

## CFX SERIES 12-, 16-, and 20-Channel Mic/Line Mixers

### Introduction

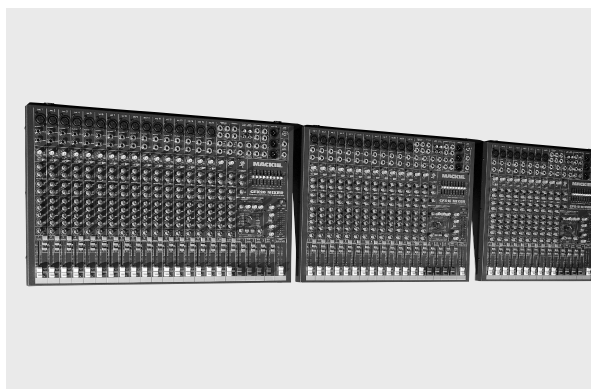
■ The CFX™ Series mixers are comprised of three compact mixers, each having a stereo graphic equalizer and digital effects built in. The EMAC™ 32-bit digital effects processor was custom designed by our digital engineers and rivals the sound of many high-quality outboard processors.

■ Like all of Mackie Designs' mixers, the CFX Series mixers are designed for rugged, day-in and day-out road use. Their sturdy-yet-light steel monocoque construction houses rugged, double-sided SMT-plated fiberglass circuit boards, and 60 mm faders with ultra-tight lip seals for keeping out dust and other contaminants. Impact-resistant knobs are mounted so they "ride" just above the steel chassis—they absorb impact without trouble. Furthermore, they're designed to last, thanks to co-molded potentiometers that do not get brittle and crack up. Metal stand-offs are used at regular intervals to mount thick fiberglass circuit boards inside the mixer. These are extremely flexible mixers, not only because of their multiple input/output configurations, but also because of their 4 subgroups, 9-band graphic EQ, and built-in digital effects.

■ The CFX•12 has eight mic/line channels and two stereo line input channels, the CFX•16 has 12 mic/line channels and two stereo line input channels, and the CFX•20 has 16 mic/line channels and two stereo line input channels. All mic/line channels have unbalanced inserts. Each channel strip has one external and one internal/external effects send plus two aux sends, pan, mute, solo (PFL), bus assigns, and 60 mm log-taper fader. The mic/line channels also have input trim controls with individual Zero Level LEDs, 3-band EQ with swept midrange, and 100 Hz low cut filters. Two separate stage monitor mixes can be created with their own effects levels.

■ The CFX Series is a true 4-bus mixer, with four sub bus faders and master ganged Left/Right fader. Outputs include XLR and TRS balanced/unbalanced main outputs, a 75 Hz low-pass subwoofer XLR output, extra TRS

(continued on page 3)



### Features

- High headroom mic preamps
- CFX•12 channels (8 mic/line mono, 2 stereo line)
- CFX•16 channels (12 mic/line mono, 2 stereo line)
- CFX•20 channels (16 mic/line mono, 2 stereo line)
- 32-bit EMAC digital effects
- External and internal EFX sends
- EFX to Monitor control
- 9-band stereo graphic equalizer
- Inserts on all mic channels and main mix
- True 4-bus design with direct sub outs and L/R assign
- 2 Pre/Post aux sends and internal/external FX level sends
- 3-band EQ with swept mid (100 Hz to 8 kHz) on mic/line
- 4-band EQ on stereo line channels
- Pan, Mute, PFL solo on each channel
- 100 Hz low-cut filters on all mic/line channels
- Subwoofer output from built-in 18 dB/octave, 75 Hz crossover
- Break switch mutes all channels
- Headphone output with level control
- Tape/CD inputs with level control assignable to Main Mix via Break switch
- Logarithmic taper 60 mm faders
- 48 V phantom power
- 12 V BNC lamp jack

### Applications

- Live sound mixing for churches, clubs, schools, conference centers, tradeshow, presentations
- Keyboard, drum machine, and DJ mixing
- A/V presentations, multimedia

### ■ RELATED PRODUCTS

SRM450 Active Loudspeaker, SR1530 Three-way Active Loudspeaker, SWA 1501 and SWA 1801 Active Subwoofers, M•800, M•1400, M•1400i, M•2600 Power Amplifiers, C300 Loudspeaker, and S500 Loudspeaker.

