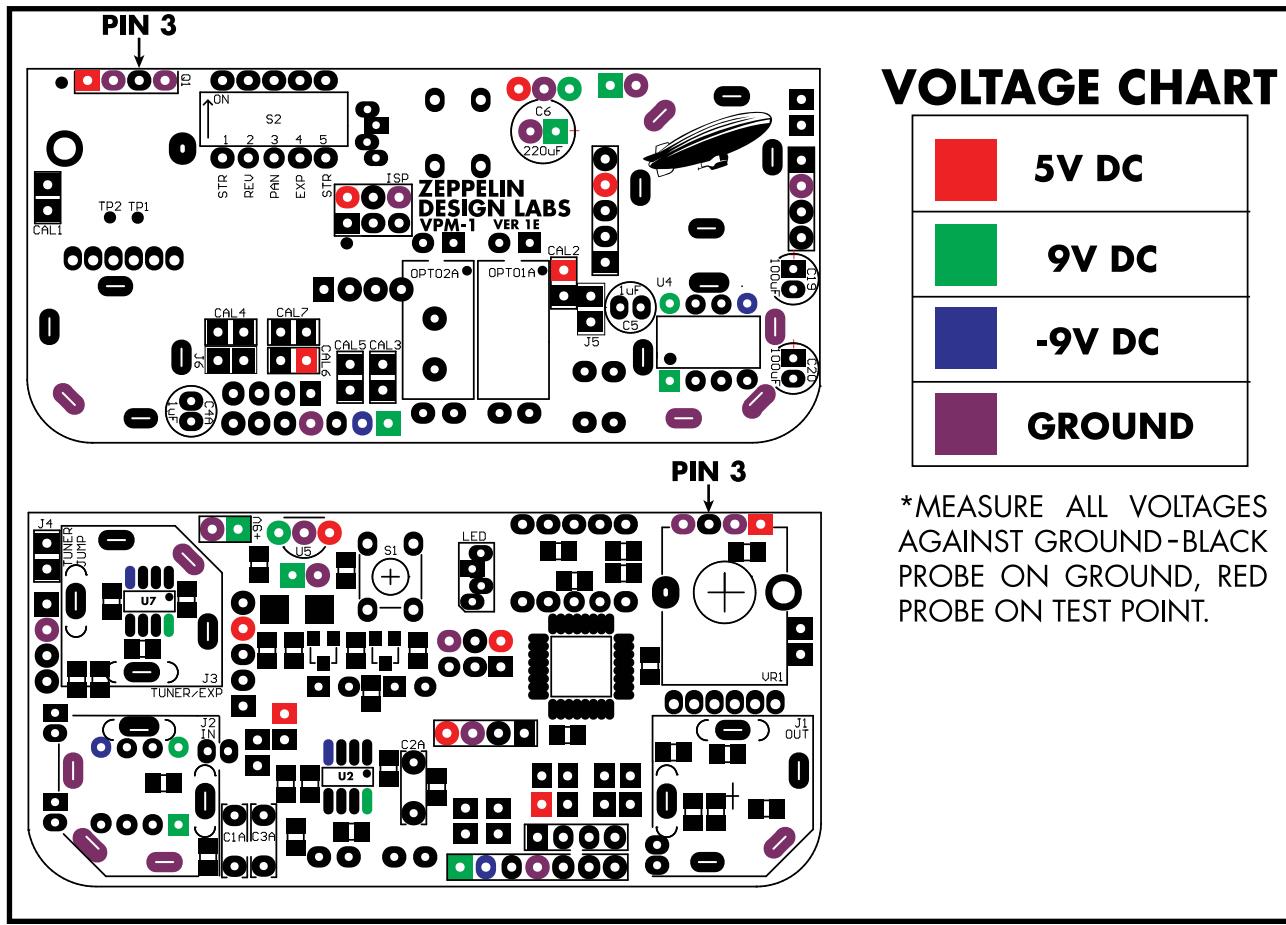


# VPM-1 TROUBLESHOOTING GUIDE

If your VPM-1 kit isn't working properly please read through this guide and follow these steps in order from the start. You'll be required to use your multimeter to test DC voltage, resistance, and continuity on various points.

