Microphone Mixer Evaluation Module

DATA MANUAL: SLOU009

Date: July 1997

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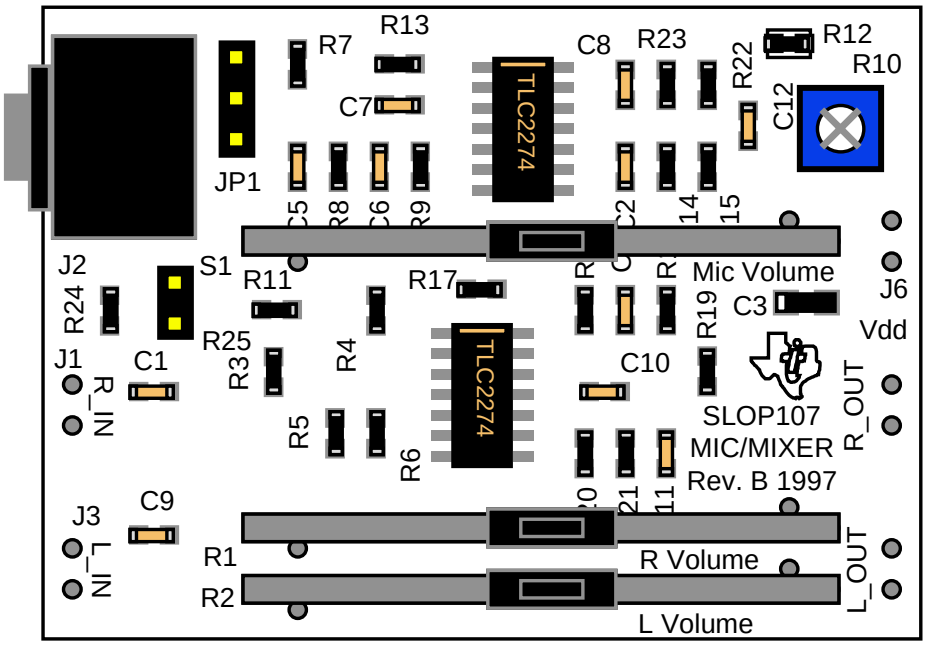
1. Layout Definition

The Mic/Mixer EVM is designed to provide basic volume control and a microphone interface to the P-n-P Audio Power Amplifier Evaluation Platform. With the Mic/Mixer plugged in to the P-n-P, the user can sing along with music from a favorite CD (karaoke) or simply use the volume control to adjust the listening level of the line inputs.

Figure 1. Mic Mixer EVM Component Placement



U1,2 - TLC2274CD
Quad op Amp, RRO, 2MHz

C1,5,9 - Capacitor, 1.0 µF Ceramic

C2,4,6,11 - Capacitor, 47 pF Ceramic

C3 - Capacitor, 10 µF Electrolytic

C7,8 - Capacitor, 2.2 µF Ceramic

C10,12 - Capacitor, 0.1 µF Ceramic

R1,2,11 - Pot, 50 k, Slide, Audio Taper

R3,5,8,12,14 - Resistor, 10 kΩ Carbon
R16,17,18,19 - Resistor, 10 kΩ Carbon
R20,21,25 - Resistor, 10 kΩ Carbon

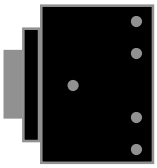
R4,6,13,15 - Resistor, 20 kΩ Carbon
R22,23,24 - Resistor, 20 kΩ Carbon

R9 - Resistor, 47 kΩ Carbon

R7 - Resistor, 2.2 kΩ Carbon

R10 - Pot, 200 k, 3/4 turn

JP1,2 -0.1” header, 2-pin, 3-pin



J2 - 1/8” Stereo Jack

2. Operation

The basis of the Mic/mixer design is the TLC2274 quad CMOS Rail to Rail op amp from TI. The bandwidth, distortion and noise performance of the TLC2274 make it an ideal workhorse in PC audio applications.