# CFX Series

## CFX SERIES 12-, 16-, and 20-Channel Mic/Line Mixers

### Specifications

#### Frequency Response:

32 Hz to 20 kHz +0, -1 dB

#### Distortion:

THD and SMPTE IMD; 20 Hz to 20 kHz

Mic Input to Main Output < 0.05% @ +4 dBu output

#### Noise:

20 Hz to 20 kHz (150 Ohms source impedance)

Equivalent Input Noise (EIN) -127 dBu

Residual Output Noise Main, Monitor, & Effects outputs

Channel & Master levels off -95 dBu

#### Common Mode Rejection Ratio (CMRR):

@1 kHz, Trim @ 0 dB 60 dB

#### Crosstalk:

Adjacent Inputs or Input to Output -90 dB @ 1 kHz

Fader Off -90 dB @ 1 kHz

Mute Switch and Break Switch Mute -80 dB @ 1 kHz

#### Input Level Trim Control Range:

+6 to -50 dB

#### Phantom Power:

+48 VDC

#### Equalization

Low Cut: 100 Hz, -18 dB/octave

#### Mono Channel EQ:

High +15 dB @ 12 kHz

Mid +15 dB @ 100 Hz to 8 kHz

Low +15 dB @ 80 Hz

#### Stereo Channel EQ:

High +15 dB @ 12 kHz

High Mid +15 dB @ 100 Hz to 3 kHz

Low Mid +15 dB @ 400 Hz

Low +15 dB @ 80 Hz

#### Graphic EQ:

(9 bands): +15 dB, Q=1.414 ISO octave centers @ 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1k, 2k, 4k, 8k, 16 kHz

#### Mixer Rated Output:

Main, Sub, Aux, & EFX +4 dBu

Maximum Rated Output +20 dBu

#### Maximum Input Levels:

Mic input, trim @ +6 dB +18 dBu

Line input, trim @ -15 dB +38 dBu

Insert Return, Stereo Line Input, Tape Input, and Effects Return +20 dBu

#### Maximum Voltage Gain:

Mic Input to  
Insert Output 50 dB  
Tape Output 66 dB  
Sub Output 66 dB  
Main Output 76 dB  
Aux Send 71 dB

Line Input to  
Insert Output 30 dB  
Tape Output 46 dB  
Sub Output 46 dB  
Main Output 56 dB  
Aux Send 51 dB

Stereo Line Input to  
Tape Output 40 dB  
Sub Output 40 dB  
Main Output 50 dB  
Aux Send 45 dB

Tape Input to  
Main Output 30 dB

Effects Return to  
Main Output 30 dB

Input Impedance  
Mic Input: 3 k $\Omega$ , balanced  
Line Input: 40 k $\Omega$ , balanced  
Insert Return, Stereo Line Input, Tape Input, and Effects Returns: 10 k $\Omega$ , unbalanced

Output Impedance  
Main Output, Insert Output, Tape Output, Sub Output, and Effects Sends: 150  $\Omega$   
Digital Effects

#### Resolution:

32-bit EMAC processing, 2-channel

#### Number of Presets:

16

#### Parameters:

2 controllable

#### Channel Level Set LED (Sensitivity):

0 dBu (normal operating level)

#### VU Meters

Main L/R

12 Segments: Clip, +10, +7, +4, +2, 0, -2, -4, -7, -10, -20, -30

#### Physical Dimensions:

CFX•12  
Height 4.6" (117 mm)  
Width 17.2" (437 mm)  
Depth 15.7" (399 mm)  
Overall Depth 5.0" (127 mm)  
Weight 17.8 lbs. (8.1 kg)

