The Blue Guitar

Peavy Classic 50:
Adjustable Bias Mod

Introduction

It is generally recommended that the bias of any tube amp be measured and adjusted whenever the output tubes are replaced. However, on many modern amps such as the Peavy Classic 50 there is no provision for adjusting the bias. The factory setting for this amp seems to work fairly well for Sovtek EL84's, but you may run into problems using other tubes, such as the Tesla/GT EL84's.

This article will explain how to add a multi-turn cermet pot to the output tube board. It will also present a simple method for measuring the bias current for each pair of tubes so that the bias pot can be set properly.

Although this modification is fairly simple it would presumably void any factory warranty on your amp, and if you are not experienced working on tube amps, I suggest that you print out this article and bring it to a local amp tech. There are potentially dangerous high voltages present in the amp even when it is unplugged and working on a modern amp using printed circuit boards can be tricky for a beginner.

Adding the Bias Adjustment Pot

The Classic 50-410 uses an 18k bias supply resistor (R16) and a 33k bias set resistor (R18), along with a 22uF filter cap (C10). These components are located between V4 and V5 (see Figure 1 below). The 33k resistor is replaced with a 20k cermet trimmer pot that has an 18k resistor soldered to the wiper. To allow for a wider range of bias voltages supplied by this circuit, the 18k bias supply resistor R16 is replaced with a 15k resistor; if bias current is still too high with a particular set of output tubes, you could further reduce the value of this resistor to something like 12k.

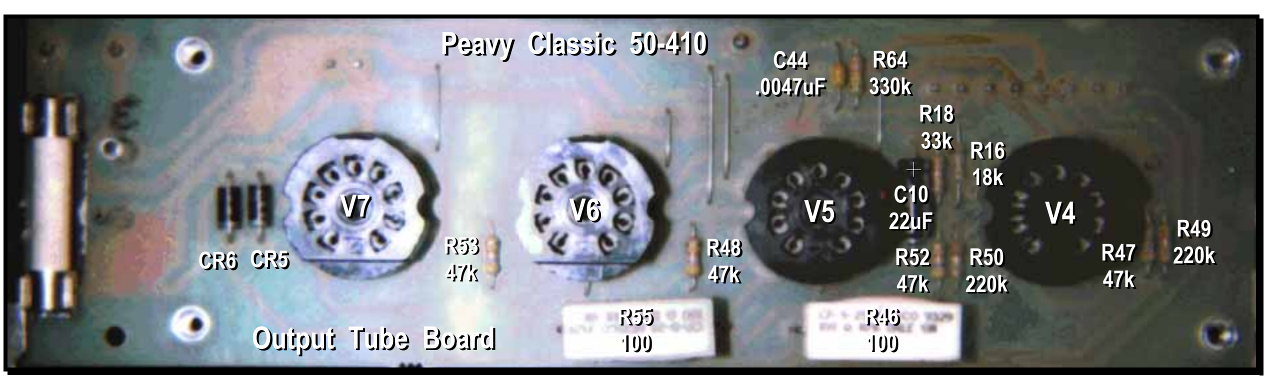

Figure 1. Components on the output tube board

The output tube board can be removed from the chassis without having to take out the other boards. After unplugging the amp and removing the back panel, discharge the filter caps through an acceptable resistor (like 10k 1watt) soldered to leads with alligator clips. With the standby switch on, you can drain the charge by clipping one end of this test cable to the positive (+) end of the 47uF/500v filter cap as illustrated for measuring bias (see Figure 4). Clip the other end of the test cable to chassis ground and leave the cable in place.

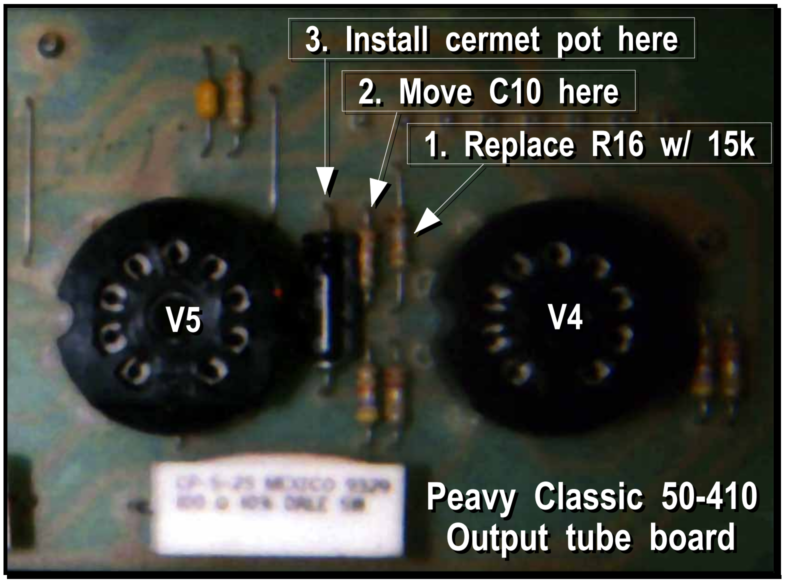

Figure 2. Bias components (before mods)

There are two 1/4" drive hex head screws holding the output tube cover in place and 4 phillips head screws which secure the output tube board to the mounting brackets. Number the tubes as you remove them for reference. Unplug the molex connectors going to the board after labeling them for proper reassembly later. The folded over 8 conductor ribbon cable going to the preamp tube board can be removed by gently prying up on the plug.