There are several different things that can go wrong with a VPM-1 kit build; the most common issues are associated with bad solder joints. The solder pads are small and components are closely spaced so please use a small soldering iron tip and small diameter solder. The tips I like to use are flat, "screwdriver" tips that are about 1.2mm or 1.6mm wide on the flat end.

As always, practice good soldering technique and use the proper amount of solder for each joint, not too much and not too little. If you are assembling this kit, we expect you to have circuit board soldering experience, so I won't go into how to make proper solder joints. If you are rusty on the topic please see one of the many good Youtube videos on the subject. Take it slow and be detailed.



## Let's Start...

A. Is the LED lighting up when you plug in the power?

- Yes?...Move on to B
- No?...
  1. Is the 5V power rail working (test any of the 5V points on the voltage chart)?
    - Yes?...Move on to A-2
    - No?...
      - a. Make sure the voltage regulator (U5) is installed correctly and with no shorts.
      - b. Make sure the 9V power rail is working (test any of the 9V points on the voltage chart): If not...
        - i. Be sure you are using the proper polarity, voltage, and current rating power supply? It should be 9VDC, able to supply 100mA of current. The center of the barrel jack should be negative (as with most pedal power supplies).
        - ii. Make sure the DC power jack is wired correctly
        - iii. Make sure the power wires soldered to the board aren't reversed
        - iv. Check for shorts on the pads where the power wire is soldered to the board (use a magnifying glass).
        - v. Check for other shorts around the board, especially around the charge pump (U4).
    - 2. Make sure the LED is soldered correctly, in the correct orientation with no solder shorts. Use your magnifying glass if necessary and/or test to make sure there is no continuity between pins.

B. Are you able to get audio signal out of the tuner jack while your guitar is plugged into the input jack (plug your amp into the tuner out jack)?

- Yes?....Move on to C
- No?...
  1. Make sure the tuner jumper is installed correctly...Or if you have the expression upgrade, make sure the expression DIP switch is set correctly to route the signal to the tuner output.
  2. Check to make sure power is getting to U7....Pin 4 should be -9V and pin 8 should be +9V. If not go to "APPENDIX A: CHARGE PUMP TESTING."
  3. If you strongly wiggle the male part of the input or tuner jack, or apply pressure to the jack in different directions (while playing guitar), does the signal jump in and out? If so go to "APPENDIX D: READJUSTING THE INTERNAL PINS OF A JACK"

- C. Is any guitar signal passing through the output jack (plug your amp into the output jack)?
- Yes?...Move on to D
  - No?...
    1. Make sure the jumpers are in place and the main board DIP switch is set correctly.
    2. Test the voltage on the pins of U2 to make sure it's correct.
    3. Check the control voltage from the sensor board to make it's working correctly. See "APPENDIX B: SENSOR BOARD TESTING."
    4. Calibrate the pedal AFTER you are sure the previous tests are successful.
- D. Does the audio signal turn off all the way?
1. Calibrate the pedal. Be sure to leave enough treadle movement in the heel down position to ensure the volume can turn all the way off.
  2. Check to make sure the ends of the heat shrink on your optocouplers are sealed and light can't get in. If you notice even the smallest opening, please fill this with some opaque substance, such as opaque caulk, or opaque hot glue, even nail polish can work if it's thick (viscous) enough...Even "sticky tack" (poster putty) will work in a pinch.
  3. Go through the Stereo Set Up process, even if you have a mono pedal, this process can help to linearize the microcontroller's volume control algorithm. This process is described on page 51 of the assembly manual. Typically (if you have a stereo pedal) this procedure requires the use of several jumpers on headers throughout the board, but if you have a mono pedal you just need to short out the "CAL1" holes upon power up. This header is on the left side of the board as you look at it from the back. You can use your metal tweezers, or aluminum foil, or any other conductive object to short them together (or you could even temporarily solder these pads together). When they are connected (in whatever way you choose to connect them) plug the power in. The LED should start flashing red. Once the LED is flashing, you can disconnect the CAL1 pads (unless you soldered them, then wait until later). The red LED will flash for a little while, probably somewhere between 45 seconds and 2 minutes (256 flashes to be exact). When this process is done the LED will start flashing green, at which point you can unplug the power and disconnect the CAL1 pins. Make sure you unsolder the CAL1 pads, if you soldered them. Now you can re-assemble your VPM-1 to see if that fixed the problem. If this doesn't work the first time, you may need to repeat this procedure a couple of times for the microcontroller to get everything set correctly.
  4. This issue could also be caused by reversing the LDRs. The LDR with the dot on the back should be in OPTO1. If you are not positive that you installed the correct LDR into the correct optocoupler, you can check this by using a razor blade or Xacto knife to slice away a tiny bit of the heat shrink on the LDR side of the optocoupler (use opaque hot glue or caulk to re-seal the slice so light can't get into the optocoupler). If the LDRs are reversed then you need to very carefully unsolder the optocouplers. Be very careful not to over heat the LDRs or bend or stress the leads too much.

