

DA-2M DISTRIBUTION AMPLIFIER



INTRODUCTION

Thank you for selecting the US Audio DA-2M. The DA-2M is a professional quality two channel analog audio distribution amplifier which accepts either mic or line level inputs. There are eight electronically balanced XLR line level outputs with individual volume controls and clip indicators. The audio performance is of the highest quality, making it an excellent value. Great care was taken in the design so that the DA-2M can fulfill any distribution requirement, from broadcast audio feeds to loudspeaker audio input distribution.

Inputs feature Neutrik combo 1/4" TRS/XLR connectors, mic/line level input switches, variable input gain controls, low cut switches for reducing low frequency rumble or wind noise, four segment headroom indicators and 48 V phantom power that is applied to the XLR in mic mode and turned off when the input is used in line mode.

The front panel COMBINE switch converts the DA-2M from two 1X4 distribution amps to a 2x8 distribution amp with the two inputs combining to feed all eight outputs. This provides the capability of having both a line and a mic input simultaneously.

A headphone circuit allows signal monitoring of each input in mono or listening to both input channels in a stereo mode.

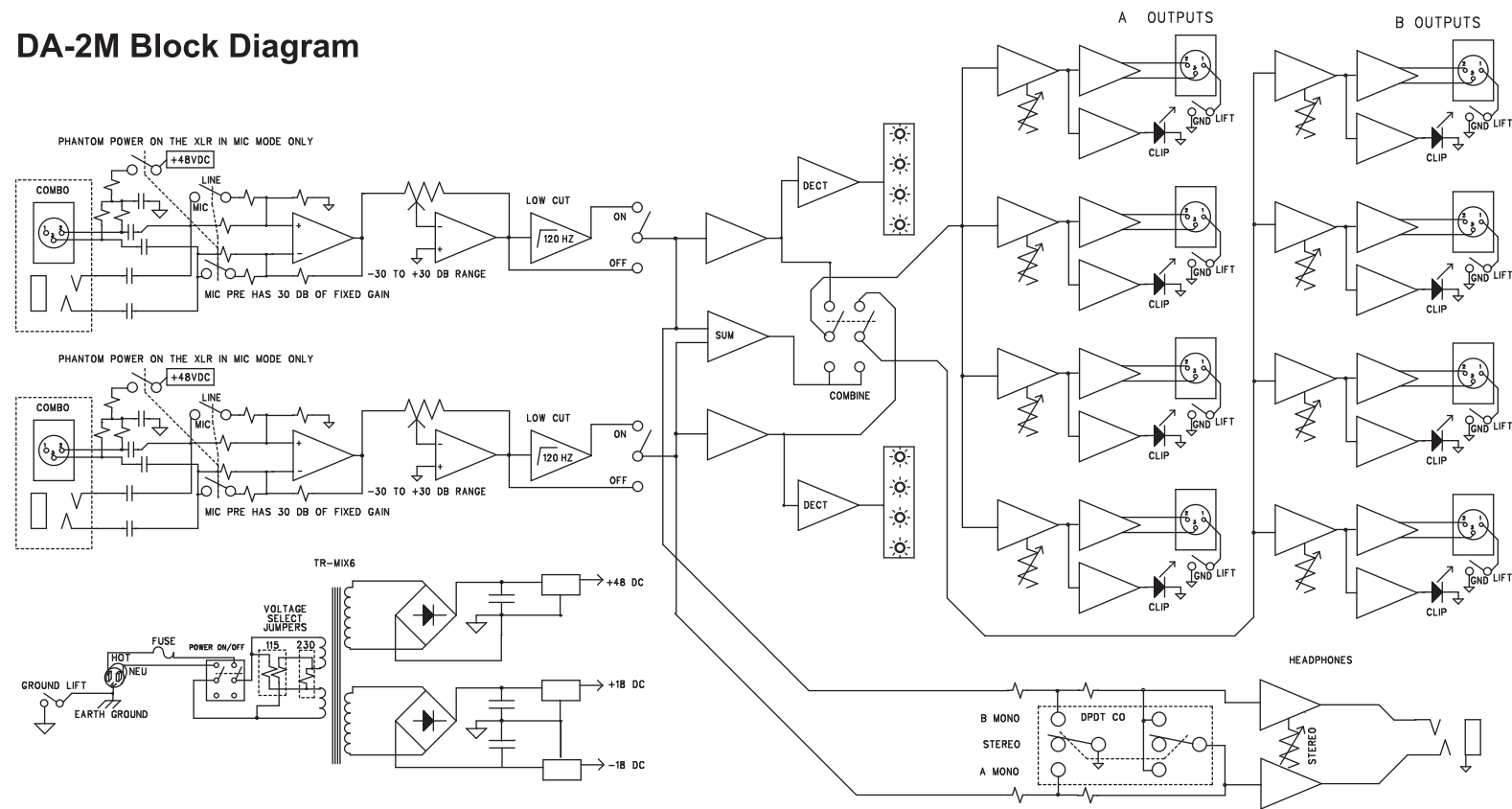
UNPACKING

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

SPECIFICATIONS

Frequency Response	Line: +/- .5 dB 20-20 kHz Mic: +/- .65 dB 20-20 kHz										
Total Harmonic Distortion +noise	< .003 % at 1 kHz										
Equivalent Input Noise	121 dB										
Total Gain	74.7 dBV										
Gain of Microphone/Line Switch	29 dBV										
Gain of Input Trim	28.7 dBV										
Gain of Channel Volume	17.0 dBV										
Range of level pot	Trim -40.8 to +28.7 dBV Channel: -61 to +17 dBV										
Common Mode Rejection of Input	Line: -80.9 dB at 60 Hz, unity gain Mic: -68 dB at 60 Hz, 40 dBV of gain										
Maximum Input level	Line: +22 dBV Mic: -7 dBV										
Input Impedance	Line: 40 K Ohms Mic: 1.5 K Ohms										
Maximum output level	+27.6 dBV										
Output drive power	+22 dBV into 600 Ohms										
Output Impedance	100 Ohms										
Minimum impedance of headphones	8 Ohms										
Noise at unity gain	-92.4 dBV Line mode										
Noise at 40 dBV of gain Mic mode	-80.4 dBV										
Working signal to noise ratio (at 20 dBV headroom)	Line: 114.6 dB at unity Mic: 87.4 dB at 40 dBV of gain										