With the board out, first remove R16 and replace it with an 18k 1/4 watt resistor. To make room for the new cermet trimmer pot this resistor needs to be pushed over towards the V4 tube socket; insulate the resistor with heat shrink tubing so that it doesn't short out to the plate voltages on pin 7 of V4. At this point there are two options for installing the cermet trimmer depending the actual size of the pot. If you have one of the smaller trim pots it may fit in the original location for R18 between R16 and C10. I used a larger panel-mount cermet pot so it was necessary to move C10 to the original location for R18 and to

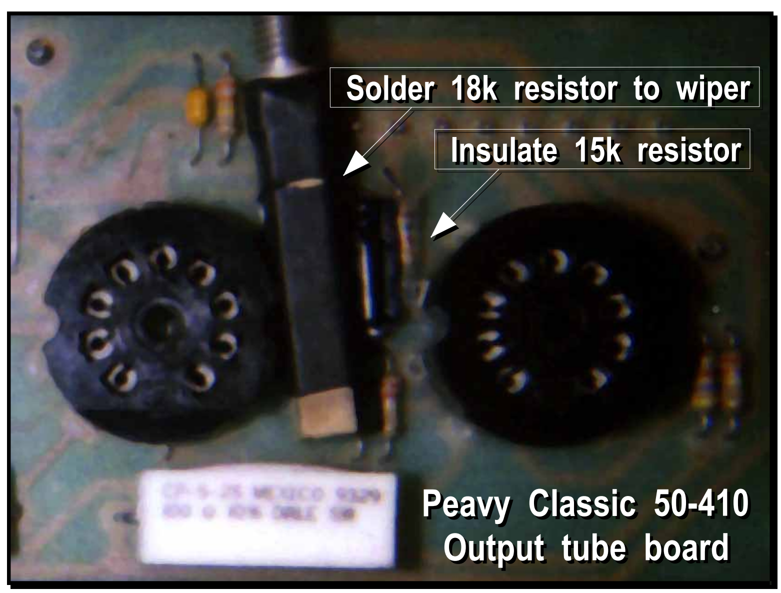

Figure 3. Bias components (after modifications)

install the pot where C10 had been.

To prepare the cermet trimmer pot, first cut off the terminal closest to the adjustment screw on the end. The middle lead is the wiper and you need to solder it to an 18k 1/4 watt resistor. You then need to form the leads to fit the two holes where either R18 or C10 had been mounted (depending on which option you are following). I used heat shrink tubing to insulate the wiper and resistor from the other pot terminal. I then put some heat shrink tubing over the cermet trimmer itself to stabilize the leads and resistor. You may eventually want to glue the encapsulated trimmer to the circuit board with epoxy or hot melt glue after ensuring that it does work properly. Before reinstalling the board you may want to double check all of your solder joints with a DMM to make sure that there are no solder bridges or open connections.

Setting the Bias Pot

In order to set the bias pot properly you will need to use the dc milliamp scale on your DMM. On many meters a different jack is used for measuring current so make sure that your probes are plugged into the proper jacks. A quick word on using the current ranges on your DMM: after clipping the red lead to the B+ (approximately 393vdc on my amp), there will be full voltage and current present at the black lead so be careful that you not allow it to touch the chassis or other components except for the brown and blue leads at the molex plug from the output transformer ("OT"). The bias for each pair of EL84 output tubes will be around 50mA so set the range on your DMM accordingly (typically 200mA).

To measure the idle bias current we will be using the transformer shunt method which measures the dc current between the center tap of the OT primary (which is red) and the brown and blue leads from the OT in turn. Incidentally, the brown wire supplies the plate voltage to V4 and V6; the blue wire goes to V5 and V7. If you notice an imbalance between the current readings at the brown and the blue wires you can try switching the tubes to minimize the difference.