- E. Does the signal jump or dip in volume as the treadle is moved along it's sweep?
1. Calibrate the pedal.
  2. If you have a stereo VPM-1 then follow the stereo setup procedure (in the assembly manual). This is the process the microcontroller uses to match stereo pairs of optocouplers.
  3. If you have a mono VPM-1 then you also need to go through this set up process. Even though you have a mono pedal, this process can help to linearize the microcontroller's volume control algorithm. Typically (for stereo pedals) this procedure requires the use of several jumpers on headers throughout the board, but in this case (for mono pedals) you just need to short out the "CAL1" holes upon startup. These holes are on the left side of the board as you look at it from the back. You can use your metal tweezers (or any other metal object) to short them together or even temporarily solder these pads together. When they are connected (in whatever way you choose to connect them) plug the power in. The LED should start flashing red. Once the LED is flashing, you can disconnect the CAL1 pads (unless you soldered them, then wait until later). The red LED will flash for a little while, probably somewhere between 45 seconds and 2 minutes (256 flashes to be exact). When this process is done the LED will start flashing green, at which point you can unplug the power. Make sure you unsolder the CAL1 pads, if you soldered them. Now you can reassemble your VPM-1 to see if that fixed the problem. If this doesn't work the first time, you may need to repeat this procedure a couple of times for the microcontroller to get everything set correctly.

## APPENDIX A: CHARGE PUMP TESTING

- If there is not -9V on pin 5 of the charge pump IC (U4) then it is not working correctly.
  1. Check to make sure there are no solder shorts between any of the charge pump pins and the pins of the input jack (look especially close at pins 4, 6 and 7). Use the continuity tester on your millimeter to test between the pins of U4 and the input jack solder pads that are closest to those pins. The pads are very close together on this part of the PCB and it's easy to short things together. Use a magnifying glass to check for shorts on all the pins. Also, test to make sure there are no adjacent pins shorted together on U4. If you need to re-solder any joints on the bottom of the board, you'll need to remove the input jack. See "APPENDIX C: REMOVING A JACK FROM THE VPM-1 MAIN BOARD" for instructions on how to remove the jacks.
  2. Make sure the electrolytic caps C19 and C20 are installed in the correct orientation.

