# User's Guide for the CRATE PRO AUDIO CSM-802



# **Rack Mixer**

In order to achieve maximum performance from your new Crate Pro Audio Mixer, we recommend that you read this user's guide prior to its use.

And "thank you!" from (





# **Congratulations.**

You have selected one of the finest pieces of Audio Reproduction Equipment available for use on stage, in the home studio, or for "institutional" use: a Crate Pro Audio Rack Mixer. In order to derive the most benefit from the mixer, and to fully understand and appreciate its flexibility and versatility, please read this User's Guíde prior to its use.

And Thank You, from



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### Introduction:

In the world of professional sound reinforcement and audio reproduction there is no room for compromise: it is absolutely vital that the **emotions** of a performance are projected to your audience, not just sounds. Your new Crate Pro Audio CSM-802 Rack Mixer is a powerful tool which allows you to successfully bridge the gap between performers and audience without losing any of the "life" of the performance in the process. No matter what your particular application, your Crate Pro Audio mixer is ready to meet the challenge with a level of performance and control unequaled by its competition.

Crate Pro Audio mixers are the result of our many years of experience with high-performance audio equipment combined with our extensive research and development procedures and guided by our inherent love of musical performances. Each mixer is built using a variety of innovative construction methods making it truly reliable and incredibly roadworthy. Its diverse features offer you an extremely high degree of versatility and flexibility regardless of application and it is designed to keep you constantly in total control of your performing environment, always with the best possible sound. Crate Pro Audio rack mixers are perfect for use on the stage, in the studio or for "institutional" use.

#### **Features:**

- Exceptionally low noise and incredible headroom
- Two rack mounting spaces and very shallow depth
- Stereo Tape In and Out jacks
- Level-controllable Headphones jack
- Dual 10-step LED ladders
- Two stereo Aux returns
- Peak LEDs, Gain controls and high-quality rotary level controls for each mono channel; high-quality rotary level and pan controls for each stereo channel; two band EQ, pan and two Aux Sends for all channels
- Balanced XLR and 1/4" Input jacks, plus an Insert jack for each Mono input channel; two 1/4" Input jacks for each stereo channel
- Color-coded knobs
- Crate's 5-Year Warranty (where applicable)
- Made in the U.S.A.

# **About This Manual:**

This manual is the compilation of many hours of discussions with engineers, musicians, experts in the field of sound reproduction as well as novices, along with "hands-on" usage and training. While we strive to provide as comprehensive and informative a manual as possible, we realize we cannot convey every application imaginable or answer every possible question. We have endeavored to cover as much as is practical in this owner's manual and have provided suggested wiring diagrams for you to use as a starting point for your application.

The Mono Input Channels (1 - 4):



FRONT PANEL

REAR PANEL



- GAIN: Use this to adjust the level of the incoming signal. For the right setting connect a signal (like a mic or instrument) to the channel and talk, sing or play at your normal level. Turn the control up until the PEAK LED (#8) starts to flash, then turn it back down until the LED only flashes on strong peak signals.
- **2 HIGH:** This controls the high frequency level for the channel. This is useful to reduce tape hiss, compensate for room acoustics or add "life" to a muffled microphone.
- **3 LOW:** This controls the low frequency level for the channel. This is useful to add punch and even boom to bass notes, to help out a weak vocalist or to reduce feedback and rumble from turntables and other sources.
- For more information on the equalizer controls, see page 14.
  4 LEVEL: This controls the level of the channel in the overall mix. When this control is adjusted it has no effect on the signal level at the AUX 1 SEND (#32, page 6), however it does control the signal level at the AUX 2 SEND simultaneously. Nominal setting is at the 2:30 position.
- **5 AUX 1:** This can be used as a separate effects send or as a monitor send. How much of the signal taps off from the channel is determined by the setting of this control. (Aux 1 is pre-EQ, pre-Level.)
- **6 AUX 2:** This can be used as a second separate effects send or as a monitor send. How much of the signal taps off from the channel is determined by the setting of this control. (Aux 2 is post-EQ, post-Level.)
- 7 **PAN:** This control proportions the signal between the left and right Main output jacks.
- 8 **PEAK LED:** This LED lights when the input signal level is within 6dB of clipping. Adjust the GAIN control (#1) as described to keep this LED from flashing (except on strong peaks).
- **9 INSERT:** An external signal processor can be inserted into the signal path through this jack. (See the "Applications" section on page 13 for a wiring diagram and more information.) Also, by inserting a 1/4" phone plug half-way into this jack a discrete direct output for the channel can be obtained without interrupting the normal signal path.
- 10 MIC IN: A microphone's or other low impedance and low level signal's XLR plug gets connected here. NOTE: Each Mic In jack has +15 volts phantom power applied to pins 2 and 3. This will not harm mics that do not require phantom power.
- **11 LINE IN:** An instrument, drum machine, tape deck channel, microphone or other high impedance and line level signal with a 1/4" plug gets connected here.