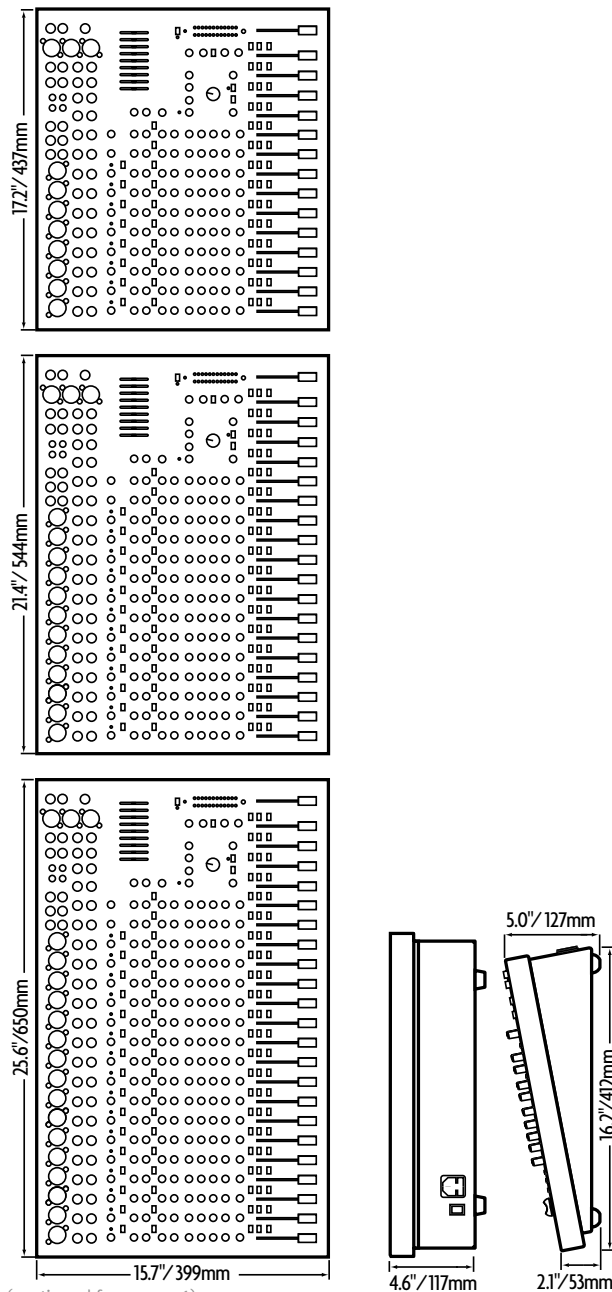
CFX•16  
Height 4.6" (117 mm)  
Width 21.4" (544 mm)  
Depth 15.7" (399 mm)  
Overall Depth 5.0" (127 mm)  
Weight 21.0 lbs. (9.5 kg)

CFX•20  
Height 4.6" (117 mm)  
Width 25.6" (650 mm)  
Depth 15.7" (399 mm)  
Overall Depth 5.0" (127 mm)  
Weight 24.3 lbs. (11.0 kg)

# CFX Series

## CFX SERIES 12-, 16-, and 20-Channel Mic/Line Mixers

### CFX Series Dimensions



(continued from page 1)

Utility outputs that are independent of the master gain control, and tape and sub bus outputs.

■ The EMAC Digital Effects section includes four controls at the top. EFX 2 regulates the signal level being sent to the EMAC effects processor from an individual channels strip's EFX 2 aux send. The overall level is monitored by the CLIP LED to prevent overload. TO MAIN MIX controls the amount of effects sent to your main mix. The two EFFECTS TO MONITOR knobs let you

add effects to stage monitor mixes independently of the EFX levels added to the main mix. Below the level controls is the preset selector for picking which effect you want. The characteristics of these presets can be changed with the TIME/RATE and DAMPING/DEPTH knobs. Between these controls are a BYPASS SWITCH and an EFX WIDE control. Wide adds psychoacoustic "width" or "depth" to all effects except delay and phaser.

■ The Stereo Graphic Equalizer is nine bands with  $\pm 15$  dB of gain and centers at 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz. This EQ is exceptionally low-noise, low-distortion, and free of phase distortion.

■ Trim Controls have 50 dB of mic gain, +30 dB of line-level gain, and a full 15 dB of attenuation to "pad" hot signals. Each channel also includes a Zero Level Set LED for easy level setting. All mic channels have a 100 Hz low cut filter to reduce stage vibration, mic stand rumble, and wind noise. Each channel includes a Pre-Fader Solo switch.

■ Channel EQs are as follows: 12 kHz shelving HIGH frequency EQ, sweepable peaking Midrange EQ (only on mono input channels), with a 100 Hz to 8 kHz bandwidth. Stereo channels employ a 2-stage fixed-frequency MID EQ, HI-MID is centered at 3 kHz; LOW-MID is centered at 400 Hz; and a LOW EQ that is shelved at 80 Hz.

■ Log-taper 60 mm faders deliver a consistent fade throughout the fader's throw. These faders have a co-polymer membrane that provides a continuously sealed barrier against dust and liquids without interfering with fader travel. Similarly, the fader's long-wearing contact material (first designed for use in exterior automotive sensors) means longer fader life and improved resistance to the elements.

■ The CFX Series mixers are designed for continuous, hassle-free use in any sound reinforcement installation. And they're packed with useful features and practical routing capabilities. Simply stated, these mixers offer more features, more peace of mind, and more possibilities than any other mixers in their class.

