StudioLive™ 24.4.2

Architect & Engineering Specifications

1. GENERAL CONFIGURATION. The mixer shall be a digital mixer and shall accommodate 24 line and/or 24 microphone signals, channels 1–24; and shall include 24 analog Send/Return channel Inserts; 24 channel Direct Outputs; 2 stereo pairs of Aux Return inputs; 2 stereo pairs of Main mix outputs; 1 Main mix Mono output, 1 stereo pair of Control Room outputs; 4 Subgroup outputs; 10 Aux Send outputs; 1 stereo pair of RCA-type phono Tape outputs; 1 stereo Headphones output; 1 stereo S/PDIF coaxial digital output; and two FireWire 400 ports that can connect to a Mac or Windows PC for recording and control and to act as a pass-through for attaching an external storage drive. The mixer shall be capable of placement on a table and shall be fitted with 1 rocker-type Power switch; 1 3-pin IEC power receptacle that accepts 100-240 VAC, with user-replaceable, socketed 2A fuse; 1 BNC socket, providing 12 VDC at 0.5A for fitting an external lamp (not included); and shall be entirely self-contained.

2. MIXER INPUTS.

CHANNELS 1–24: Each channel shall include an electrically balanced, mono microphone input, using an XLR-3-F-type connector, accepting nominal levels from -30 to +16 dBu via a rotary Trim control. Each channel shall include one XMAX™ Class A solid-state microphone preamplifier. Phantom power shall be individually enabled/disabled for each channel via a button-type switch. Twenty-four balanced line inputs shall be wired using 1/4" TRS phone jacks and shall accept nominal levels from -10 dBV to +4 dBu and maximum input levels of +22 dBu. Each channel shall include a pre-fader Insert point, using 1/4" TRS phone jacks (tip=send, ring=return, sleeve=ground), delivering and accepting nominal levels from -10 dBV to +4 dBu and maximum input levels of +18 dBu. In addition, each channel shall accept an input signal from the FireWire 400 bus. The input of each channel shall be switchable between the analog inputs and the FireWire input, using a button-type switch. Each channel and Subgroup shall have a Solo switch and a Mute switch. Each channel shall have a dedicated, 100 mm level-control fader with marked increments at ∞, -60, -50, -40, -30, -30, -20, -10, -5, 0, +5, and +10 dB.

OTHER INPUTS: The mixer shall include 4 balanced Aux Return inputs, forming 2 stereo pairs, using 1/4" TRS phone jacks, accepting nominal levels from -10 dBV to +4 dBu and maximum input levels of +18 dBu; a Talkback Microphone input that shall include one XMAX Class A solid-state microphone preamplifier

with 48V phantom power always present, plus a rear-panel rotary level control; and 1 stereo pair of Tape Input jacks, using unbalanced RCA-type phono jacks, accepting nominal levels from -10 dBV to +4 dBu. The Tape Input source shall be switchable between the analog Tape Input and the FireWire input, using a button-type switch. The Tape Input level shall be controllable using a rotary encoder.

3. MIXER OUTPUTS.

MAIN OUTPUTS: The mixer's Main mix-bus stereo outputs shall be fitted in three ways: Using balanced XLR jacks, delivering a maximum output of +24 dBu, with an output impedance of 51Ω; using balanced 1/4" TRS phone jacks, delivering a maximum output of +24 dBu; and using unbalanced RCA-type phono jacks (labeled Tape Out), delivering nominal levels from -10 dBV to +4 dBu. Output level for both the XLR and TRS Main mix-bus outputs shall be controllable using a single rear-panel knob. The Main mix-bus Mono output shall be fitted with one balanced XLR jack, delivering nominal levels from -10 dBV to +4 dBu, and with an output impedance of 51Ω; and it shall include a rear-panel rotary level control.

OTHER OUTPUTS: Channels 1-24 shall include pre-insert, balanced, analog Direct Outputs, using three sub-DB25 jacks (channels 1-8, 9-16, and 17-24), delivering nominal levels from -10 dBV to +4 dBu. The mixer shall include 4 Subgroup outputs, using balanced 1/4" TRS phone jacks, delivering a maximum output level of +18 dBu and nominal levels from -10 dBV to +4 dBu, with an output impedance of 51Ω; 1 stereo pair of Control Room outputs, using balanced 1/4" TRS phone jacks, delivering a maximum output level of +18 dBu and nominal levels from -10 dBV to +4 dBu, with an output impedance of 51Ω; 10 Aux Send outputs using balanced 1/4" TRS phone jacks, delivering a maximum output level of +18 dBu and nominal levels from -10 dBV to +4 dBu, with an output impedance of 51Ω; and 1 stereo Headphones output, using an unbalanced 1/4" TRS phone jack (tip=left, ring=right, sleeve=ground), and with a maximum output level of 150 mW.