The Stereo Input Channels (5 - 8):



FRONT PANEL



- 12 HIGH: This controls the high frequency level for the channel. This is useful to reduce tape hiss, compensate for room acoustics or add "life" to a muddy sounding input source.
- **13 LOW:** This controls the low frequency level for the channel. This is useful to add punch and even boom to bass notes, to help out a weak signal source or to reduce feedback and rumble from turntables and other sources.
- For more information on the equalizer controls, see page 14.
  14 LEVEL: This controls the level of the channel in the overall mix. When this control is adjusted it has no effect on the signal level at the AUX 1 SEND (#32, page 6), however it does control the signal level at the AUX 2 SEND simultaneously. Nominal setting is at the 2:30 position.
- **15 AUX 1:** This can be used as an effects send or monitor send. How much of the signal taps off from the channel is determined by the setting of this control. (Aux 1 is pre-EQ, pre-Level.)
- **16 AUX 2:** This can be used as a second separate effects loop or monitor send. How much of the signal taps off from the channel is determined by the setting of this control. (Aux 2 is post-EQ, post-Level.)
- **17 PAN:** This control proportions the signal between the left and right Main output jacks. In stereo applications it acts as a left/right balance control (see "Applications: Basic Stereo Operation" on page 8). It can also be used to separate vocal channels from instrument channels (see "Separating Vocals and Instruments" on page 12).
- 18 LEFT/MONO: An instrument, drum machine, tape deck channel, or other high impedance and line level signal with a 1/4" plug gets connected here. For *stereo* inputs use this jack for the left channel input and the RIGHT jack (#19) for the right channel input. For *mono* inputs use this jack only.
- **19 RIGHT:** An instrument, drum machine or tape deck channel gets connected here. For *stereo* inputs use this jack for the right channel input and the LEFT/MONO jack (#18) for the left channel input. For *mono* inputs use the LEFT/MONO jack (#18) only.



# The Master Section:

Note: For more information on the use of the Aux and Main jacks, see the "Applications" section on pages 7-13.





- 20 AUX RETURNS: Use these controls to adjust the level of the signal returning from external effects devices connected to the AUX 1 and AUX 2 send jacks.
- 21 TAPE IN/OUT LEVELS: Use these controls to set the level of the signals at the TAPE IN/TAPE OUT jacks. (Tape Out is unaffected by the Master Level control setting.) NOTE: To avoid feedback keep the Tape In Level at minimum when recording.
- 22 OUTPUT LED METERS: These 10 stage LED ladders give a visual indication of the output signal level going to the MAIN OUT jacks.
- 23 HEADPHONES LEVEL: Use this control to set the level of the signal going to the HEADPHONES jack (#26).
- 24 MASTER LEVEL: Use this control to set the signal level at the MAIN OUT jacks.
- 25 PHANTOM POWER LEDS: The bottom two LEDs will be lit whenever the unit is on, indicating that phantom power is active at the MIC IN jacks (#10). This does not indicate the presence of a signal.
- 26 HEADPHONES: Plug a pair of stereo headphones into this jack to monitor the signals at the MAIN OUT jacks. Use the HEADPHONES LEVEL control (#23) to set the volume.
- 27 POWER SWITCH: This switch turns the mixer on in the up position, off in the down position.
- 28 TAPE IN/TAPE OUT JACKS: Use these jacks to connect to the RECORD and PLAY jacks of an external tape deck. See page 13.
- **29 AUX RETURNS:** Use these jacks to receive the processed signal from an external effects device. For stereo effects use both the "L" and "R" jacks; for mono effects use only the "L" jack.
- **30 POWER JACK:** Connect the AC power adapter here.
- **31 MAIN OUTS:** Use these jacks to send the output signals to the house amplifier(s). (See pages 7-12.)
- **32 AUX SENDS:** Use these jacks to send a signal to an external effects device or an external monitor amplifier. The mix at each jack is determined by the setting of the Aux 1 or 2 pots for each channel.