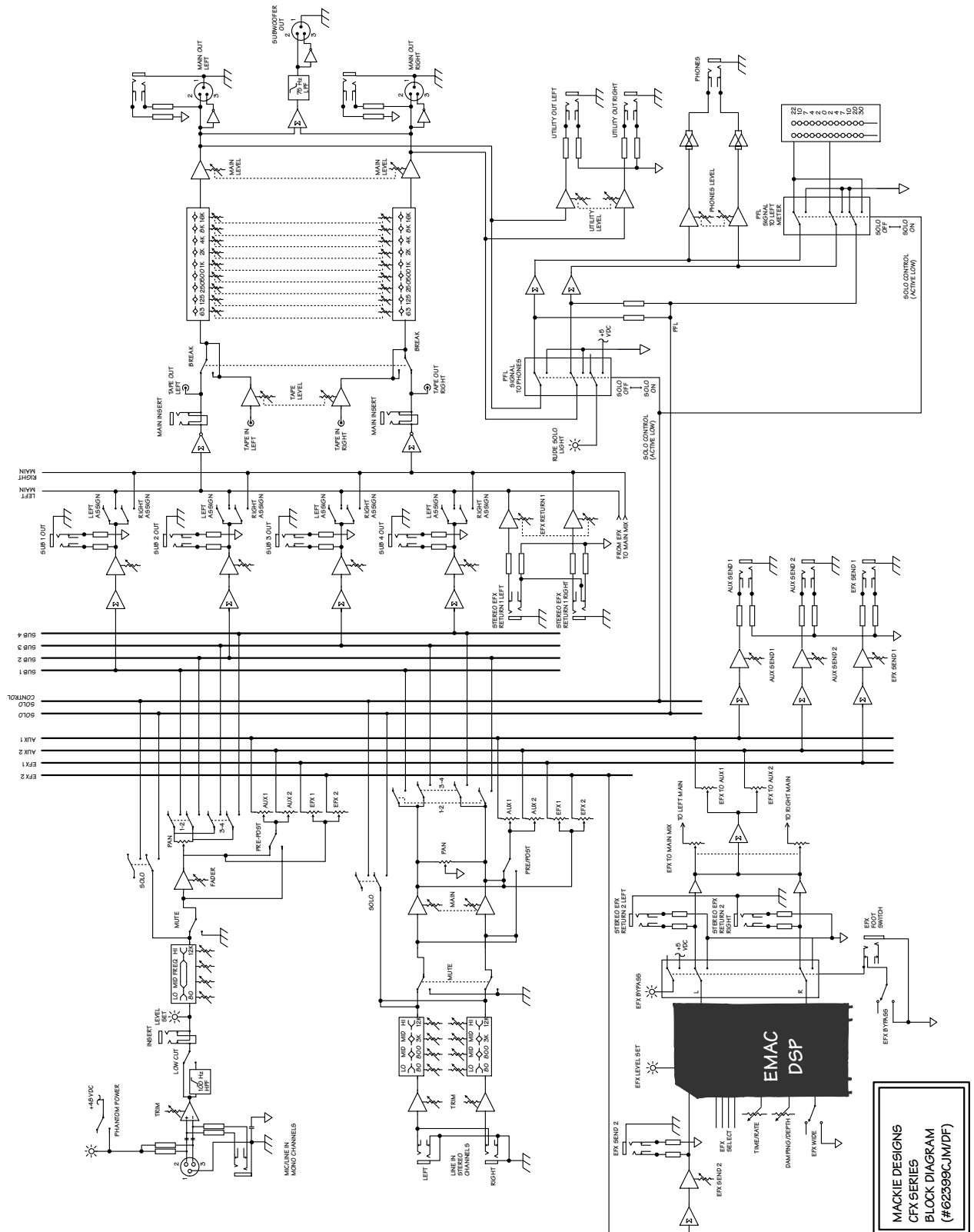
■ And they're Mackies.