## APPENDIX B: SENSOR BOARD TESTING

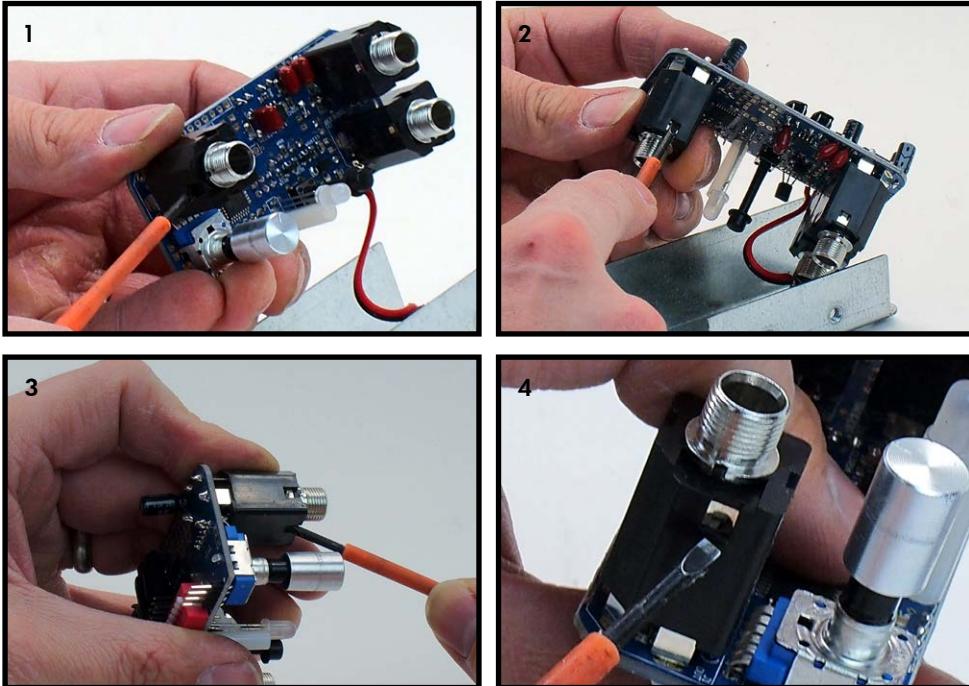
- You can use your multimeter to test the voltage going to and coming from the sensor board. Use the VPM-1 main board chassis or the input jack sleeve as the ground reference for your multimeter.
  1. Make sure pin 1 on the sensor board is receiving 5VDC (or very close to 5V) from the main board. Measure this directly on the sensor board header pin. Pin 1 is the pin closest to the white dot beside the header.
  2. On the main board, test to see that pin 3 on the Q1 header (as referenced on the voltage chart) is returning a variable voltage as the treadle is moved all the way up and all the way down. This voltage should be around 3V in the heel down position and around 4V in the toe down position. If these voltages are reversed then it means the magnet is installed upside down. It helps to remove the main board chassis from the pedal chassis to make this measurement. Just leave the ribbon cable attached while the main board chassis is sitting in front of the pedal chassis.
  3. Use your meter's continuity tester to make sure pins 2 and 4 are connected to ground. Test this directly on the sensor board.

The sensor board should be working properly if all these tests were successful.

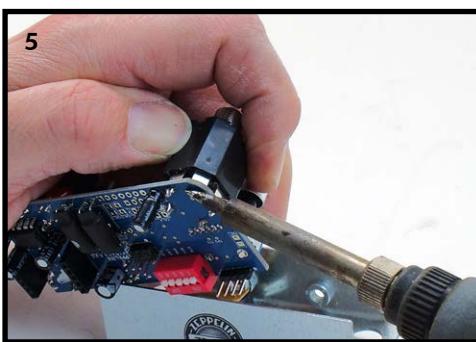
## APPENDIX C: REMOVING A JACK FROM THE VPM-1 MAIN BOARD

Sometimes a jack needs to be removed from the main board. It is very difficult to unsolder all 5 jack leads without damaging the board. Fortunately, there is a very simple method to remove a jack that involves heating up only one solder joint while lifting off the jack body.

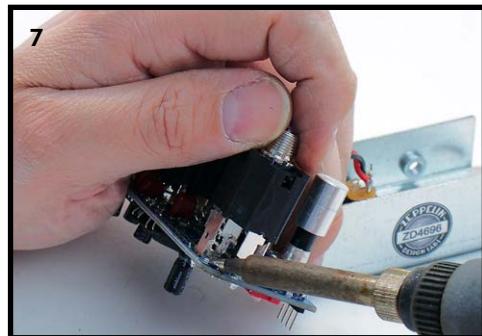
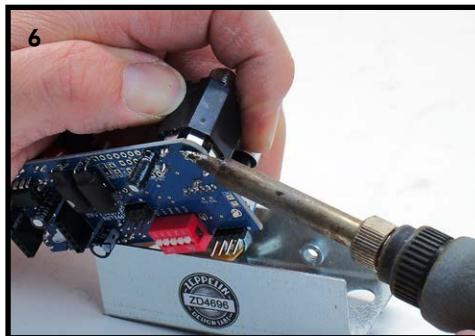
1. Use a small screwdriver or other small tool to push in all the retaining tabs on the top of the jack body. It's fine to push them all the way in.



