

# U.S. Audio

**whirlwind**

**OPERATIONS MANUAL**

# Mix 6

**STEREO MIXER**



## INTRODUCTION

Thank you for selecting the US Audio Mix 6. The Mix 6 delivers the ultimate in sonic performance for the most demanding professional mic and line mixing applications. Utilizing the Analog Devices 2017 IC, a carefully wound toroidal power transformer, true star grounding, plus many other design features, the Mix 6 has a working signal to noise ratio (S/N) of 92dB with 22dB headroom at unity gain! At 40dB of gain the Mix 6 holds a working S/N of 85dB making it ideally suited for production with digital recording media. The Mix 6 can provide up to 76dB of gain, with a professional quality signal to noise ratio and still have 10 to 15dB of headroom. Other features include 2 stereo aux inputs, one of which can be used as a separate monitor input, a stereo peak limiter, low cut filters and a headphone circuit. With a full complement of hook-up hardware, the Mix 6 is capable of handling any configuration of line or mic level signals as well as any combination of balanced or unbalanced XLR and 1/4" connectors.

## UNPACKING

US Audio has made every effort to ensure that your equipment is received in the same perfect condition it was in when it left the factory. Please inspect your product for any signs of damage during shipping and report them to your dealer so that he can present a claim to the shipper. We recommend that you save your packaging material for use in the unlikely event that you need to return your equipment for service.

# THEORY OF OPERATION

The US Audio Mix 6 has four mic or line input channels and two stereo aux line inputs. All of the XLR and 1/4" input and output jacks, except aux 1, are active electronically balanced circuits. The input sections of channels 1-4 on the Mix 6 use the relatively new Analog Devices 2017 integrated circuit, which was designed to yield high amounts of gain with the lowest possible noise. This IC, along with careful component selection, a toroidal power transformer, and true star grounding on a 2 ounce copper double sided circuit board, enable the Mix 6 to achieve a working signal to noise ratio (S/N) of 92db with 22dB of headroom at unity gain. The Mix 6 holds a working S/N ratio of 85db at 40db of gain and can provide up to 76dB of gain, still maintaining 10 to 15db of headroom. With the mic/line switch is in the mic position, the 2017 is factory set at 36db of gain by an internal resistor. This 36db plus the two sections of 20 dB available from each of the channel volumes and master volume offer a total gain of 76db. For applications which need even more, the Mix 6 can be ordered or modified to obtain up to 50dB of gain from the 2017 via a simple resistor change.

All the gain controls on the Mix 6 (Channel gain, Aux and Master) have a range of -60 to +20dbm. With the input and output switches in the Line position and with both the channel and master volume controls at the same position, unity gain is at the 9 O'clock knob position, 10dB gain at 12 O'clock, and 15dB gain at 3 O'clock. The 60db of attenuation in the off position allows the Mix 6 to adequately turn off line level signals. Maximum signal level through the Mix 6 at clipping is +28dBm balanced and +22dBm unbalanced. The sonic figures apply to both the input and the output and individual clip LEDs are provided which illuminate at -3dB below actual clipping. The OL (Over Load) circuit senses the signal level in 2 places (input diff amp and after channel gain) to ensure foolproof visual indication of distortion.

Channels 1-4 have a pan control. The center detented, dual element, audio taper pot provides a wide range of stereo positioning for the input signal. The center detent allows quick centering of the signal. Also included on channels 1-4 is a low frequency rolloff switch for elimination of sub frequencies such as mic handling or wind noise. The cutoff frequency is 120Hz with a 24dB per octave slope.

Aux inputs one and two are true stereo line level inputs. Aux input 1 is via unbalanced RCA jacks. Aux input 2 is accessed through left and right balanced 1/4" TRS jacks, which can be used balanced or unbalanced. Aux 2 has a unique main/off switch which routes the input signal to the left and right stereo busses when activated. This feature allows aux 2 to be disconnected from the main output and in combination with the headphone main/mon switch, routes the signal to only the headphones for cueing or monitoring. The Mix 6 aux inputs will interface easily with most all types of consumer or professional equipment.