# **Applications: Basic Mono Operation:**

This setup shows one way of using the mixer and one stereo power amplifier to run both the house speakers and the stage monitors.

Run a signal cable from the mixer's MAIN OUT LEFT jack to the power amp's CHANNEL 1 INPUT jack (A). Run another signal cable from the mixer's AUX 1 SEND jack to the amp's CHAN-NEL 2 INPUT jack (B).

Run a speaker cable from the power amp's **CHANNEL 1** SPEAKER OUTPUT to the house speakers (C). Run another speaker cable from the amp's **CHANNEL 2** SPEAKER OUTPUT to the monitor speakers (D).

The mixer's **MASTER LEVEL** control will set the house volume level and each channel's **AUX 1** control will set the level of the mix going to the monitors.

Please note that the sample connections shown in the Applications sections are NOT absolute mandates as to how to connect your sound system. They are merely intended to provide a springboard from which you may launch the system that will best suit your particular needs.





# **Applications: Basic Stereo Operation:**

In this setup both of the mixer's outputs will be used. A second power amplifier will be needed to drive the monitors.

Run a pair of signal cables from the mixer's MAIN OUT LEFT and MAIN OUT RIGHT jacks to the "house" power amp's CHANNEL 1 and CHANNEL 2 INPUT jacks (A). Run another signal cable from the mixer's AUX 1 SEND jack to the monitor power amp's MONO INPUT jack (B).

Run a speaker cable from the house power amp's CHANNEL 1 SPEAKER OUTPUT to one of the house speakers (C). Run another speaker cable from the power amp's CHANNEL 2 SPEAKER OUT-PUT to the other house speaker (D). Run a third speaker cable from the monitor power amp's MONO SPEAKER OUTPUT to the monitor speakers (E).

The mixer's MASTER LEVEL control will set the house volume level and each channel's AUX 1 controls will set the level of the mix going to the monitors. The mixer's PAN pots on each channel will serve as the left/right balance controls for each channel.



# **Applications: DJ Setup:**

In this setup the mixer will feed a stereo power amplifier to drive the house speakers.

Run a pair of signal cables from the mixer's MAIN OUT LEFT and MAIN OUT RIGHT jacks to the power amp's CHANNEL 1 and CHANNEL 2 INPUT jacks (A).

Run a speaker cable from the power amp's **CHANNEL 1 SPEAKER OUTPUT** to one of the house speakers (B). Run another speaker cable from the power amp's **CHANNEL 2 SPEAKER OUTPUT** to the other house speaker (C).

The mixer's **MASTER LEVEL** control will set the house volume level. The **PAN** pot on the channel for the turntable's left output must be turned fully counterclockwise; the **PAN** pot for the right channel, fully clockwise.





# **Applications: House of Worship:**

In this setup the mixer's MAIN OUTS are used for the sanctuary mix, AUX 1 is used for a platform mix, a stereo mix is provided for an external tape deck and a mono mix is provided for a radio feed via AUX 2.

Run signal cables from the mixer's MAIN OUT LEFT and MAIN OUT RIGHT jacks to the INPUT jacks of the sanctuary speakers' power amp (A). Run another signal cable from the mixer's AUX 1 SEND jack to the INPUT jack of the monitor speakers' power amp (B). Run another signal cable from the mixer's AUX 2 SEND jack for the radio feed (C).

Run speaker cables from the sanctuary power amp's SPEAKER OUTPUT to the sanctuary speakers (D). Run another speaker cable from the monitor power amp's **SPEAKER OUTPUT** to the monitor speakers (E).

The MASTER LEVEL control will set the level of the sanctuary speakers. The AUX 1 controls will set the mix going to the platform monitors. The AUX 2 controls will set the mix going to the radio feed.