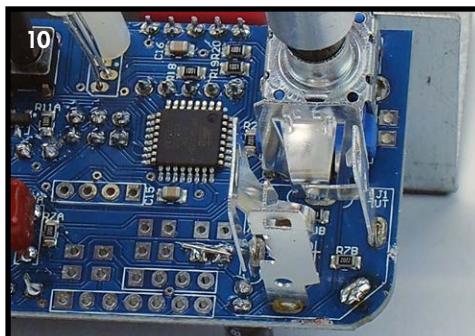
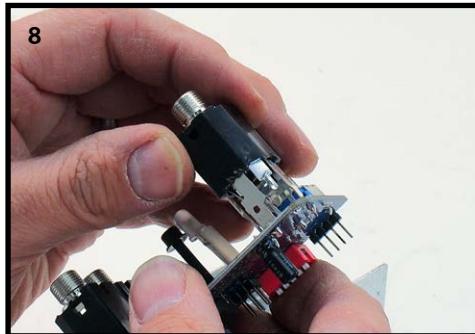
2. Heat up the solder joint of the diagonally angled (corner) lead on the jack.



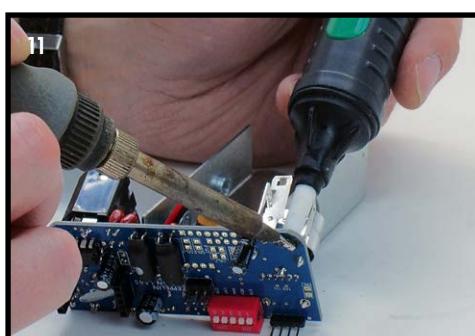
3. While you are holding your soldering iron on the angled lead, pull up on the jack body away from the circuit board. It can be hard to lift the jack body off the leads at first so sometimes it helps to use a flat screwdriver to pry up the body of the jack away from the top of the circuit board (just make sure you don't damage any PCB traces where the screwdriver touches the board).



4. The body of the jack and the angled lead should slide up and off of the other 4 leads.

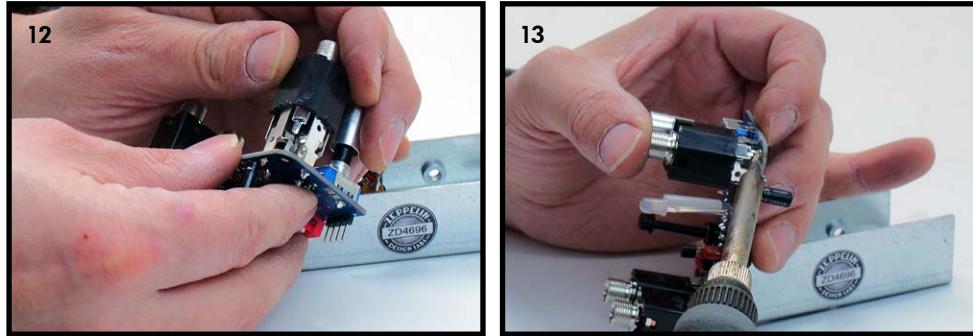


5. Use a solder pump to clean out the empty pad's hole



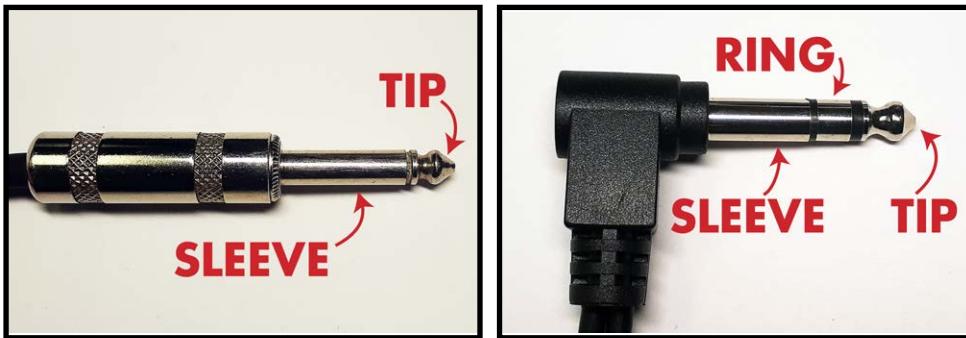
6. If you need to re-solder anything under the jack, removing the body of the jack usually provides sufficient space to do that. But if you need to remove any of the other jack leads, they can now be removed one by one from the PCB. Install them back in the jack body as you remove them, as to keep track of where they fit inside the jack. Clean out their holes with your solder pump.