# MACKIE®

# CFX Series

## CFX SERIES 12-, 16-, and 20-Channel Mic/Line Mixers

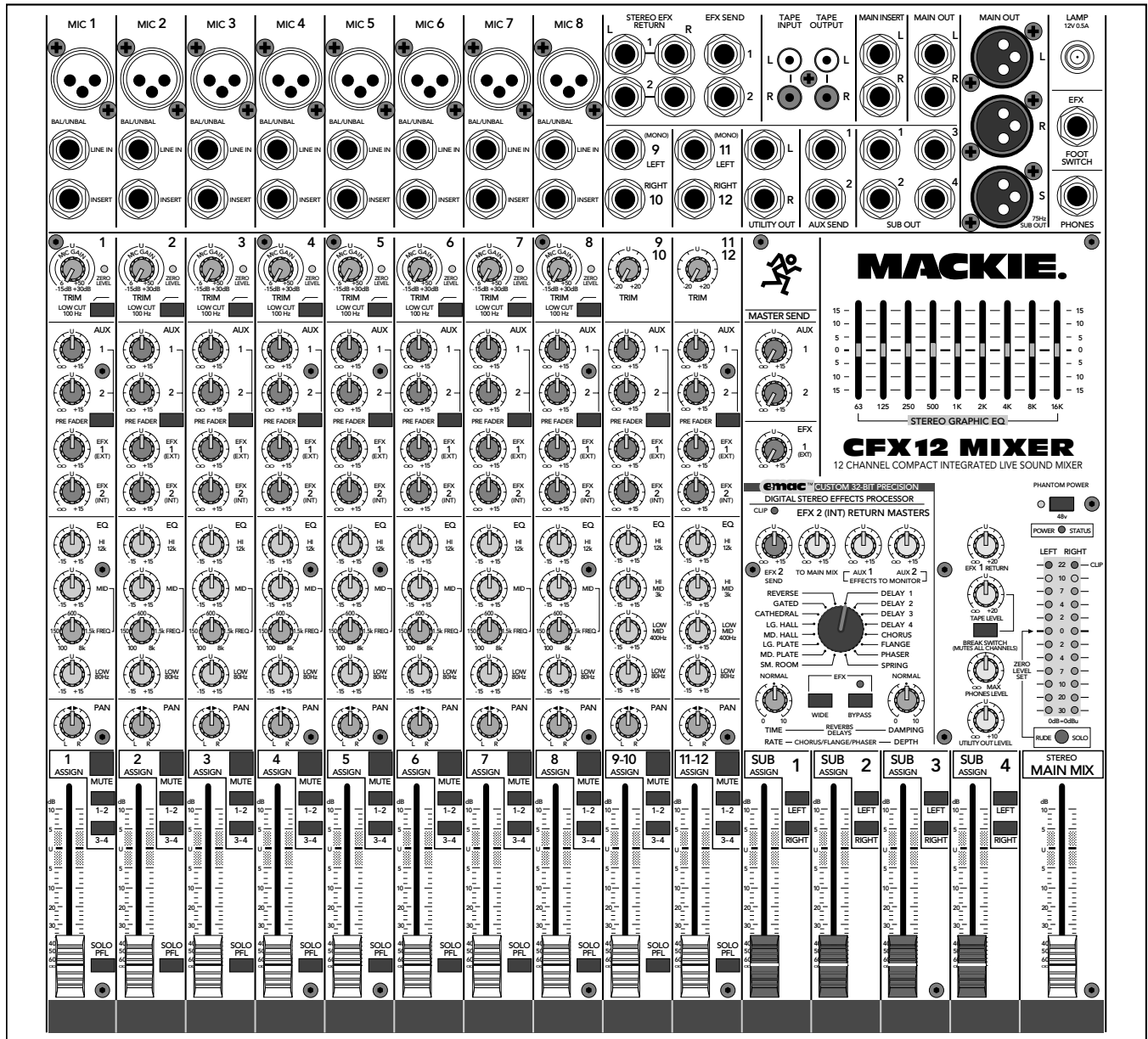
### CFX Series Block Diagram



MACKIE DESIGNS  
CFX SERIES  
BLOCK DIAGRAM  
(#62399CJM/DF)