Isolation between input channels	Line at unity: 112 dBV at 1 kHz 98 dBV at 20 kHz Mic at 40 dBV of gain: 90 dBV at 1 kHz 75 dBV at 20 kHz										
Clip LED threshold	<table border="1"> <thead> <tr> <th>LED</th> <th>Headroom</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>1 dBV</td> </tr> <tr> <td>Yellow</td> <td>12 dBV</td> </tr> <tr> <td>Green 1</td> <td>24 dBV</td> </tr> <tr> <td>Green 2</td> <td>36 dBV</td> </tr> </tbody> </table>	LED	Headroom	Red	1 dBV	Yellow	12 dBV	Green 1	24 dBV	Green 2	36 dBV
LED	Headroom										
Red	1 dBV										
Yellow	12 dBV										
Green 1	24 dBV										
Green 2	36 dBV										
Phantom Power	48 Volts DC										
High pass filter	3 dB at 120 Hz 24 dB per octave slope										
Output isolation between channels	102 dBV at 1 kHz 95 dBV at 20 kHz										
Max Output of Headphones	+12 dBm at 47 Ohms +7 dBm at 23.5 Ohms										
Power consumption	<table border="1"> <thead> <tr> <th>Condition</th> <th>Amps AC</th> </tr> </thead> <tbody> <tr> <td>Idle</td> <td>.09</td> </tr> <tr> <td>Full clean</td> <td>.195</td> </tr> <tr> <td>Max.</td> <td>.30</td> </tr> </tbody> </table>	Condition	Amps AC	Idle	.09	Full clean	.195	Max.	.30		
Condition	Amps AC										
Idle	.09										
Full clean	.195										
Max.	.30										
Size	1 RU										
Internal Mains fuse	.5 amp slow blow type 3ag										
AC dropout voltage	105 VAC 60 Hz										
Power requirements	120 VAC 60 Hz Internal jumpers for 230 VAC 50 operation 40 Watts Max.										

DA-2M Block Diagram



THEORY OF OPERATION

The Whirlwind DA-2M is a 1 RU Distribution Amplifier (DA) with 2 mic/line inputs and 8 outputs. Using the same technology as in high-end mixing consoles, the DA-2M boasts low noise and distortion, suitable for the most demanding of professional audio applications. The expanded feature set allows this unit to be used in numerous applications.

The DA-2M can be used in stereo or a 2 channel application as two sets of 1 in (mic or line) to 4 out DAs (stereo, with 4 zones), or in a mono application as 1 set of 2 inputs combined (mic and/or line) to 8 outs (mono). The 2 inputs are switchable for either mic or line level applications. The mic preamp is set for a fixed 29 dB of gain when the mic/line switch is in the mic position. A trim control after the preamp adds another 28 dB of gain, and then each output level control adds another 17 dB of gain. Total gain is 74 dBV, allowing one to drive power amplifiers to full power with all microphones.

