# Easy Fit Replacement PCB for Fender Blues Junior
# Instructions, ver C

The original manufacturer's PCB is single sided, i.e. has copper on the non-component side only. The EL84 tubes run very hot in these and this weakens the glue that attaches the copper foil to the substrate material. The original substrate does not appear to be FR4 glass fibre but possibly an inferior composite such as SRPB. When the glue fails the heavy tube & socket is free to vibrate and soon the attached copper track fails due to metal fatigue. You hear crackling, popping and/or a loss of power. When that happens the PCB needs replacement.

These replacement PCBs are designed to drop in and are made from a reinforced glass fibre substrate FR4. They also use a double sided copper foil with plated through holes. This overcomes the glue failure issue.

Features

- Durable Glass fibre reinforced FR4 material
- Prevents glue failure issues by using double sided PCB with plated through holes
- Drop in replacement is cheaper and much easier to wire in than hand wired plate alternatives
- Bias current measurement test points make tube replacement easier
- Just unsolder the wires from the old PCB and attach to the new one.
- No need to remove the main circuit board.
- Heatproof ceramic tube sockets
- Much faster to upgrade than hand wired solutions as most of the wiring has been done for you
- Better than uncertain hand-wiring as the location of 'wires' is fixed and pre-optimised for you giving repeatable results
- Greatly eliminates the chance of expensive mis-wiring errors
- Incorporates resistors for measurement of bias current on each EL84
- Oversized holes to make re-wiring easier
- Heater tracks optimised to reduce hum
- Instructions included. Anyone with decent soldering skills can do this.
- Increase /preserve the value of your amp

**WARNING**

*There are lethal voltages inside these amplifiers. Always exercise extreme caution to avoid the risk of electric shock. If in any doubt refer to a qualified technician. Fitting and use of these parts is entirely at your own risk. No exceptions.*

## Fitting instructions

1. Turn off your Blues Junior, unplug and leave for 10 minutes.
2. For the version with the bias trimmer on board only, insert the supplied trimmer into the side of the PCB *without* the tube sockets and solder in place. Note there is a wire link between two of the pads. This must be left in place.
3. Remove the screws indicated and then remove the rear cover. Fig 1.

*Fig 1: Rear Cover Screws*

4. Unplug and carefully store all five valves.
5. Measure the DC volts where indicated to check this is less than 20V, Fig 2

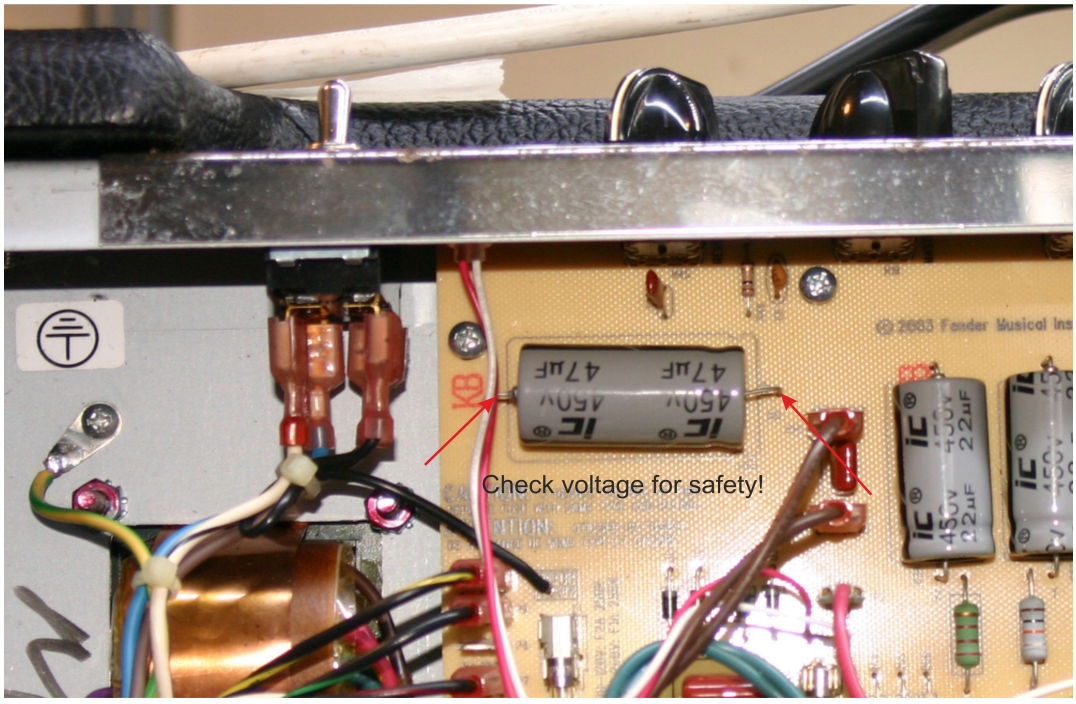
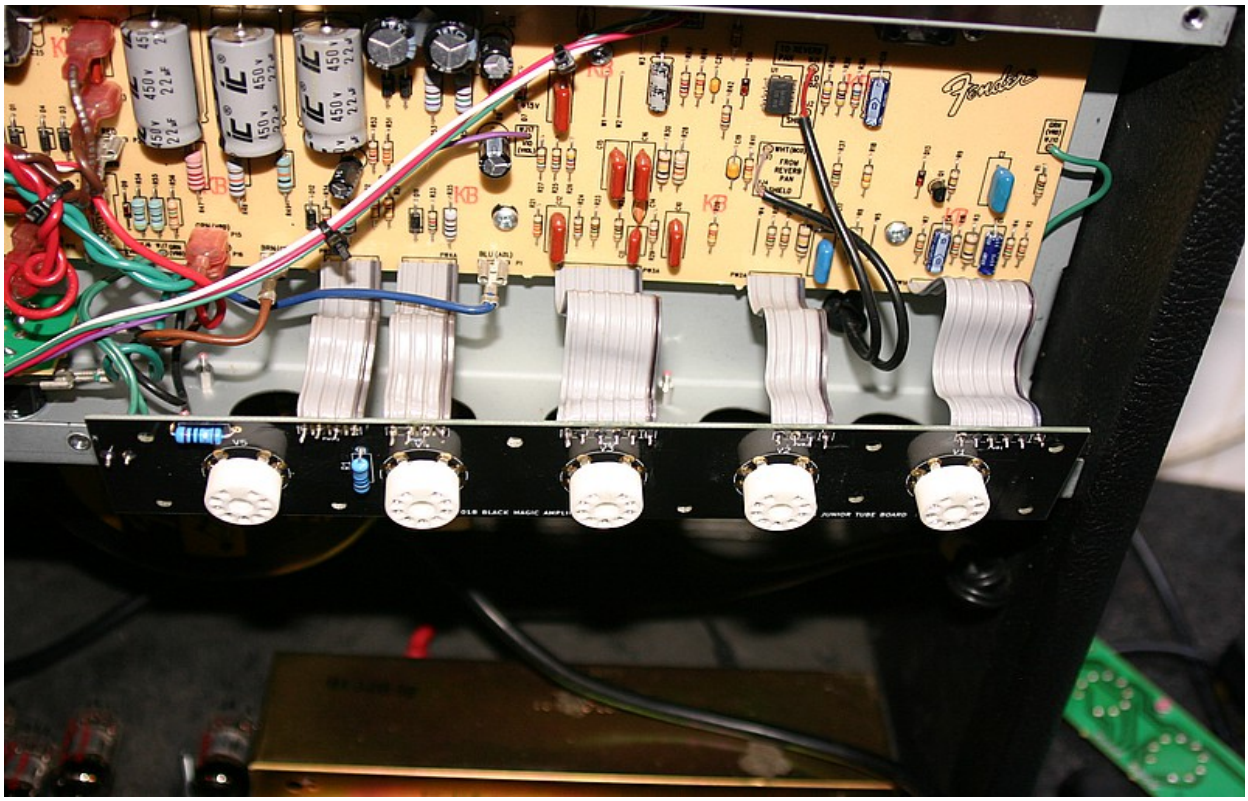