4. MIXER INPUT SECTION. In addition to the controls listed in section 2 (MIXER INPUTS), the mixer shall include 10 sets of Aux Send controls, each of which shall have a pre/post switch, a Solo switch, an Output level control that employs a rotary encoder, and a Select switch for controlling the Fat Channel processing section for the selected Aux Send.

5. DYNAMICS PROCESSING, PARAMETRIC EQ, AND BUS ASSIGNMENT: All input channels, Aux Sends, Subgroups, and the Main Bus shall be routed to a section called the “Fat Channel” when their associated Select buttons are pressed. The Fat Channel shall provide the following digital signal-processing: High-pass Filter and Phase Reverse (input channels only), switchable Gate/Expander, Compressor, Limiter, Pan, and four-band fully parametric equalizer (EQ).

The Gate/Expander shall include Key Filter, Key Listen, Threshold, Range, Attack, and Release parameters. The Compressor shall have sweepable Threshold, Ratio, Attack, Release, and Gain; shall include an Auto Attack and Release feature; and shall be switchable between hard and soft knee. The Limiter shall have a sweepable Threshold.

The four-band parametric EQ shall be a second-order shelving filter. The Low band shall have a sweepable frequency from 36 Hz to 465 Hz, ±15 dB and shall be switchable between shelf and peaking. The Low Mid band shall have a sweepable center frequency from 90 Hz to 1.2 kHz, ±15 dB. The High Mid EQ shall have a sweepable center frequency from 380 Hz to 5 kHz, ±15 dB. The High band shall have a sweepable frequency from 1.4 kHz to 18 kHz, ±15 dB and shall be switchable between shelf and peaking. Each band shall have a sweepable Q ranging from 0.1 to 4 and shall be individually switchable on/off; a separate switch shall allow the entire parametric EQ to be enabled/disabled.

In addition, the Fat Channel shall enable signals to be assigned to the Subgroups and Main bus and shall enable adjacent odd-even channels (e.g., channels 1-2, 3-4, etc.) to be linked in stereo. The Fat Channel also shall provide button switches that enable Channel settings to be copied, loaded, and saved to and from onboard memory.

6. MIXER OUTPUT SECTION. The mixer shall have 1 stereo 100 mm fader for the Main bus, providing up to 10 dB gain, and 4 mono 100 mm Subgroup faders, each providing up to 10 dB gain. These 5 faders shall be marked at ∞, -60, -50, -40, -30, -30, -20, -10, -5, 0, +5, and +10 dB. The mixer shall have a Solo bus that shall include a rotary Cue Mix volume control; a button switch that shall toggle between After-Fader Listen (AFL) and Pre-Fader Listen (PFL); and a Solo-In-Place (SIP) mode, which shall be engaged using a button switch. The mixer shall have a Monitor bus that feeds the Control Room and Headphone outputs. The Headphone output level and Control Room output level shall be controllable with dedicated rotary encoders. The Tape Input, Solo bus, Main bus, and main L/R

FireWire returns shall each be assignable to the Monitor bus using dedicated button-type switches. The mixer shall have a Talkback mic section that shall include a rotary level control; four buttons that assign the Talkback mic to Aux Sends 1-2, 3-6, and 7-10 and to the Main bus; and a latching Talkback (Talk) on/off button.

7. EFFECTS AND GRAPHIC EQ. The mixer shall include two stereo, 32-bit effects processors and a library of effects presets that shall include time-based processing such as delay and reverb. The effects library and effects parameters shall be accessed using an FX button.

The mixer shall also include 4 dual-mono (8 channels), 31-band, 1/3-octave graphic equalizers with curve-fitting algorithm. The graphic EQs shall be assignable to the Main mix bus, the Subgroups, or the Aux Sends. Gain/attenuation shall be ±15 dB. A “GEQ” switch shall display the Graphic EQ menu on the LCD screen, providing fast access to the GEQ settings.