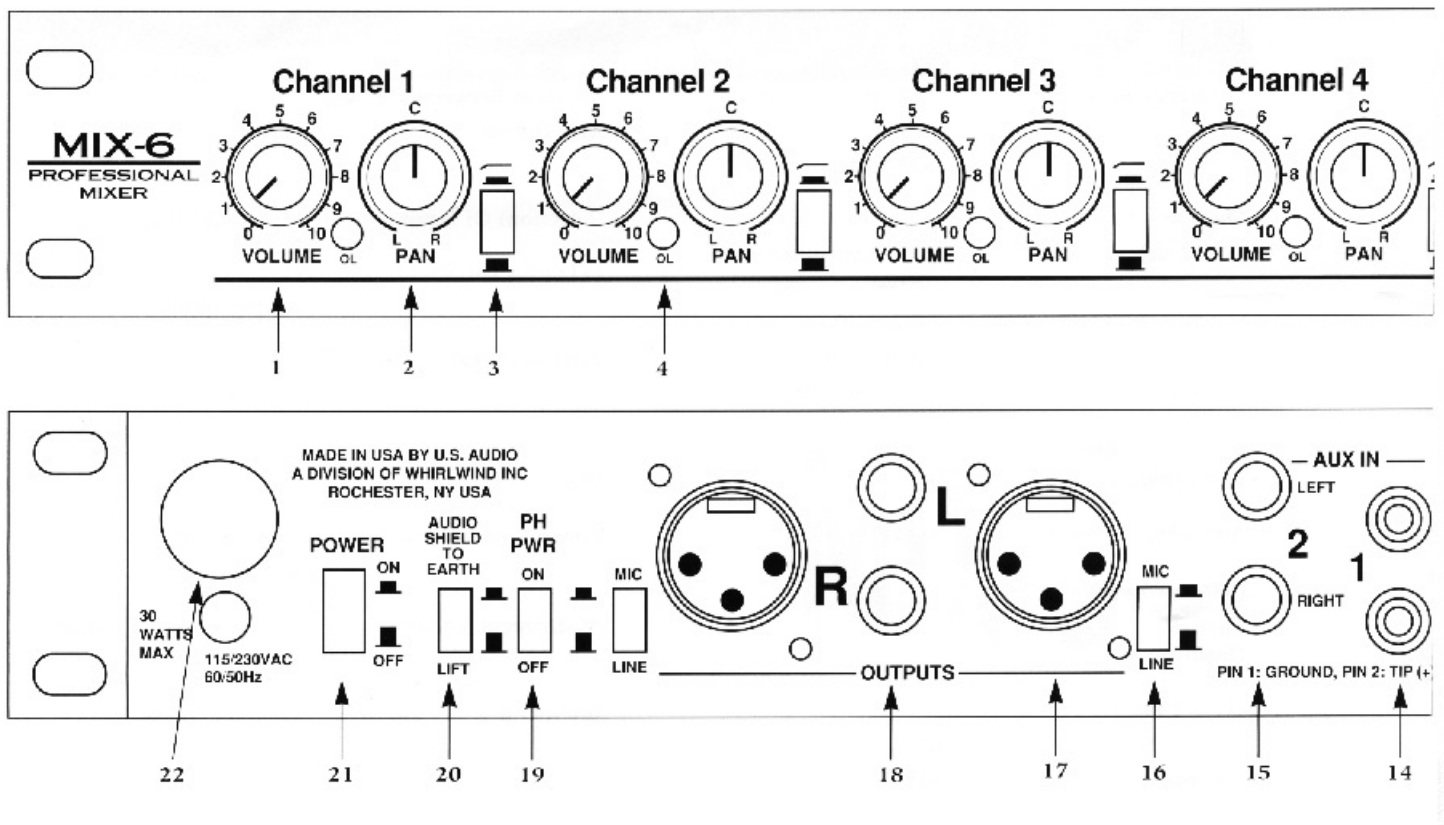
The output section of the Mix 6 was designed to accommodate any configuration, line or mic level balanced or unbalanced XLR and balanced or unbalanced 1/4" connectors. Each channel's output jacks are individually buffered so any combination of the outputs, at any impedance, will not affect the other outputs. With the Mic/Line output switch in the Mic position, the XLR's output is reduced by 20db (this switch does not affect the 1/4" jacks). The Mix 6 uses an H-Pad resistor network at the XLR to maintain the S/N ratio, regardless of the position of the Mic/Line switch. For the XLR outputs, if ground lifting of pin 1 is desired, jumpers JMP 6 and JMP 7 inside the unit can be clipped off. Then, in Line mode pin 1 of the XLR is completely lifted and in Mic mode the XLR's pin 1 is ground isolated and referenced to pins 2 and 3. If unbalanced operation is desired from the XLR outputs, pin 2 is hot, pin 1 is ground, and pin 3 should be left UNCONNECTED.