Power: 5.0 to 16 Vdc, 10 mA

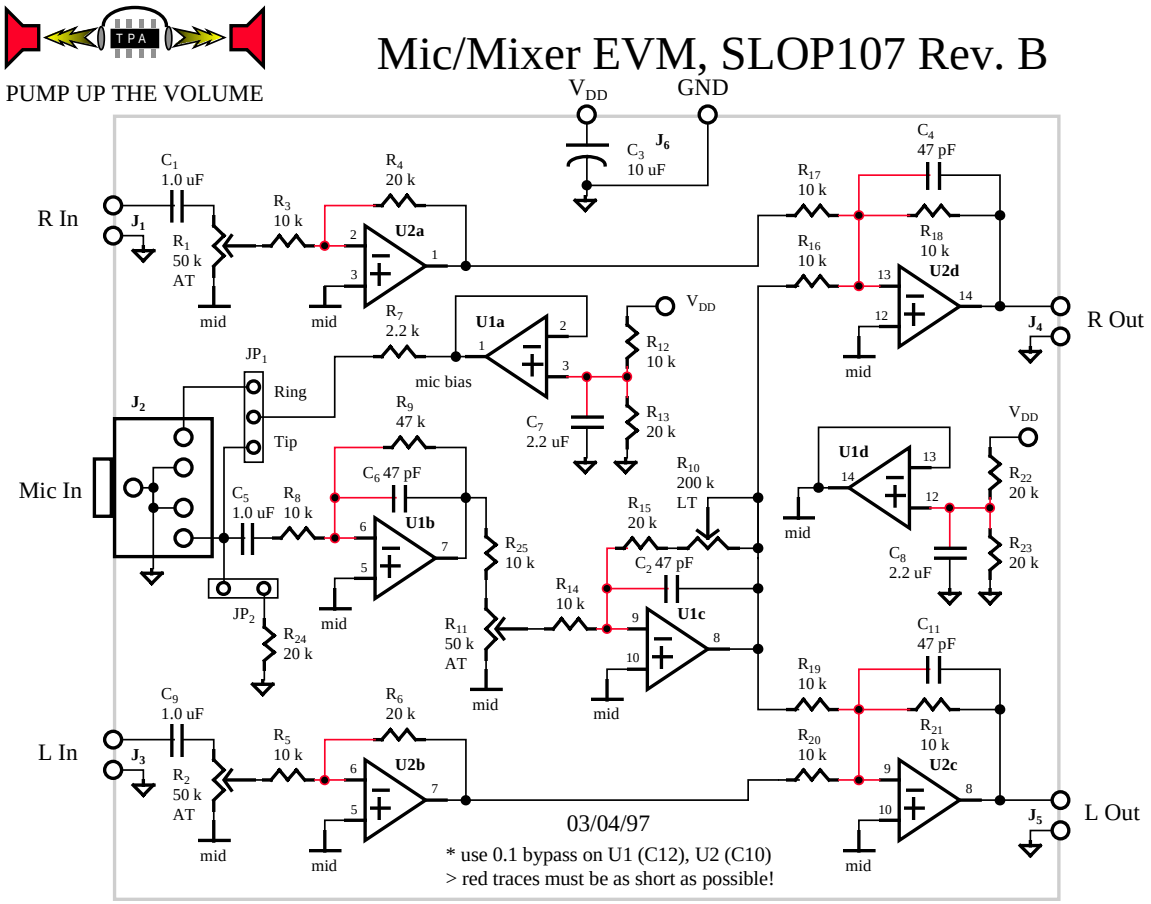
Audio Inputs: L/R IN, AC Coupled, 1 Vrms Nominal, G = 0 to 2, individual L/R slide control with audio taper,

Audio Outputs: L/R Out, DC Coupled (Vcc/2 offset), THD < 0.004% Nominal 1 kHz.

NOTE:MIC INTERFACE:MIC IN, 1/8" STANDARD INPUT JACK COMPATIBLE WITH MOST ELECTRET OR DYNAMIC MICROPHONES, G = 0 TO 7.5 WITH R19 SET TO MIN, G = 0 TO 83 WITH R19 SET TO MAX. INDIVIDUAL MIC LEVEL SLIDE CONTROL MIXES MIC INPUT TO BOTH LINE OUTPUTS. MIC BIAS OUTPUT SET TO VCC*0.66 SELECTABLE TO RING OR TIP.