# **Applications: Live Band Setup:**

In this setup the mixer and one stereo power amplifier are used to run both the house speakers and the stage monitors. The drum and keyboard sub-mixes are supplied by additional CSM-802 mixers, each patched into the house mixer. A two-channel graphic equalizer has been added between the house mixer and the power amp.

Run a signal cable from the house mixer's MAIN OUT LEFT jack to the EQ's CHANNEL 1 INPUT jack (A). Run another signal cable from the mixer's AUX 1 SEND jack to the EQ's CHANNEL 2 INPUT jack (B).

Run a signal cable from the EQ's CH 1 OUT jack to the power amplifier's CHANNEL 1 INPUT jack (C). Run another signal cable from the EQ's CH 2 OUT jack to the amp's CHANNEL 2 INPUT jack (D).

Run a speaker cable from the power amp's **CHANNEL 1** SPEAKER OUTPUT to the house speakers (E). Run another speaker cable from the amp's **CHANNEL 2** SPEAKER OUTPUT to the monitor speakers (F).

The mixer's **MASTER LEVEL** control will set the house volume level and each channel's **AUX 1** control will set the level of the mix going to the monitors.





# **Applications: Separating Vocals and Instruments:**

In the setup shown here the pan controls on the vocal mic channels are rotated all the way to the left to assign all vocals to the left channel. The instruments are then all assigned to the right channel by rotating their pan controls all the way to the right.

Two pairs of speakers are required: one pair for the vocals and another for the instruments. Each pair of speakers will be powered by a channel of a stereo power amplifier. A mono amplifier (or a stereo amp in the bridged mono mode) will drive the monitors. The vocal speakers should be placed on top of the instrument speakers to minimize interference between the sounds from the two sets of speakers.

Run a pair of signal cables from the mixer's MAIN OUT LEFT and MAIN OUT RIGHT jacks to one of the power amp's CHANNEL 1 and CHANNEL 2 INPUT jacks (A). Run another signal cable from the mixer's AUX 1 SEND jack to the monitor power amp's INPUT jack (B).

Run a speaker cable from the stereo power amp's CHANNEL 1 SPEAKER OUTPUT to the "vocal" speakers (C). Run another speaker cable from the power amp's CHANNEL 2 SPEAKER OUTPUT to the 'instrument" speakers (D). Run a third speaker cable from the monitor power amp's SPEAKER OUT-PUT to the monitor speakers (E). The mixer's MASTER LEVEL control will set the house volume level and each channel's Aux 1 controls will set the level of the mix going to the monitors.



# **Applications: External Effects and Recorders:**

There are several ways to use the Crate Pro Audio rack mixers with external signal processors (such as effects and delay units, equalizers, etc.). For example, any (or all) of the four mono channels may have its own processor patched in by use of the INSERT jack (#9, page 4). Effects may also be patched in through the AUX 1 and AUX 2 SEND and RETURN jacks. Both AUX loops will accommodate stereo as well as mono effects. The illustrations below show some of these different connections. Other options may also be available depending upon the effect used – consult the effect's owner's manual.

The signal level for the AUX sends is controlled by the setting of each channel's AUX pots. The AUX 1 and AUX 2 RTN pots (#20, page 6) let you control how much of the effected signal is in the master mix.

Connecting a tape deck for recording and playback is accomplished as follows: Connect the **PLAYBACK (LINE OUT)** of the deck to the mixer's **TAPE IN** jacks. Connect the **RECORD (LINE IN)** of the deck to the mixer's **TAPE OUT** jacks. The mixer's **TAPE IN** and **TAPE OUT** pots (#21, page 6) let you adjust the signal levels to and from the tape deck. *To avoid feedback, keep the TAPE IN control at minimum when recording!* 



# **Equalization Diagrams:**

Each input channel has two bands of equalization which let you alter the tonal characteristics of the input signal. The EQs may be used to add "color" or to compensate for inadequacies of the original signal. They also may be used to cut frequencies to help eliminate unnatural sounds or to de-emphasize over-pronounced tones and to help prevent acoustic feedback. Each EQ has a range of 28dB (+/-14dB).