The input connector is a Neutrik Combo, which is female XLR and ¼ inch Tip Ring Sleeve jack. Either connector can be used in mic or line mode. When the DA-2M's inputs are in mic mode 48 Volt phantom power will be present on the XLR input connector (not present on the TRS). A low cut filter can be activated on both XLR or TRS inputs with a switch. The low cut uses a steep 24 dB per octave 4 pole filter set at 120 Hertz which will reduce wind noise, stage vibrations etc. In line mode, the DA-2M's 40 kOhm input impedance allows the user to parallel many DA-2M inputs together to generate numerous buffered outputs.

The headroom LEDs on each of the inputs provide quick visual confirmation of input level and headroom. Designed with an extreme amount of headroom (the DA-2M uses a bipolar 18 VDC supplies) the DA-2M can drive up to 27 dBV without distortion down balanced lines. In a typical mic application, the user would set the input trim controls so that the 24 dB headroom light is illuminated about 50% of the time. With more compressed line level audio, 12 dB of headroom usually is sufficient.

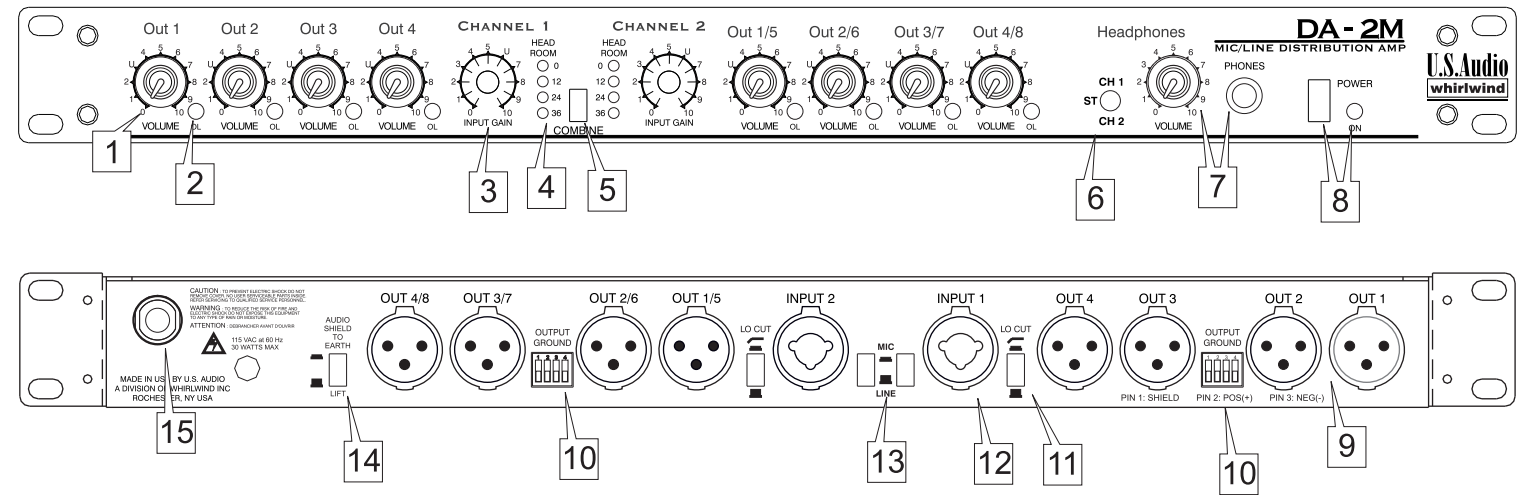
The Headphone section of the DA-2M uses a 3-position switch allowing for stereo listening or mono listening of either input. In the non combine mode (stereo or 2 channel) with the headphone select switch in the middle position, input 1 will be on the left earpiece and input 2 will be on the right earpiece. With the headphone select switch in the channel 1 position, channel 1 will be in both earpieces. With the headphone select switch in the channel 2 position, channel 2 will be in both earpieces. The volume control and the headphone amps are designed so a wide range of headphones of varying impedances may be used.

The 8 balanced outputs of the DA-2M are male XLR with individual level controls, clip LEDs, and ground lift switches. The level controls span a range of -60 to +18 dBV of gain. With the level control able to reduce signal 60 dB, this is sufficient to mute audio in most applications. When ground loop hum occurs, lifting the ground at the DA-2M's outputs can help break the loop. The clip LED on each channel visually shows the user that levels are too great and need to be turned down.