3. Input/Output Connections

Figure 2. Mic Mixer Schematic



Each audio input channel is AC coupled through a 1 uF capacitor into a volume control potentiometer. The slide pot is logarithmic (audio Taper) which compensates for the nonlinear response of the ear resulting in a linear volume control. A single stage amp with a gain of -2 is used to buffer the volume control form the summing stage amplifier. A midrail (virtual ground) voltage is generated with a voltage divider from the supply voltage and buffered with a single amplifier. This voltage is used to bias the AC signal to the center of the operating voltage range to prevent positive or negative clipping of the audio signals. The voltage is set to Vcc/2.

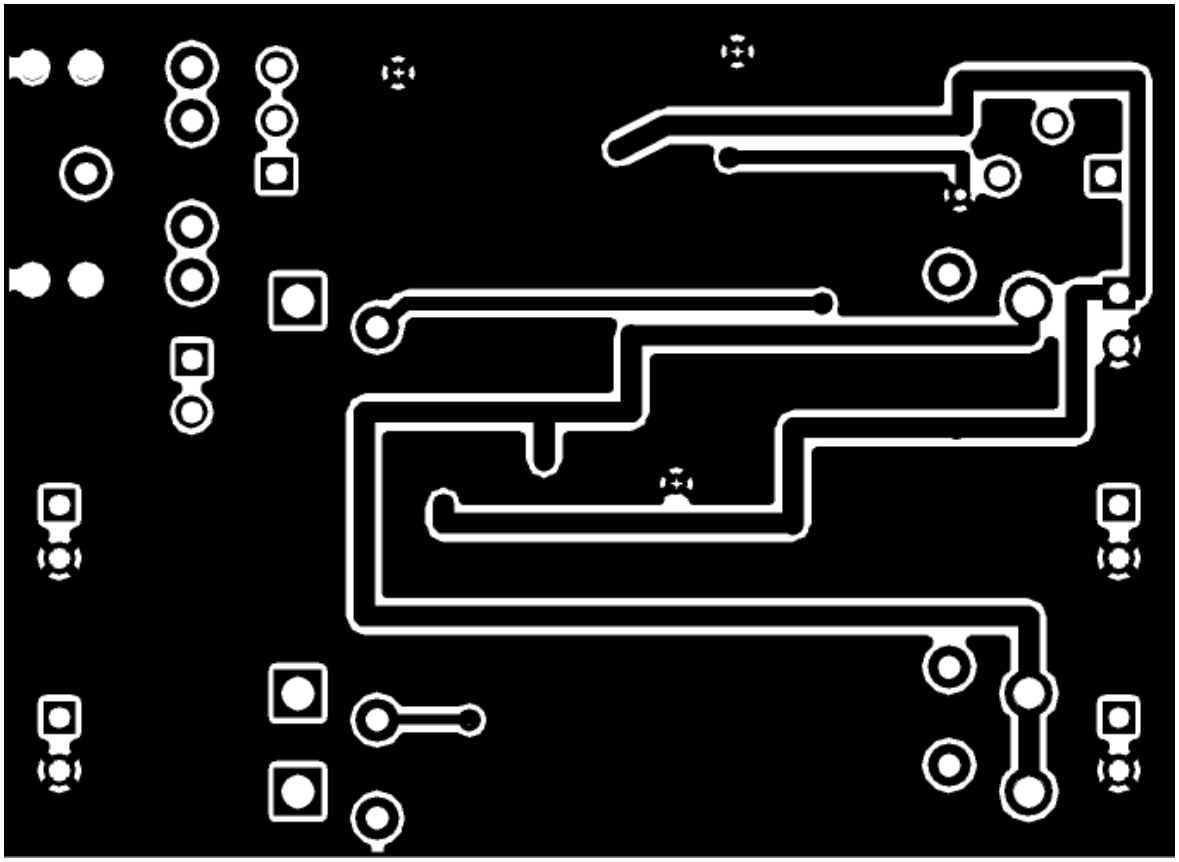
The microphone interface is compatible with common SoundBlaster type electret mics and dynamic mics. Electret mics require a bias voltage to operate. The bias circuit can be

