

HW-8-LM386 Audio Amplifier Board

Assembly Instructions

This LM386 based audio amplifier kit was designed to replace the small audio amplifier board in the Heathkit HW-8 transceiver. The result is the ability to drive regular modern day 8 ohm headphones or a small 250mW¹ external speaker. The majority of this schematic is pulled straight from the Texas Instruments LM386 data sheet. We have included the Bass Boost and Gain Loop options on the board, with the optional parts, to keep this board versatile for other projects.

Parts List included with this kit:

QTY	Part	Refs
1	Printed Circuit Board	PCB
3	Cap elect radial 10uF 16V	C3,5,6
1	Cap Elect Radial 220uF 16V	C9
2	Cap Disc .01uF (103)	C1,2
1	Cap Disc .1uF (104)	C4
2	Cap Disc .047uF (473)	C7,8
1	Res 10 1/4W (BRN-BLK-BLK)	R2
1	Res 1.2K 1/4W (BRN-RED-RED)	R1
1	Res 4.7K 1/4W (YEL-VIO-RED)	HW-8
1	Res 10K 1/4W (BRN-BLK-ORA)	R3
1	Trimmer 10K 1/4W	RV1
1	Socket DIP 8 pin	U1s
1	IC LM386N-1	U1
2	Terminal Blocks	P1-8

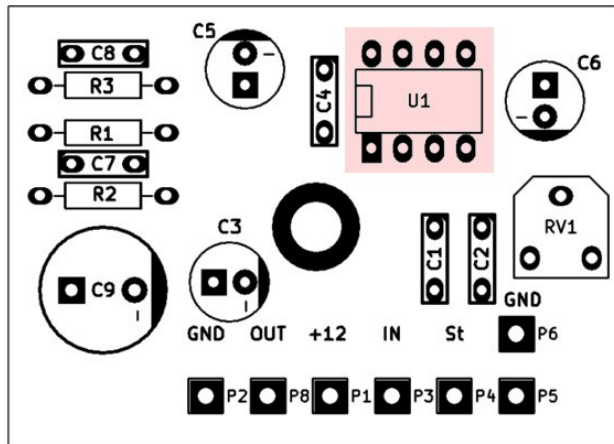
¹ An LM386N-3 or LM386N-4 may be substituted to for additional power output.

HW-8-LM386 Audio Amplifier Board Assembly Instructions

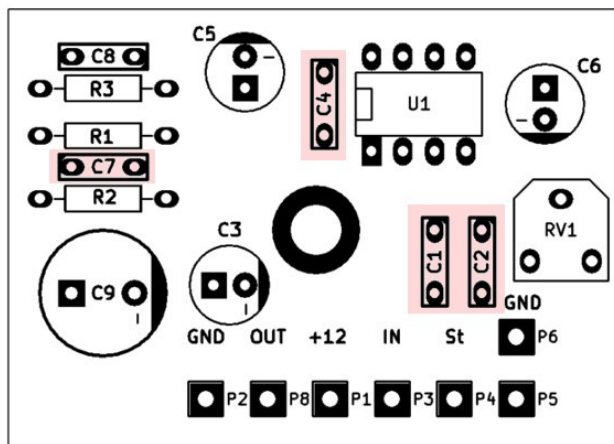
Board Assembly

All components are installed on the top side of the board which also shows the placement of the components. Trim excess leads on each part where needed.

1. Install the IC socket for the LM386N-1 IC at position U1. Align the notch at the end of the socket to the notch on the PCB.

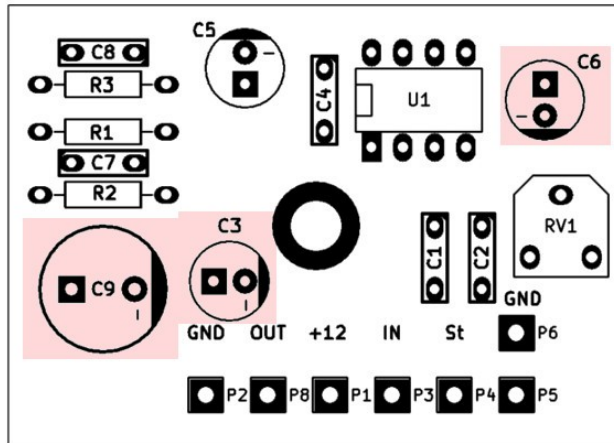


2. Install the following disc capacitors
 - a) .01uF (103) at positions C1 and C2.
 - b) .1uF (104) at position C4.
 - c) .047uF (473) at position C7.