LED dB meters provided on the Mix 6 are precisely calibrated at 3dB increments and span a range of -15 to +12dBm measured unbalanced at the 1/4" output. The output of the XLR, with the switch in Line mode, is 6db greater, measured balanced.

The limiter section of the Mix 6 is pre master fader, allowing versatility in selection of output levels while the peak limiter is active. The limiter is true stereo, with separate detectors for each side, which engage at 0dB and limit up to 15dB. The left and right LEDs on the front panel illuminate when the limiter is working and get brighter as limiting increases. With a quick attack time and moderate ratio the limiter is ideal for open mic situations where unexpected level changes can occur.

The Mix 6 has a headphone monitoring section consisting of a source select switch, a volume control, and a 1/4" TRS headphone jack. The headphone circuit is stereo and drives any headphones with 20 Ohms or greater impedance. The volume control has a gain range of -60 to +20db to accommodate a wide range of audio levels. The select switch allows listening to either the prefader stereo master outputs or the postfader signal coming from the aux 2 inputs.

The Mix 6 utilizes a dual primary toroidal power transformer which is configured with internal jumpers for 120 VAC 60Hz or 230 VAC 50Hz operation. There is an internal fuse on the hot side of the AC cord, and the power switch makes and breaks both the hot and neutral legs of the AC cord. A ground lift switch is provided which can disconnect the audio circuit ground from the AC chassis ground.



## CONTROLS AND CONNECTIONS

### 1. Channel Volume Pots control input signals over a range of

60dBm attenuation at full off to 20dBm of gain at full on.

2. **Pan Pots** are dual pots with center detent, offering over 65dB of stereo isolation from left to right channel. The center detent allows convenient and accurate setup, feeding signal equally to both channels.

3. Low frequency **Cut Switch** for reduction of wind noise, etc. The cutoff frequency is 120Hz with a 24dB slope.

4. **OL (Over Load) LED** illuminates when the level is 3dB below distortion. The clip circuit senses the signal level at the input diff amp and after the channel gain.

5. **Aux 1 Input Pot** controls the rear panel RCA jacks. Aux I is a stereo unbalanced circuit feeding the left and right busses. This control has a gain range of -60 to +20dB.

6. **Aux 2 Input Pot** controls the rear panel stereo 1/4" TRS balanced jacks through a gain range of -60 to +20dB. Postfader signal is fed to the headphone select switch "mon" position allowing aux 2 to become an external input to the headphone circuit. The main/off switch routes the aux 2 input signal to the left and right stereo busses in

the "in" position and lifts the signal when "out". Signal to the headphone switch is always on.