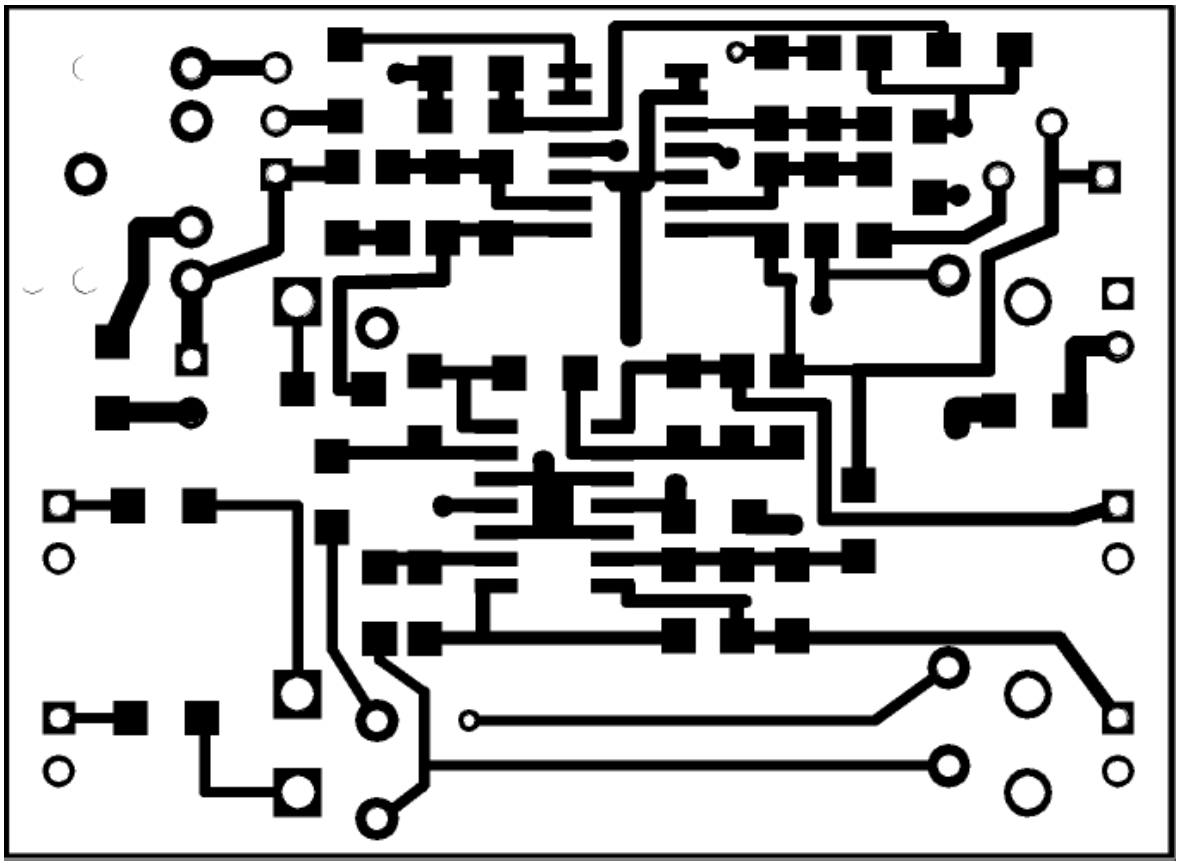
configured to bias the ring or tip of the mic connector. Some experimentation may be required to determine the proper setting for each different mic. The bias voltage is generated with a resistor divider from the main supply voltage and is 0.66*Vcc. The input stage is a single amp with a gain of 4.7 driving a volume control pot. An isolation resistor is required due to the capacitive nature of the slide pots resulting in a 0.8*4.7 or 3.8 max gain. the main gain stage is after the level control pot and can be adjusted for gains of 2 to 22. This makes the maximum mic gain 4.7*0.8*22 = 83. 47 pF bandwidth limiting caps are placed across the feedback resistors on the gain stages of the mic interface. This is a technique designed to prevent oscillation in high gain and capacitive loading circuits of which this has both.