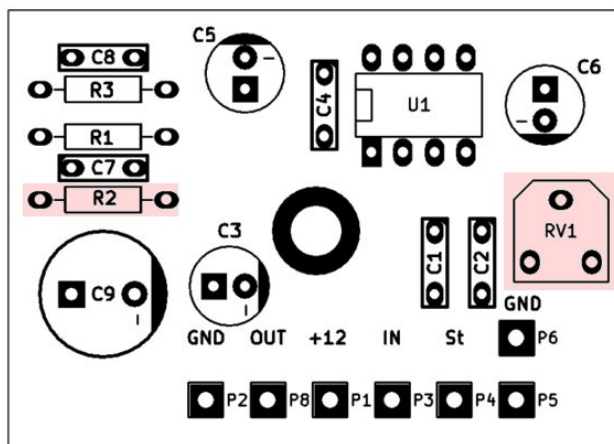


HW-8-LM386 Audio Amplifier Board Assembly Instructions

3. Install the following electrolytic capacitors. Observe polarity when installing. The square pads on the PCB are positive (+).
 - a) 10uF at positions C3 and C6.
 - b) 220uF at position C9.

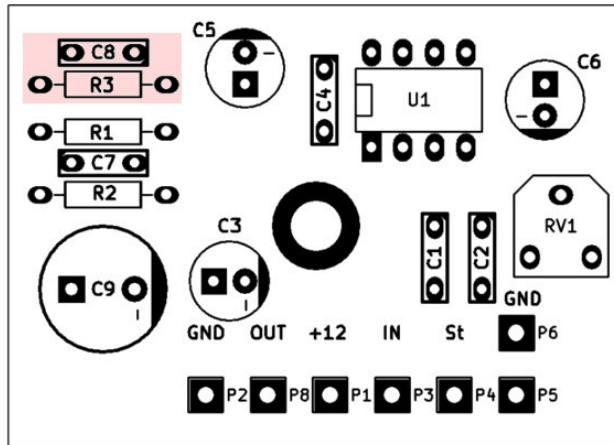


4. Install the following resistors
 - a) 10 ohm (Brown-Black-Black) at position R2.
 - b) 10K trimmer at position RV1.

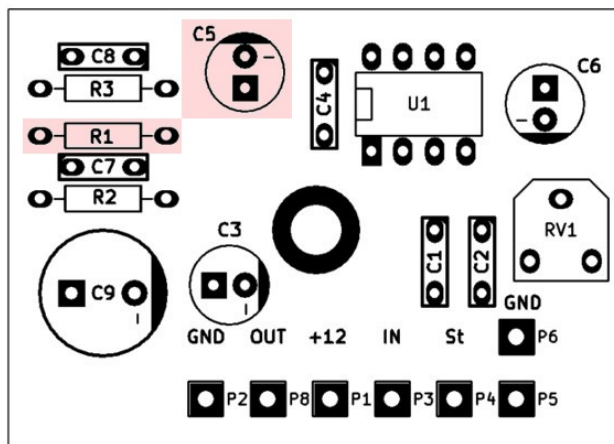


HW-8-LM386 Audio Amplifier Board Assembly Instructions

5. OPTION – Bass Boost – This option gives the audio a boost at the lower frequencies. Our own personal taste finds the HW-8 to sound better with it but we leave this option up to you.
- a) Install a 10K resistor (Brown-Black-Orange) at position R3.
 - b) Install a .047uF (473) disc capacitor at position C8.

