

M108 Audio Mixer

FUNCTION DESCRIPTION



The M108 Audio Mixer is one the most usefull module in the family. It features 6 channels of DC coupled circuits who give the possibility to mix any signals such as audio waveforms, LFO waveforms, DC controls, etc ... The final mix goes to a Master volume. Normal and reverse mix signals are available on 4 output jacks. A clipping monitor 'watches' any clipplings of the final mixed waveform in the positive or negative side of the output opamp's supply rails and lite a front panel Led.

The printed circuit board

The module uses a 2U Moog style front panel. The PCB is a double side board, 4.25" X 5.5", has 4 mounting holes, one on each corner and is mounted on 4 x 4-40 1/4" "standoffs. All the parts are through hole types. Connectors P1 to P7 are positioned to be adjacents to their dedicated pots. 100kA log potentiometers are used for smooth response. Power is connected by use of a 6 pins 0.156" Molex type connector. All the wiring cables are shielded type. 2 shielded conductors for all the pots wiring, and Belden RG-174 coax are used for all the input/output jacks connections.

The circuit description

The M108 Audio Mixer circuitry is straight forward. First all the 6 channels Inputs are connected to switchcraft 1/4" jacks to be then routed to their 6 respective 100kA volume pots. All the resulting pots values are mixed using R1 to R6 then amplified using U1A that has a gain of 16k/100k (or 1/6) to avoid any clipping at the U1A output pin 1. This signal then goes thru the master volume pot P7, U1B keeps P7 from being loaded by the final gain stages. U2A sets the mix gain back to 1 (100k/16k or gain of 6) but is moderated By P7 who can be set to avoid clipping to occur at U2A pin 1. A normal output signal mix is available on J7 output jack. Opamp U2B reverses the normal output voltage and feeds it to jack J8.

Clipping monitor:

Since clipping would occur close to both opamps supply rails, both positive and negative clipping 'thresholds' values will be used to be compared (U4A,B) to the final U2A mix's pos. and neg. peaks, then on any of both threshold crossings, U4 comparators will trigger U5 which is a NE555 timer. U5 TR pin needs a falling edge trigger so Q1 will reverse both D1, D2 positive pulses when presents. R23 & C8 are calculated to give a 1 second led pulse duration on any occurring clippings. R25 has been added after the final PCB design. Since pos/neg clipping values are not quite the same at TL072 opamps output pins, R25 'pulls' the negative threshold level a little closer to gnd to reach the actual negative clipping level value. Doing so, VR1 trimmer pot can adjust BOTH positive and negative threshold values.

Adjustments and trimmings:

- Feed 4 of the 6 channels with the same 1khz sinewave.
- Set ALL front panel volumes to MAX position.
- Connect a scope to jack output+.
- Slowly drop down Master volume until clipping on output+ jack stops.
- Adjust trimmer VR1 until front panel Led shuts OFF then get it back slowly to ON.

The M108 is now ready for use.

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Jean-Pierre Desrochers
ArcEnSon

ELECTRONIC SPECIFICATIONS

POWER CONNECTOR

PIN ASSIGNMENTS

1	-15V
2	A GND
3	A GND
4	+15V
5	D GND
6	+5V

Panel Size: Double width 4.240" w x 8.75" h.

Volume control inputs: 6 summed

Channels input impedance: 100k +/-5%

Channels volume response: Log

Mixed outputs: 2 normal, 2 reversed

All output impedances: 100ohms +/-5%

Power:

+15V @ 27mA,

-15V @ 14mA,

+5V @ 0mA.