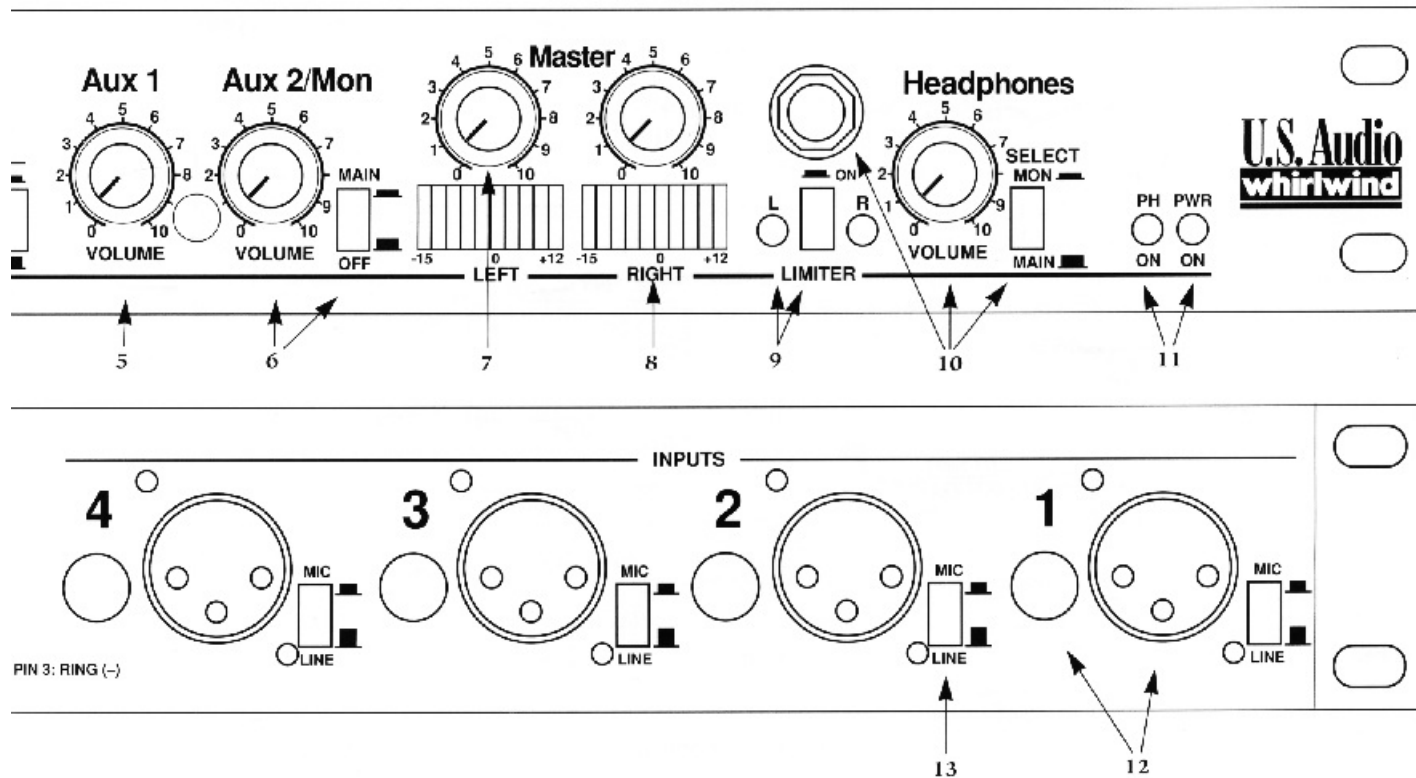
7. **Master Volume Pots** determine the amount of signal from the summing amps that is fed to the output drivers and the meters. These also have a gain range of -60 to +20dBm.

8. **LED dB Indicators** are precisely calibrated at 3dB increments and span a range of -15 to +12dBm measured unbalanced at the 1/4" output. The output of the XLR, with the switch in Line mode, is 6dB greater.

9. **Stereo Peak Limiter** is pre master fader and is switchable in or out of the signal path. Threshold is set at 0dB and limiting up to 15dB is possible. The left and right LEDs on the front panel illuminate when the limiter is working and get brighter as limiting increases. Attack time is fast and the ratio is approximately 4:1.

10. **Stereo Headphone Circuit** consists of a source select switch, a volume control, a 1/4" TRS headphone jack and will drive any headphones with 20 ohms or greater impedance. The volume control has a gain range of -60 to +20dB. The select switch feeds either the prefader stereo master signal or the aux 2 postfader signal to the headphone amplifier.