The output stage for each channel is a unity gain summing amp that adds the signal from the line inputs to the signal from the mic according to the ratio set by the level control pots. Bandwidth limiting caps are again used to help stabilize the outputs that could be driving unknown but possibly very capacitive loads.

4. Layout

NOTE: Layouts are not to scale.





5. Bill of Materials

File: micmixer.xls				
Date: 03/05/97				
Ref Des	**Part No.**	**Description**	**Source**	Page
C1	C3216Y5V1C105Z	Capacitor, Ceramic, 1.0 uF, 16V, Y5V, 1206	TDK	
C2	PCC470CCT-ND	Capacitor, Ceramic, 47 pF, 50V, NPO, 1206	Digikey	245
C3	C3225Y5V1C106Z	Capacitor, Ceramic, 10 uF, 16V, Y5V, 1206	TDK	
C4	PCC470CCT-ND	Capacitor, Ceramic, 47 pF, 50V, NPO, 1206	Digikey	245
C5	C3216Y5V1C105Z	Capacitor, Ceramic, 1.0 uF, 16V, Y5V, 1206	TDK	
C6	PCC470CCT-ND	Capacitor, Ceramic, 47 pF, 50V, NPO, 1206	Digikey	245
C7	C3216Y5V1C225Z	Capacitor, Ceramic, 2.2 uF, 16V, Y5V, 1206	TDK	
C8	C3216Y5V1C225Z	Capacitor, Ceramic, 2.2 uF, 16V, Y5V, 1206	TDK	
C9	C3216Y5V1C105Z	Capacitor, Ceramic, 1.0 uF, 16V, Y5V, 1206	TDK	
C10	PCC104BCT-ND	Capacitor, Ceramic, 0.1 uF, 50V, X7R, 1206	Digikey	245
C11	PCC470CCT-ND	Capacitor, Ceramic, 47 pF, 50V, NPO, 1206	Digikey	245
C12	PCC104BCT-ND	Capacitor, Ceramic, 0.1 uF, 50V, X7R, 1206	Digikey	245
J1		Header, 2-pin, 0.025"-sq, 100-mil centers		
J2	161-3504	Phone Jack, Stereo, 1/8"	Mouser	92
J3		Header, 2-pin, 0.025"-sq, 100-mil centers		
J4		Header, 2-pin, 0.025"-sq, 100-mil centers		
J5		Header, 2-pin, 0.025"-sq, 100-mil centers		
J6		Header, 2-pin, 0.025"-sq, 100-mil centers		
JP1		Header, 3-pin, 0.025"-sq, 100-mil centers		
JP2		Header, 2-pin, 0.025"-sq, 100-mil centers		
R1	448XC3503BAN	Potientiometer, 50K Ohm, Slide, Audio taper, 1.4"	CTS	
R2	448XC3503BAN	Potientiometer, 50K Ohm, Slide, Audio taper, 1.4"	CTS	
R3		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R4		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R5		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R6		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R7		Resistor, CF, 2.2K Ohm, 1/8 W, 5 %, 1206		
R8		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R9		Resistor, CF, 47K Ohm, 1/8 W, 5 %, 1206		
R10	3362P-200K	Potientiometer, 200K Ohm, 1-turn, 1/4"-sq		
R11	448XC3503BAN	Potientiometer, 50K Ohm, Slide, Audio taper, 1.4"	CTS	
R12		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R13		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R14		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R15		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R16		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R17		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R18		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R19		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R20		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R21		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
R22		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R23		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R24		Resistor, CF, 20K Ohm, 1/8 W, 5 %, 1206		
R25		Resistor, CF, 10K Ohm, 1/8 W, 5 %, 1206		
U1	TLC2274CD	IC,Quad Op Amp, RRO, 2 MHz, SO-14	TI	
U2	TLC2274CD	IC,Quad Op Amp, RRO, 2 MHz, SO-14	TI	
PCB	SLOP107	Printed Circuit Board, 2-layer	TI	