When using the outputs to drive an unbalanced input the male XLRs can be wired 2 ways. The standard configuration is using pin 2 hot, pin 1 as ground and no connection on pin 3. The output ground switch for this channel must be ON in this setup. The second is called "quasi balanced" and is used primarily when ground loops are an issue. Wire pin 2 to hot and pin 3 to ground of the unbalanced input, leaving pin 1 unconnected.

An earth to audio ground lift is also supplied on the back panel of the DA-2M. This switch separates the earth ground of the power cord (which is always connected to the chassis) from the audio ground. This ground can also be used to break audio ground loops, however breaking them with the individual channel ground switches is a better approach. When in high Radio Frequency Interference situations, it is suggested to keep audio ground connected to chassis ground.

Housed in a compact 1 RU enclosure the DA-2M uses a dual primary toroidal power transformer. Internal jumpers can be changed to operate the DA-2M at 230 VAC 50 Hertz.



CONTROLS AND CONNECTIONS

1. Output Volume Pots control the level at the corresponding rear panel output XLR. Each of the controls has a gain range of -60 dB attenuation at full off to +18 dB of gain at full on.

2. Individual Clip LEDs on all 8 outputs indicate signal overload conditions within the circuitry. The red clip LEDs illuminate at the clipping point of the unit (+27 dBV).

3. Input Gain Controls for each channel adjust the input signal to optimize to drive level to the outputs. These controls operate through a range of -40 dB to +30 dB and are shipped as screwdriver adjustable to deter unauthorized operation. If knob actuation is desired, remove the black bushings and install the included knobs as follows. Carefully pry the edge of the bushings away from the front panel and depress the plastic fingers that hold them in place. The fingers are located behind the printed areas on the face of the bushing. Rotate the control fully counterclockwise, align the knob's pointer with the scale and push it onto the shaft. If repositioning is required, the knob insert must be removed separately by grabbing the rectangular top with pliers and pulling it off. Reinstall the insert into the knob by aligning the ridge on the insert with the groove inside the knob behind the pointer.

4. Headroom Indicator LEDs on each of the input channels indicate the remaining headroom of the signal being applied to the output drive circuitry. The two green lights and the yellow indicate level below clipping (-36, -24, and -12 dB respectively) and the red LED illuminates at 1 dB below actual clipping.

5. Combine switch converts the DA-2M from two 1X4 distribution amps to a 2x8 distribution amp with the two inputs combining to feed all eight outputs. In this mode the two inputs are actively mono-summed, either input may be used to feed the eight outputs. The mono-sum feature allows the DA-2M to properly combine left and right stereo signals into a mono feed and also provides the capability of using both a line and a mic input simultaneously.

6. Channel 1/ST/2 Select switch determines the input signal that is fed to the headphone circuit for monitoring. Channel 1 or 2 selections are fed to both left and right as mono and the center ST position feeds Ch. 1 to the left and Ch. 2 to the right.

7. Headphone Circuit monitors the signals coming into the DA-2M inputs. It separately drives both earpieces in stereo headphones having an impedance 8 Ohms or greater. The volume control has a gain range of -60 to +18 dB to accommodate a wide range of audio levels. The jack is a standard 1/4" TRS type.

8. Power Switch connects AC to the transformer primary and the 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.

9. Output XLRs on the DA-2M are actively balanced with each output driven by its own individual driver circuit providing channel to channel isolation greater than 102 dBV. The outputs are wired pin 2 positive, pin 3 negative and are RF bypassed with capacitors for rejection of RF signals on output lines.

10. Output Ground Switches are provided to connect Pin 1 from each output XLR to the common audio ground bus. The dip switches are numbered 1-4 and correspond with the same numbered male XLR. In the down (off) position the Pin 1 of each output is lifted.

11. Low Cut Switch activates a 24 dB per octave filter set at 120 Hertz which will reduce wind noise, stage vibrations etc. The low cut filter is applied to both XLR and TRS inputs in either mic or line input mode.

12. Input connectors are combination female XLR and balanced ¼ inch TRS jacks. Either type can be used in mic or line mode. In mic mode 48 Volt phantom power will be present on the XLR only (not on the TRS). In line mode, the 40 kOhm input impedance allows the user to parallel many DA2M inputs together.

13. Mic/Line Switches insert the microphone preamps into the circuit when required for mic level input applications. Each mic preamp is set for a fixed 29 dB of gain in the mic position.

14. Audio Shield to Earth Switch separates the earth ground of the power cord (which is always connected to the chassis) from the audio ground. When in high Radio Frequency Interference situations, it is suggested to keep audio ground connected to chassis ground.

15. Power Cord has a standard 15 Amp plug for the DA2M 120 VAC model and has no plug on the DA2MX 230 VAC model. Black is line, white is neutral and green is earth. The mains fuse is internal.