# CFX Series

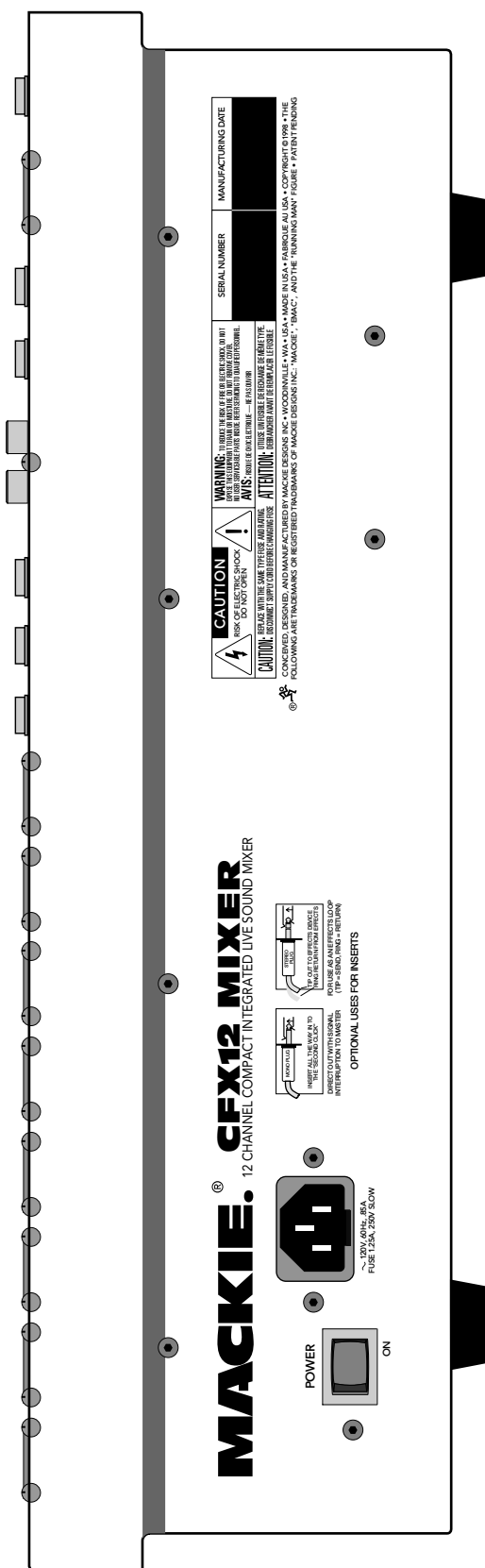
CFX SERIES 12-, 16-, and  
20-Channel Mic/Line Mixers



# CFX Series

## CFX SERIES 12-, 16-, and 20-Channel Mic/Line Mixers

### CFX SERIES 12-Channel Rear Panel



**MACKIE®**

### Architects' and Engineers' Specifications

**1. GENERAL CONFIGURATION.** The CFX•12 mixer shall accommodate 8 microphone signals: mono channels 1-8; 12 line signals: mono channels 1-8, and stereo channels 9-12. The CFX•16 mixer shall accommodate 12 microphone signals: mono channels 1-12; 16 line signals: mono channels 1-12, and stereo channels 13-16. The CFX•20 mixer shall accommodate 16 microphone signals: mono channels 1-16; 20 line signals: mono channels 1-16, and stereo channels 17-20. The CFX Series mixers shall have 2 stereo pairs of Aux Return inputs, a Send/Return channel Insert for each mic/line channel, 2 stereo pairs of Main Mix outputs, 1 stereo pair of RCA-type Tape Inputs, 1 stereo pair of RCA-type Tape Outputs, 1 stereo pair of Utility outputs, 2 Aux Send outputs, 4 Submaster outputs, and 1 stereo headphone output. The mixers shall be fitted with 1 rocker-type Power switch, one 3-pin power receptacle, 1 BNC socket providing 12 VDC for fitting an external lamp (not included), 1 EFX Bypass footswitch jack, and shall be entirely self contained.

### 2. MIXER INPUTS.

**MONO CHANNELS:** Each monaural input channel shall have an electronically balanced microphone-level input using XLR-3-F-type connectors, accepting nominal microphone levels between  $-50$  dBu and  $+4$  dBu via rotary Trim controls. 48 V phantom power shall be available via a globally-controlled switch. Each monaural input channel shall also have an electronically balanced line level input, accepting a nominal line-level of between  $-10$  dBV and  $+4$  dBu, using 1/4" TRS phone jacks. In addition, each monaural input channel shall include an unbalanced insert connection using 1/4" TRS phone jacks (tip=send, ring=return, sleeve=ground), delivering and accepting nominal levels from  $-10$  dBV to  $+4$  dBu.

Each stereo input channel shall have left and right electronically balanced line-level inputs, accepting nominal levels from  $-10$  dBV to  $+4$  dBu. These jacks shall be fitted with internal switching contacts to accommodate monaural configuration.

**OTHER INPUTS:** Each mixer shall include 4 bal/unbal Aux Return inputs, forming two stereo pairs, using 1/4" TRS phone jacks and accepting nominal levels from  $-10$  dBV to  $+4$  dBu. The mixer shall include 1 stereo pair of Tape In jacks, using unbalanced RCA-type phono jacks, accepting nominal levels from  $-10$  dBV to  $+4$  dBu.