The high EQ for each channel is a "shelving" type, with an action point (+6dB) at 2.5kHz, reaching maximum effect at 12kHz and above.

The low EQ for each channel is a "shelving" type with an action point (+6dB) at 300Hz, reaching maximum effect at 70Hz and below.



# Differences in Cable Types:

This manual makes reference to different types of cables; in particular, balanced and unbalanced signal cables and speaker cables. These are not the only types of cables associated with sound reinforcement, but they are similar enough to each other to warrant a more descriptive explanation. The three 1/4"-terminated cables below may look alike at first, but upon closer examination their differences become apparent.







# **Technical Specifications**

#### SYSTEM INPUTS

- 4 mic/line and 2 stereo input channels 2 stereo effects returns
- 1 stereo tape return

#### MONO CHANNELS

- Low-Z Mic: 1 3-pin "XLR" (balanced, pin 2 = "in phase") Transformerless electronically balanced 1k ohm load impedance
- High-Z Line: 1 1/4" phone jack (balanced) 10k ohm load impedance

#### **CHANNELS 5-8**

High-Z Line: 2 1/4" phone jacks 22k ohm load impedance

#### EQUIVALENT INPUT NOISE

Typically < -129dB @ 20 - 20k equivalent bandwidth unweighted with 200 ohm source impedance

#### COMMON MODE REJECTION

Typically -90dB min., -70dB @ 50Hz

#### PEAK INDICATOR

Indicates 6dB headroom remaining

#### MAXIMUM SIGNAL ACCEPTED

Low-Z Mic: 3.46V RMS (13dBv)

High-Z Line: 15.9V RMS (26dBv)

#### **CHANNEL GAIN**

Typically 52dB adjustment range

#### CHANNEL INPUT SENSITIVITY

Low-Z Mic:	Levels up	8.7mV	RMS	max.	(43dB gai	n)
	Ch. up only	2.7mV	RMS	max.	(53dB gai	n)
	Levels "+10"	.28mV	RMS	max.	(73dB gai	n)
High-Z Line:	:Levels up	87mV	RMS	max.	(23dB gai	n)
	Ch. up only	27mV	RMS	max.	(33dB gai	n)
	Levels "+10"	28mV	RMS	max.	(53dB gai	n)

#### **CHANNEL EQ (ACTIVE)**

Low	+/-14dB @ 70Hz shelving
High	+/-14dB @ 12kHz shelving

#### AUX RETURNS / TAPE INPUTS

1/4" phone jacks:	15k ohm input impedance
RCA jacks:	15k ohm input impedance
Max. Sensitivity:	-20dBv (80mV RMS)
Max. Input Accepted:	+30dBv (24.5V RMS)

#### AUX SEND / TAPE OUT

	501
1/4" phone jacks:	+4dBv (1.23V RMS)
	nominal output
RCA jacks:	+4dBv (1.23V RMS)
	nominal output

#### PHANTOM POWER

+15VDC applied to pins 2 and 3 of XLR inputs (always on)

@ High-Z

@ High-Z

#### **LEFT & RIGHT OUTPUTS**

Unbalanced out @ 10k ohm load impedance Balanced @ 3k ohm load impedance +4dBv (1.23V RMS) nominal output 18dBv (6V RMS) max. output

#### DUAL OUTPUT LED INDICATORS

Туре:	10 LED quasi-peak
Calibration:	Calibrated to indicate +4dBv @ 7th LED
Range:	-18dBv to +13dBv
Signals Read:	Left and Right Main Outs

#### **RESIDUAL NOISE**

90dB below 1.23V RMS min. with all levels down. 60dB below 1.23V RMS with Master Level up full and one channel up full.

#### TOTAL HARMONIC DISTORTION

< 0.1% @ 1kHz input @ 5V RMS output (typically 0.05%) measured from Mic In to Main Out (EQ flat) with Master @ nominal "0" setting (-10dB from max. gain), and Gain and Channel Level at max. (At lower input signal levels, measurement is limited by the noise floor.)

#### SIZE AND WEIGHT

3.5" H x 19" W x 3.25" D (88.9mm x 482.6mm x 82.6mm) 4.3lbs (1.95kg)

#### POWER REQUIREMENTS

9-10VAC 750mA

Specifications subject to change without notice.





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