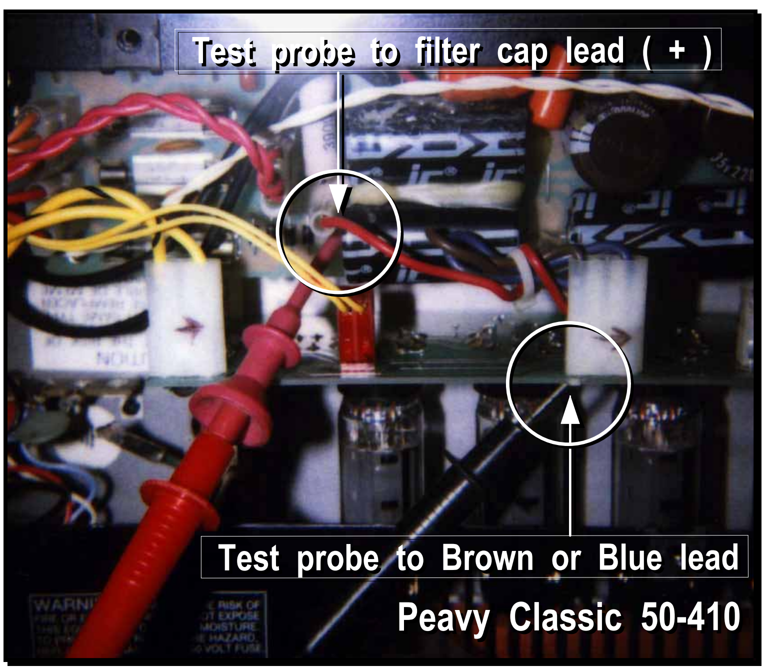

Figure 4. Measuring idle bias current

Unplug the amp and discharge the filter caps (click here) before clipping the red test probe to the positive (+) lead from the 47uF/500V filter cap adjacent to the single-conductor nylon plug on the red wire going to the OT (see Figure 4). If you don't have a micro-clip adaptor for your test probe you might try inserting a short length of 22 ga bus wire into the nylon plug and use a regular-sized alligator clip instead.

Let your amp warm up for a minute before turning on the standby switch. Set all of the volume controls to 0 and select the Normal channel. On the copper side of the board directly below the 2 conductor Molex connector from the OT are two "nubs" where the pins were soldered to the board. You will measure the idle bias current at these two points. Turn on the standby switch and carefully hold the tip of your black test lead to the solder nub below the brown wire. Observe the readings on your DMM as the tubes heat up; if the bias current exceeds 50mA turn the adjustment screw on the trimmer pot counter clockwise to lower the current below 50mA. Once the readings have stabilized you can readjust the pot, aiming at approximately 50mA for the two tubes.

You can now measure the current at the solder nub beneath the blue wire to see how well-balanced the two pairs of tubes are. If the difference between the two readings is much higher than 2 or 3mA you ought to turn the amp off and try switching the tubes around after they cool down a bit. For starters, reverse the inner pair of tubes and then measure the bias current again. If the difference is less, leave them in their new locations and then try switching the outer pair of tubes to see if increases or decreases the difference in current readings. In any case, if switching a pair of tubes increases the difference in readings, put them back in their original location.

Incidentally, the channel select relay derives its dc voltage from the same power supply tap as the bias supply so switching to the OD channel will increase the idle bias current approximately 1mA per tube. So what is the "magic figure" for setting bias on the Peavy Classic 50? I just stuck with the factory value of 24mA to 25mA per tube and am pleased with the results, especially after switching the tubes around to minimize the difference between the two pairs of tubes.

Good luck!

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March 1, 1999

(Revised 03/01/99)

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http://www.blueguitar.org/

Other Peavy Classic 50 files:

Tweed Bassman Mod:

http://www.blueguitar.org/c50twdbm.pdf

Tweed Bassman Mod (annotated schematic):

http://www.blueguitar.org/c50_mod1.pdf

Main schematic (preamp, reverb, fx loop):

http://www.blueguitar.org/c50sch_a.pdf

Auxiliary schematic (output section, power supply):

http://www.blueguitar.org/c50sch_b.pdf

Basic Mods for the Classic 50 (boost circuit, cap upgrades):

http://www.blueguitar.org/c50_mods.htm

Bonus! Reinforcing and repairing the Classic 50 pot shafts

One common complaint about the construction of the Classic 50 is that the split pot shafts do not hold the chicken-head knobs securely and tend to break if you try to pry the prongs apart. The problem here is that the pot metal used for the shafts has very little strength, especially with the smaller diameter shafts used on the Classic 50 (3/16" vs. the more common 1/4").

To reinforce the shafts, I cut some 20 gauge sheet metal into strips 1/8" wide, and cut those strips into pieces approximately 1/4" long. After centering those inserts between the prongs of each pot shaft, I added a drop or two of Krazy Glue© to secure them in place. Not wanting the glue to get into the bushings, I tipped the chassis up on its side (heavy transformer down) and propped up the back approximately 1/2" so that any excess glue would migrate towards the end of shaft. I allowed the glue to set overnight before reinstalling the knobs. If after adding these inserts the knobs are still too loose, you can tightly wrap several thicknesses of plumbers' teflon tape around the shaft. If the knobs are too tight you can file down the knurled shaft a bit.

To repair a broken shaft, I epoxied an 1/8" by 1/4" strip of sheet metal to the unbroken prong, holding it in place with a hemostat. After the epoxy had cured, I secured the broken shaft piece to the insert with epoxy and a hemostat. Allow the epoxy to cure overnight before reinstalling the knob, making adjustments as necessary if the knob is too loose or too tight. (Note: for reinforcing the more common 1/4" shafts, I use a 3/16" strip of sheet metal approximately 5/16" long; this trick is handy when using knobs with set screws on split-shaft pots.) If the broken shaft piece has disappeared Dan Erlewine explains how to repair it using a wooden dowel in the 2/99 issue of GP.