### 3. MIXER OUTPUTS.

**MAIN OUTPUTS:** The mixer's Main Output stereo pairs shall be fitted in three ways: Using XLR-3-M-type connectors with a maximum output of  $+20$  dBu; using bal/unbal 1/4" TRS phone jacks, delivering nominal levels from  $-10$  dBV to  $+4$  dBu; and using unbalanced RCA-type phono jacks (labeled TAPE OUT) delivering nominal levels from  $-10$  dBV to  $+4$  dBu.

**OTHER OUTPUTS:** Each mixer shall include 1 Subwoofer Output using an XLR-3-M-type connector that includes a built-in 18 dB/octave 75 Hz crossover. The mixer shall include 4 Submaster outputs, using bal/unbal 1/4" TRS phone jacks, delivering nominal levels from  $-10$  dBV to  $+4$  dBu; 1 stereo pair of Utility outputs, using bal/unbal 1/4" TRS phone jacks, delivering nominal levels from  $-10$  dBV to  $+4$  dBu; 2 Aux Send outputs using bal/unbal 1/4" TRS phone jacks, delivering nominal levels from  $-10$  dBV to  $+4$  dBu; 2 EFX Send outputs using bal/unbal 1/4" TRS phone jacks, delivering nominal levels from  $-10$  dBV to  $+4$  dBu; and 1 stereo Headphones output, using an unbalanced 1/4" TRS phone jack (tip=left, ring=right, sleeve=ground).

**4. MIXER INPUT SECTION.** Each monaural channel shall include 1 rotary Trim control, 1 Zero Level LED that is triggered to glow when an audio signal at or above 0 dBu is passed through the channel, Low-Cut filter (HPF) providing an 18 dB per octave curve at 100 Hz, 2 rotary Aux Send controls providing up to 15 dB above unity gain, 1 Pre-Fader switch assignable to Aux Sends 1 & 2, and 2 EFX Send controls, providing up to 15 dB above unity gain. Each monaural channel shall include 4 rotary equalization (EQ) controls:  $+15$  dB fixed 12 kHz shelving gain,  $+15$  dB midrange peaking gain, 100 Hz-8 kHz midrange frequency, and  $+15$  dB fixed 80 Hz shelving. Each monaural channel shall also include 1 rotary Pan control, 4 dB attenuation panned center, and 1 Mute switch. Each monaural channel shall also include 2 output Assign switches delivering the channel's signal relative to its Pan setting to Submasters 1-2 and Submasters 3-4, 1 channel Fader providing up to 10 dB above unity gain, and 1 Pre-Fader (PFL) Solo switch.

**5. MIXER OUTPUT SECTION.** The mixer shall have 1 Main Mix stereo fader providing up to 10 dB gain, 4 Submaster mono faders, (each providing up to 10 dB gain), independent left and right Assign to Main Mix switches for each submaster, 1 Utility Out level rotary stereo control, providing up to 10 dB gain, and 1 Phones level rotary stereo control providing up to 10 dB gain. The mixer shall also have 1 Break switch that mutes all input channels to Main Mix, 1 rotary stereo Tape In level control providing up to 20 dB of gain, 1 rotary stereo EFX Return level control providing up to 20 dB of gain, and 1 Phantom Power switch providing 48 V of phantom power to each mic input channel. The mixer shall also have 2 rotary Aux Send Master controls for Aux Sends 1 and 2 providing up to 15 dB above unity gain, and 1 EFX Send Master control for EFX Send 1 providing up to 15 dB above unity gain. The mixer shall also have a 9-band graphic equalizer providing  $\pm 15$  dB of gain at 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz; a blinking master Solo LED; a Power indicator LED; and a Phantom Power indicator LED.

# CFX Series

## CFX SERIES 12-, 16-, and 20-Channel Mic/Line Mixers

**6. EMAC EFFECTS PROCESSOR.** The 32-bit EMAC Digital Stereo Effects Processor shall include 16 preset digital effects algorithms selectable by a detented knob. Effects shall include 9 Reverb types: Spring, Small Room, Medium Plate, Large Plate, Medium Hall, Large Hall, Cathedral, Gated, and Reverse. Effects shall also include 4 Delay Types: Delay 1 providing one repeat, Delay 2 providing two repeats, Delay 3 providing three repeats, and Delay 4 providing four repeats. Effects shall also include 1 Chorus, 1 Flange, and 1 Phaser. Two rotary parameter knobs shall provide control over Time/Rate and Damping/Depth. The EMAC shall include 1 EFX WIDE button providing more width or depth to the effect, and 1 Bypass button that mutes the effect's output signal. The EMAC shall also include 1 EFX 2 Send rotary knob providing up to 15 dB of gain above unity, and control of the dry signal being sent to the input of the EMAC, and 1 To Main Mix rotary knob providing up to 15 dB of gain above unity and control over signals sent from Stereo EFX Return 2. The EMAC shall also include 2 Effects To Monitor rotary knobs labeled Aux 1 & Aux 2 providing up to 15 dB of gain above unity and control over signals sent from Stereo EFX Return 2 and being sent to Aux Sends 1 & 2 and a Clip LED that indicates when the EMAC is 6 dB below clipping.

