WIDE Switch**

When a Modulation effect is selected, the TIME/RATE knob controls the effect Rate, which is the speed of the sweeping effect. Fully counter-clockwise produces the slowest sweeps and fully clockwise produces the fastest.

The DAMPING/DEPTH knob controls the effect depth, which is the strength of the sweeping effect. Fully counter-clockwise produces the lightest sweeping effect and fully clockwise produces the thickest.

The EFX WIDE switch is very effective at dramatically increasing the strength and thickness of a modulation effect. For example, using the EFX WIDE on Chorus mimics a multi-voiced chorus effect.

The following table is a quick reference to the EMAC effects, showing the range of parameters and suggested applications. Your mileage definitely will vary, but give these a try for starters.

EMAC Effects and Applications Summary

Note: the PPM series Powered Mixers are the exception since they don't have a SOLO switch. Watch the INPUT LEVEL SET light. When it blinks on peaks, that's the equivalent of a 0 VU reading.

EMAC SELECTIONS		
NAME	PARAMETERS	TYPICAL APPLICATIONS
REVERBS	DECAY/PRE-DELAY	
REVERSE	35 ms-515 ms/none	Special effects on instruments or drums
GATED	35 ms-515 ms/none	Special effects on instruments or drums
CATHEDRAL	2 sec-10sec/75 ms	Wind instruments; acoustic guitar; choir
LG. HALL	1 sec-5 sec/75 ms	Vocals; electric and acoustic guitar
MD. HALL	750 ms-2.5 sec/65 ms	Vocals; electric and acoustic guitar
LG. PLATE	1 sec-5 sec/none	Vocals; snare
MD. PLATE	750 ms-2.5 sec/none	Tight vocals; snare
SM. ROOM	250 ms-1 sec/30 ms	Tight vocals
SPRING	1 sec-5 sec/none	Acoustic guitar
DELAYS	DELAY/NO. OF REPEATS	
DELAY 1	5 ms-524 ms/1	Country, swing guitar; rockabilly vocals
DELAY 2	5 ms-524 ms/2	Rock, gospel vocals; acoustic guitar; wind instruments
DELAY 3	5 ms-524 ms/3	Slow, bluesy vocals; melodic flute
DELAY 4	5 ms-524 ms/4	Long vocal notes
CHORUS/FLANGE/PHASE	MODULATION/DEPTH	
CHORUS	0.5 Hz-30Hz/0 %-100 %	Electric, acoustic guitars; bass; choir
FLANGE	0.5 Hz-20 Hz/0 %-100 %	Rock electric guitar
PHASER	0.5 Hz-35 Hz/50 %-100 %	Strummed acoustic guitar, electric guitar power chords