11. **LED Indicators for Phantom Power and Unit Power** illuminate when rear panel switches are activated.



**12. Input 1/4 TRS and XLR Jacks** are AC coupled through phantom blocking capacitors with pin 2 being positive wired to tip, pin 3 being negative wired to ring and pin 1 being common wired to sleeve.

**13. Input MidLine Switch** is connected to an active circuit and turns on 36dB of gain when pushed in to the Mic position. This gain is applied to both input jacks.

**14.** Left and right **Unbalanced RCA Jacks** for aux 1 input.

**15.** Left and right **Balanced 1/4 TRS Jacks** for aux 2 input.

**16. Output Mic/Line Switches** affect only the XLR output jacks by inserting a 20dB pad across pins 2 and 3 in the Mic position.

**17. Output Male XLR Jacks** are balanced with pin 2 being positive, pin 3 being negative and pin 1 being audio ground. For unbalanced operation use pins 1 and 2 leaving pin 3 UNCONNECTED. To internally lift pin 1 from common, open the unit and cut jumper JMP7 for left or JMP6 for right.

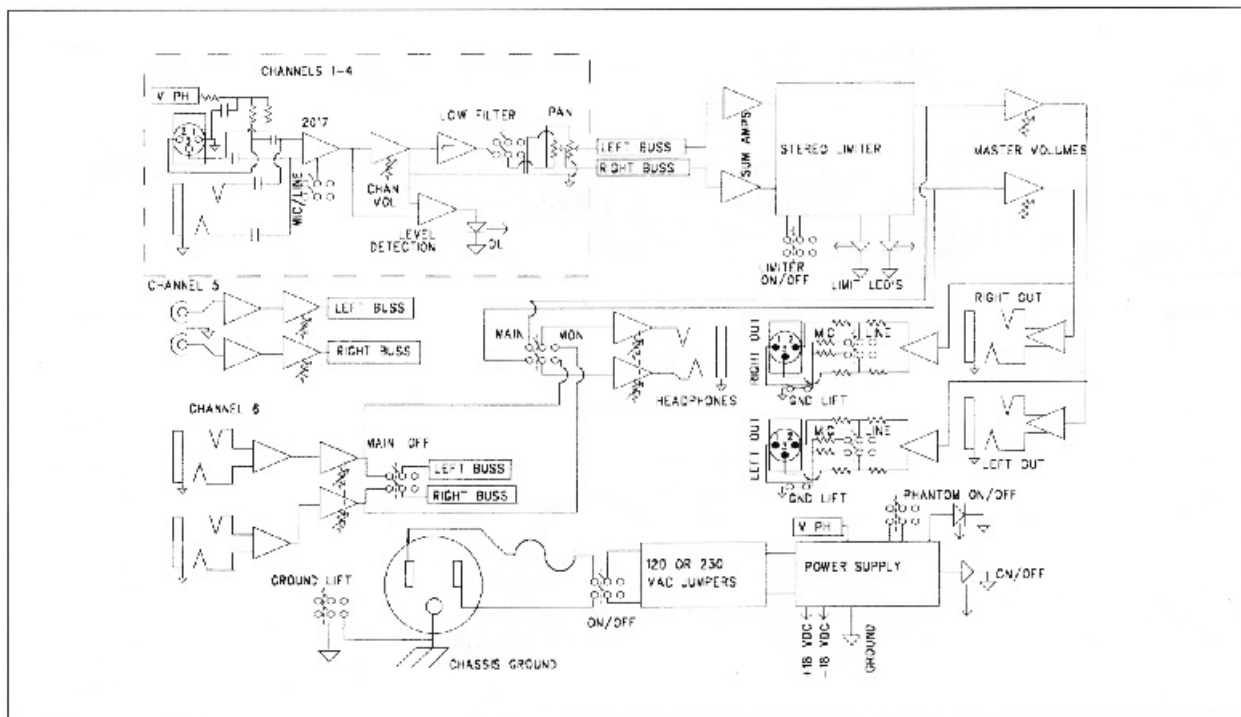
**18. Output 1/4 TRS Jack** delivers the same signal as the XLR but has a separate driver circuit providing complete isolation. May be used either balanced with a TRS plug or unbalanced with a TS plug. Tip is positive, ring is negative and sleeve is audio ground.