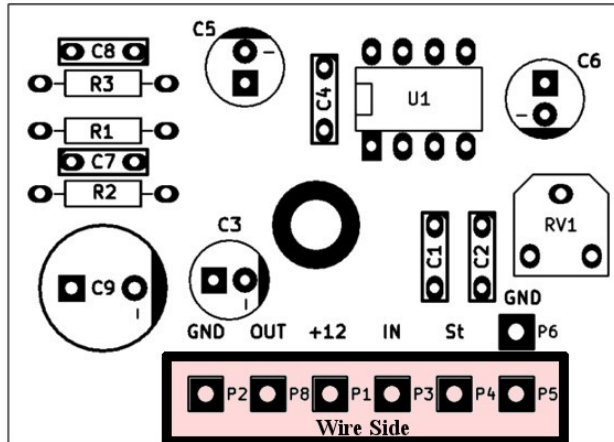


6. OPTION – Gain Loop – This option allows the gain of the amplifier to be changed from 20 to a larger value for other applications. For example, the gain could be changed to 200 if you wished to insert the audio amplifier right after the product detector. **DO NOT install this option for regular HW-8 installation.**
- a) Install a 10uF electrolytic capacitor at position C5, note the square pin is the positive lead.
 - b) To increase the gain to 50 install a 1.2K resistor (Brown-Red-Red) at position R1.
 - c) To increase the gain to 200 install a jumper wire across position R1.

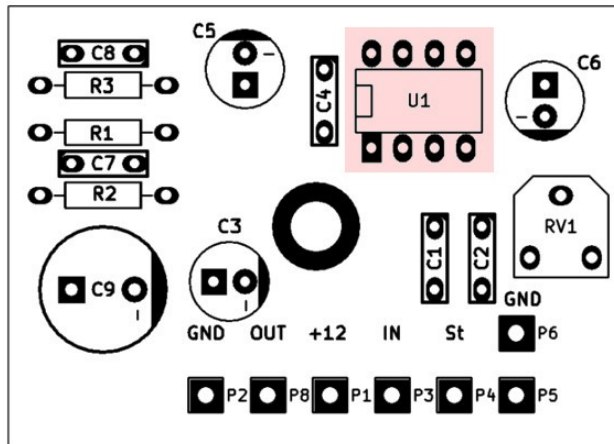


HW-8-LM386 Audio Amplifier Board Assembly Instructions

- (optional) – Slide the two terminal block together. Please the connected blocks into the P2,P8,P1,P3,P4,P5 wire holes. Make sure the terminal block wire entrances are facing out.



- Insert the LM386 IC into socket at U1 by aligning the notch on the IC to the notch on the socket. Note: Pin 1 is near the notch left side.



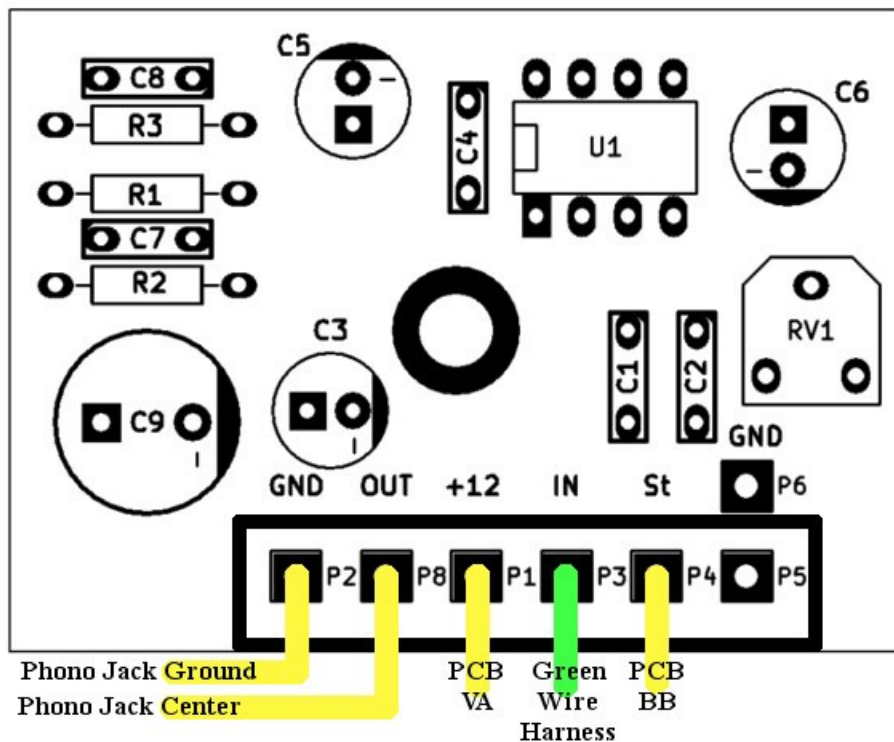
This completes the board assembly procedure.