8. MEMORY AND GENERAL SETTINGS. The mixer shall provide digital memory (storage) for the status of all digital mixer parameters but not for the status of the analog channel Trims. The mixer shall enable storage of up to 80 Global Scenes, 48 channel-strip Scenes, and 50 presets for instruments and vocals. The mixer shall permit settings to be copied between channels. Memory shall also be provided for effects settings. The mixer shall include a Digital Effects | Master Control section that includes an LCD display and controls that provide access to systems settings and the graphic equalizer and that enables store and recall of mixer scenes and Fat Channel and effects settings. These controls shall include a rotary Value encoder, Previous and Next buttons, Page Up and Page Down buttons, an FX button for accessing the effects, and Scene, System, Store, and Recall buttons. This section also shall include a Tap button, the primary purpose of which is setting tempo for the delay effects described in Section 7 (EFFECTS AND GRAPHIC EQ).

9. AUDIO INTERFACE
The mixer shall provide a built-in computer interface for recording and playing back audio. The interface shall enable 32 audio streams to be sent to a Mac or PC computer and 26 streams to be returned from the computer to the mixer via FireWire 400, as described in Section 1 (GENERAL CONFIGURATION) and Section 2 (MIXER INPUTS). The interface shall support digital audio with up to 24-bit bit depth and (selectable) 44.1 or 48 kHz sample rate.

10. METERING.

MAIN METERING: The mixer shall provide individual level meters for the left and right channels of the Main bus and for each of the four Subgroups; these 6 meters shall be 15-segment LED meters, each with labeled points at -60, -45, -30, -20, -10, 0, and +10 dB, with an additional point labeled “OL” (Overload). The Main and Subgroup meters shall be calibrated so that a 0 dBu signal at the Main or Subgroup output shall be indicated as 0 dB on the meters, ±1 dB. The mixer shall provide one 15-segment LED meter to display the level of the currently selected channel; this meter shall have labeled points at -72, -38, -24, -15, -10, -6, and -2 dB, with an additional point labeled “OL” (Overload). The mixer shall provide one 15-segment LED meter to display the Gain Reduction for the currently selected channel; this meter shall have labeled points at -21, -18, -15, -12, -9, -6, and -2 dB. Button switches shall be provided that turn PFL input metering on/off; turn post-fader output metering on/off; turn gain-reduction metering on/off; turn aux bus master out metering on/off, and turn fader-recall (Locate) metering on/off.

MULTIPURPOSE METERING: Multipurpose metering shall be provided in the Fat Channel section (described in Section 5, DYNAMICS PROCESSING, PARAMETRIC EQ, AND BUS ASSIGNMENT) that shall display the levels of all 24 inputs, post-gain and pre-dynamics, pre-EQ, and pre-fader; the levels of all 24 inputs, post-dynamics, post-EQ, and post-fader; the gain reduction for all 24 inputs; the output volume of each of the 10 Aux Sends; the gain levels for each band of any of the 31-band graphic EQs, or the fader settings for a saved Scene. A horizontal LED Pan meter shall be provided that shall display the pan position for the selected channel or linked channels.

11. BUNDLED SOFTWARE. The mixer shall ship with at least three software packages for Mac and Windows computers. These packages shall include:

- A multitrack audio-recording application primarily intended for recording live events.
- A digital audio workstation application that enables recording, editing, and playback of both MIDI data and audio.
- A bidirectional mixer-control application that provides preset- and scene-management features and enables real-time adjustment of the most commonly used mixer settings.

The mixer shall also be wirelessly controllable from an Apple iPad®, and its Aux buses shall be controllable from an Apple iPhone® or iPod® Touch, using dedicated applications.

12. PHYSICAL CONFIGURATION. The mixer shall be made of steel, with an aluminum armrest, and shall be painted gray, silver, and blue with black and white graphics. The mixer shall weigh 51 lbs, 0 oz (15.88 kg). Dimensions of the mixer shall be 22.35" (56.8 cm) in length, 25.5" (64.77 cm) in width, and 6.9" (17.53 cm) in depth.

13. SPECIFICATIONS. In addition to specifications already cited, the mixer shall meet or exceed the following specifications:

Microphone Preamp	
Type	XLR Female, balanced
Frequency Response to Direct Output (at unity gain)	20-40 kHz, 0 / -0.5 dBu
Frequency Response to Main Output (at unity gain)	20-20 kHz, ±0.5 dBu
Input Impedance	1 kΩ
THD to Direct Output (1 kHz at unity gain)	0.005%, +4 dBu, 20-20 kHz, unity gain, unwtd
THD to Main Output (1 kHz at unity gain)	0.005%, +4 dBu, 20-20 kHz, unity gain, unwtd
EIN to Direct Output	125 dB unwtd, +130 dB A-wtd
S/N Ratio to Direct Output (Ref = +4 dB, 20 kHz BW, unity gain, A-wtd)	97 dB
S/N Ratio to Main Output (Ref = +4 dB, 20 kHz BW, unity gain, A-wtd)	94 dB
Common Mode Rejection Ratio (1 kHz at unity gain)	65 dB
Gain Control Range (±1 dB)	16 dB to +67 dB
Maximum Input Level (unity gain)	16 dBu
Phantom Power (±2 VDC)	48 VDC
Line Inputs	
Type	1/4” TRS Female, balanced mono
Frequency Response to Direct Outputs (at unity gain)	10-40 kHz, 0 / -0.5 dBu
Frequency Response to Main Outputs (at unity gain)	20-20 kHz, ±0.5 dBu

Input Impedance	10 kΩ
THD to Direct Output (1 kHz at unity gain)	<0.0007%, +4 dBu, 20-20 kHz, unity gain, unwtd
THD to Main Output (1 kHz at unity gain)	<0.005%, +4 dBu, 20-20 kHz, unity gain, unwtd
S/N Ratio to Direct Output (Ref = +4dBu, 20 kHz BW, unity gain, A-wtd)	105 dB
S/N Ratio to Main Output (Ref = +4dBu, 20 kHz BW, unity gain, A-wtd)	94 dB
Gain Control Range (±1 dB)	20 dB to +20 dB
Maximum Input level (unity gain)	22 dBu
Tape Inputs	
Type	RCA Female, unbalanced (stereo pair)
Maximum Input Level	18 dBu
Auxiliary Inputs	
Type	1/4” TRS Female, balanced (2 stereo pairs)
Maximum Input Level	18 dBu
Main Outputs	
Type	XLR Male, balanced (stereo pair); 1/4” TRS Female, balanced (stereo pair); XLR Male, balanced (mono)
Rated Output Level	24 dBu
Output Impedance	51Ω
Aux Outputs	
Type	1/4” TRS Female, balanced (mono)
Rated Output Level	18 dBu
Output Impedance	51Ω
Subgroup Outputs	
Type	1/4” TRS Female, balanced (mono)
Rated Output Level	18 dBu
Output Impedance	51Ω
Tape Outputs	
Type	RCA Female, unbalanced (stereo pair)
Rated Output Level	18 dBu
Output Impedance	100Ω

Control Room Outputs	
Type	1/4” TRS Female, balanced (stereo pair)
Rated Output Level	18 dBu
Output Impedance	51Ω
System Cross Talk	
Input to Output (Ref = +4dBu 20-20 kHz, unwtd)	90 dB
Adjacent Channels (Ref = +4dBu 20-20 kHz, unwtd)	87 dB
Noise Gate / Expander	
Threshold Range	-84 dB to 0 dB
Attack Time	0.2 to 500 ms
Release Time	0.05s to 2s
Expander Attenuation Range	2:1 (fixed)
Noise Gate Attenuation Range	-84 to 0 dB
Key Filter	2nd-order, resonant bypass; Q=0.7
Key Listen	Off to 16 kHz
Compressor	
Threshold Range	-56 dB to 0 dB
Ratio	1:1 to 14:1
Attack Time	0.2 ms to 150 ms
Release Time	2.5 ms to 900 ms
Auto Attack and Release	Attack = 10 ms, Release = 150 ms
Curve Types	hard and soft knee
Limiter	
Threshold	-28 dB to 0 dB
Ratio	∞:1
Attack	20 ms
Hold	10 ms
Release	20 ms
Parametric EQ	
Type	2nd order shelving filter
Low (Lowpass or Bandpass)	36 to 465 Hz, ±15 dB
Low Mid (Bandpass)	90 Hz to 1.2 kHz, ±15 dB
High Mid (Bandpass)	380 Hz to 5 kHz, ±15 dB
High (Highpass or Bandpass)	1.4 kHz to 18 kHz, ±15 dB
Q (sweepable for each band)	0.1 to 4
Digital Audio	
ADC Dynamic Range (A-wtd, 48	118 dB

kHz)	
DAC Dynamic Range (A-wtd, 48 kHz)	118 dB
FireWire	S400, 400Mb/s
Internal Processing	32-bit, floating point
Sampling Rate	44.1, 48 kHz
A/D/A Bit Depth	24
Reference Level for 0 dBFS	18 dBu
Clock	
Jitter	20 ps RMS (20 Hz - 20 kHz)
Jitter Attenuation	60 dB (1 ns in, 1 ps out)

The mixer shall be a PreSonus StudioLive™ 24.4.2.