**7. METERING.** The mixer shall include 1 stereo 12-segment LED meter with points at -30, -20, -10, -7, -4, -2, 0, +2, +4, +7, +10, and +22 dB. The source signals for the meters shall be the same signals selected in the Left/Right Sub Assign, and a solo condition shall replace the Sub Assign selection with the soloed channel(s). The meters shall be calibrated so that a 0 dBu signal at the Phones output shall be indicated as 0 dB on the meters.

**8. PHYSICAL CONFIGURATION.** The mixer shall be made of steel and aluminum, painted dark gray and black with light gray graphics. The CFX12 shall weigh 17 lbs, 8 oz. (8.1 kg); the CFX16 shall weigh 21 lbs, 0 oz. (9.5 kg); and the CFX20 shall weigh 24 lbs, 3 oz. (11.0 kg). Optional rackmount brackets shall allow the CFX12 to be mounted in a rack system with the chassis surface flush with the rack rail. The CFX16 and CFX20 are not rackmountable. Dimensions of the CFX12 shall be 17.2" (437 mm) in width, 15.7" (399 mm) in depth, and 5.0" (127 mm) in height. Dimensions of the CFX16 shall be 21.4" (544 mm) in width, 15.7" (399 mm) in depth, and 5.0" (127 mm) in height. Dimensions of the CFX20 shall be 25.6" (650 mm) in width, 15.7" (399 mm) in depth, and 5.0" (127 mm) in height.

**9. SPECIFICATIONS.** In addition to specifications already cited, the mixers shall meet or exceed the following specifications. Frequency response, microphone input to any output (Trim at 0 dB), 32 Hz to 20 kHz, +0 dB/-1 dB; Total Harmonic Distortion (THD), Mic Input to Main Output: <0.05% @ +4 dBu output; Equivalent Input Noise (EIN), -127 dBu; Common Mode Rejection Ratio (CMRR), 60 dB at 1 kHz, Trim at 0 dB; Residual Output Noise, Main, Monitor, and Effects outputs, Channel and Master levels off, -95 dBu; Input impedance, microphone inputs, 3 k $\Omega$ ; Line input, 40 k $\Omega$ ; Insert Return, Stereo Line Input, Tape Input, and Effects Returns, 10 k $\Omega$ ; and all outputs, 120  $\Omega$ .

**10. DESIGNATION.** The mixers shall be Mackie Designs CFX12, CFX16, and CFX20.

# MACKIE®

[www.mackie.com](http://www.mackie.com)

16220 Wood-Red Road NE, Woodinville, WA 98072 USA  
888.337.7404, fax 425.487.4337, [sales@mackie.com](mailto:sales@mackie.com)

UK +44.1268.571.212, fax +44.1268.570.809, [uk@mackie.com](mailto:uk@mackie.com)  
ITALY +39.0522.354.111, fax +39.0522.926.208, [italy@mackie.com](mailto:italy@mackie.com)  
FRANCE +33.3.85.46.91.60, fax +33.3.85.46.91.61, [france@mackie.com](mailto:france@mackie.com)  
GERMANY +49.2572.96042.0, fax +49.2572.96042.10, [germany@mackie.com](mailto:germany@mackie.com)

Electronic files for this product available at:  
[www.mackie.com](http://www.mackie.com)

This Specification Sheet	CFXSeries_SS.PDF
Owner/Operator's Manual	CFXSeries_OM.PDF
CADD files	CFXSeries.DXF

Mackie Designs continually engages in research related to product improvement. New material, production methods, and design refinements are introduced into existing products without notice as a routine expression of that philosophy. For this reason, any current Mackie product may differ in some respect from its published description, but will always equal or exceed the original design specifications unless otherwise stated. ©1999–2003 Mackie Designs Inc. All rights Reserved. Mackie and the "Running Man" figure are registered trademarks of Mackie Designs Inc.

Part No. 091-218-00 Rev A1 2/03