HW-8-LM386 Audio Amplifier Board Assembly Instructions

Board Installation

1. Remove the 6-32 screw and lock washer holding the audio board in place on the HW-8.
2. Carefully unsolder the 4 wires from the AF board as follows:
 - a) Wire from Ground on 1/4" phono jack - GND.
 - b) Wire to center of 1/4" phone jack – OUT.
 - c) Wire from point VA on the main board - +12.
 - d) Green Wire from harness – IN.
3. Unsolder the 2 wires which connect to the center position of the 1/4" phono jack as follows:
 - a) Wire from OUT on AF board.
 - b) Wire from point BB (sidetone) on the main board.
4. Install the wires to the NEW AF board as follows. Note the first 4 connections on the new board are wired the same as the old board. The 2 grounds at P5 and P6 are not used.
 - a) Wire from P2 GND to the 1/4" phono jack ground.
 - b) Wire from P8 OUT to the 1/4" phono jack center.
 - c) Wire from P1 +12 to point VA on the main board.
 - d) Green wire from P3 IN to the Green wire on the harness.
 - e) Wire from P4 St to point BB on the main board.

Note: if terminal blocks are used unscrew each block, place the wire in and slightly tighten down.
5. Position the new audio board in place using the 6-32 screw.



HW-8-LM386 Audio Amplifier Board

Assembly Instructions

6. Recommended modification (F6DFZ)– A 4.7K resistor (Yellow-Violet-Red) has been included with this kit. This is a common HW-8 modification used to remove some of the raspy sound by reducing the gain of the op amp from infinite to a more reasonable value. This in turn removes the clipping of all audio into square waves.
 - a) Remove the wire from the center terminal of the Wide/Narrow switch.
 - b) Clip one end of the 4.7K resistor so only about 1/2" of lead remains.
 - c) Solder the clipped end to the center terminal of the Wide/Narrow switch.
 - d) Clip the other end of the 4.7K resistor so only 1/2" lead remains.
 - e) Solder the removed wire to the end of the resistor.
 - f) Make sure the resistor and soldered wire do not touch the chassis or other components.
Optional – Tape or shrink wrap the resistor and connection.

Operation

1. Set RV1 on the new AF board to the mid position.
2. Connect power, antennas, and a speaker or headphones. Use caution when wearing headphones!
3. Turn on the HW-8 and adjust the volume until background noise or a received signal is heard.
4. Slowly increase the volume. Adjust RV1 on the new AF board as needed for maximum volume without excessive feedback or distortion.
5. Replace the antenna with a dummy load. Connect key. When transmitting a sidetone can be heard. Adjust sidetone level using R77 on the main board.
6. Enjoy your new AF board!

Alternatives

An alternative installation can be obtained as follows:

1. Remove the 2 wires from the 1/4" phono jack.
2. Connect these wires to the St and IN connections on the AF board. (Order does not matter).
3. Connect the OUT connection on the AF board to the 1/4" phono jack.Piggyback board.
4. Connect the +12 on the old AF board to the +12 on the new AF board.
5. Using a spacer and screw you can piggy back the new board on top of the old or hand to the chassis edge using double sided sticky tape.
6. Adjust using the same procedure as above.

Note: This alternative has not been tested!!

Enjoy using this board for QRP and non-radio applications using the spare parts provided for Bass boost and Gain!

HW-8-LM386 Audio Amplifier Board Assembly Instructions

HW-8-LM386 Schematic