**19. Phantom Power Switch** activates 48V DC on channel 1-4 XLR inputs. Status is indicated by the front panel LED. Each of the mic inputs is filtered to eliminate crosstalk through the supply rail and phantom power is isolated from the TRS jacks.

**20. Ground Lift Switch** connects the audio circuit ground to AC ground and the chassis of the unit, if desired.

**21. Power Switch** connects AC to the transformer primary and the front panel LED indicates that the unit is working. Both sides of the AC line are switched and a mains fuse is located on the circuit board inside the unit.

**22. Power Cord** has a standard 15 amp plug for 120VAC and has no plug on the Mix 6X 230VAC models. Black is line, white is neutral and green is earth.



Block Diagram: Aux 2 can be routed to the main output or only to the headphones for monitoring.

INPUT LEVEL	INPUT MIC/LINE SWITCH	GAIN	HEADROOM MAX OUT	SIGNAL TO NOISE RATIO	RESIDUAL NOISE
10	Line	0	12	101	-91
0	Line	0	22	91	-91
0	Line	10	12	92	-82
-10	Line	20	12	82	-72
-10	Line	30	2	82	-62
-20	Line	33	9	72	-59
-20	Mic	36	6	105	-89
-30	Mic	36	16	95	-89
-40	Mic	40	22	85	-85
-40	Mic	50	12	86	-76
-50	Mic	50	22	76	-76
-50	Mic	60	12	76	-66
-60	Mic	60	22	66	-66
-60	Mic	70	12	68	-58

## **SPECIFICATIONS**

### **Frequency Response**

Line mode	± 3dB, 6Hz to 40kHz -0.4dB @ 20Hz -.8dB @ 20kHz
Mic mode	± 3dB, 18Hz to 36kHz -2.5dB @ 20Hz -1dB @ 20kHz

### **Maximum Input Level**

Line mode	+22 dBm unbalanced +28 dBm balanced
Mic mode	- 14 dBm unbalanced +28 dBm balanced
Aux 1 & 2	+22 dBm unbalanced +28 dBm balanced

### **Input Impedance**

4k Ohm

### **Aux 2 Input Impedance**

4k Ohm

### **Maximum Output Level**

Balanced	+28dBm
Unbalanced	+22dBm

### **Output Impedance XLRs**

Line mode	100 Ohms
Mic mode	200 Ohms

### **Output Impedance TRS**

Unbalanced	60 Ohms
Balanced	120 Ohms

### **Rise Time**

8.6uSec

### **Stereo Separation**

>65dBm

### **Attenuation Of Line/Mic Output Switch**

20dBm

### **Isolation Between 1/4" and XLR Outputs**

>100dBm

### **C.M.R. (Common Mode Rejection) of Input**

> 55dBm @ 60Hz

### **LED Clip Threshold**

+19dBm unbalanced  
+25dBm balanced

### **THD+N (Total Harmonic Distortion + Noise)**

.005% @ 1kHz  
.02% 20Hz to 20kHz

### **Phantom Power**

+ 48 Volts DC

### **Power Consumption**

.27 Amps Max AC @ 120 VAC  
.27 Amps Max AC @ 230 VAC

### **AC Dropout Voltage**

+103 VAC @ 120VAC Nominal  
+203 VAC @ 230VAC Nominal

### **Internal Mains Fuse**

.25 Amps Slo-Blo 3AG

### **Size (Single space standard E.I.A. Spec)**

19.0" (482.6mm) Width  
6.0" (152.4mm) Depth  
1.75" (44.45mm) Height

### **Shipping Weight**

9 lbs (4.08kg)

### **Unit Weight**

7 lbs (3.18kg)