To reinstall the jack, slide the jack body down onto the remaining leads. Make sure the leads of the jack are flush to the surface of the PCB when you re-solder the jack.



## APPENDIX D: READJUSTING THE INTERNAL PINS OF A JACK

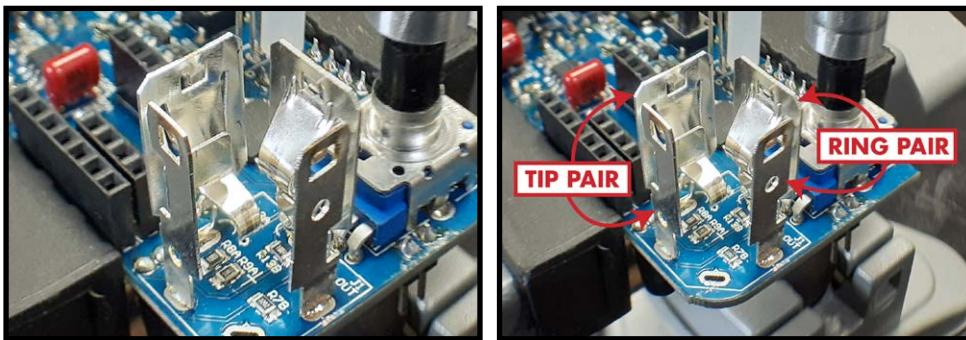
Sometimes when a jack is not passing signal it is because some of the internal pins are not working properly and causing the signal to short to ground. You can test this by plugging in a (known working) ¼ cable into the jack. Use your continuity tester on the other end of the cable to see if the tip and the sleeve of the cable are connected. On stereo versions use the TRS adapter cable to test both the left and right channels.



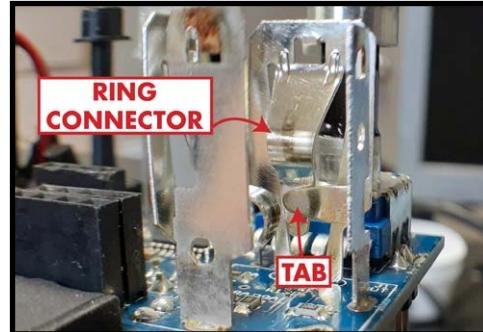
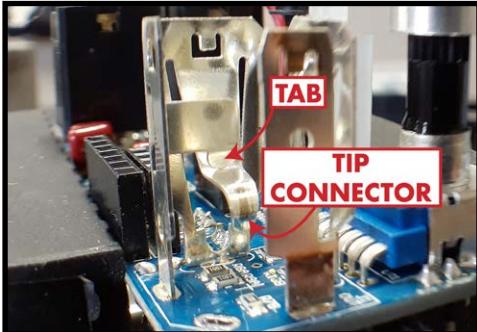
In this test, if the tip of the jack is connected to the sleeve (ground) then it means the internal pins are shorted and you'll need to disassemble the jack to correct this.

For this process you'll need to remove the housing from the jack (see "APPENDIX C: REMOVING A JACK FROM THE VPM-1 MAIN BOARD")

Once the housing is off, you should see 4 oddly shaped pins left in the board. These 4 pins make up 2 pairs: one pair for the "tip" of the jack and one pair for the "ring" of the jack.



You can see how one pin in each pair would make contact with the male jack. The other pin in each pair contains a tab that touches the first pin when the male jack is not plugged in.



When the jack is not working properly it's often because one of the tabs is not fully disconnecting from the other pin when the cable is plugged in. So we'll need to physically bend the pins apart a little bit to help them disconnect properly.

If you have a mono pedal, the only tab pin that you need to be concerned with is the one in the "tip" pair. If you have a stereo pedal then you need to be concerned with the tabs in both pairs.

You can bend the tabs with some needle nose pliers or some tweezers (if they are strong enough). Gently bend the tab away from the other pin, so that when you are done they will barely make contact when no male jack is plugged in, ensuring they fully separate when the jack is inserted. Once you have bent the tabs the correct amount, return to "APPENDIX C: REMOVING A JACK FROM THE VPM-1 MAIN BOARD" to re-install the jack housing. You'll need to repeat this process if the tabs don't end up being bent enough the first time.