*Fig 2: Check voltage here before starting*

6. Undo the nuts on the rear of the existing tube board using a 1/4in SAE spanner /wrench.
7. Lift the board off the supports and rotate so the solder joints where the board is attached to

the main board are exposed.

8. Carefully unsolder the five flat cables and the two green heater wires. It is recommended that you use desolder braid and/or a de-soldering tool. Take care not to overheat and so damage the insulation or fray the stranded wire lest they are rendered unusable. Alternatively you can snip the flat cables flush with the old board. Now use wire strippers to expose about 0.2in/4mm of wire. You can then fit them to the non-component side of the new board instead of the component side. Some folk choose to replace them with silicone type wire but that is a bit more work. If the worst should happen you will need to remove the main board and fit new wires. It may help to carefully partially separate the cables into individual wires by cutting the thin plastic between the wires with a sharp blade. If you have the green board version also unsolder the wires to the jewel light.
9. For **the bias trimmer on board version only**, solder the supplied 1M trimmer to the NON TUBE SOCKET side of the board. On the main board, clip the leads of 22K resistor R52 close to its body and replace it by soldering the supplied 56K resistor to the stubs
10. Solder the five flat cables to the new PCB inserting from the bottom i.e. not the tube socket side ( see image).



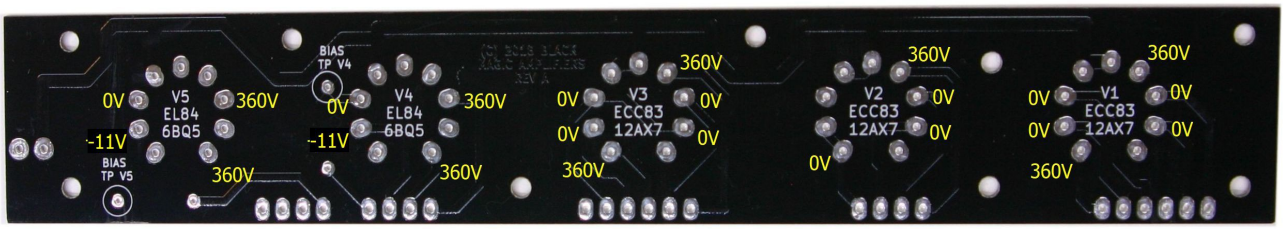
*You can insert the cables into the rear of the board for a neater installation*

11. Put the two green heater wires through the holes and solder on the bottom.
12. Only for the green board version, solder the wire to the jewel light to the pads marked LED white to “+” and red to “-”
13. Rotate the board into position and fasten the nuts. Take great care not to over tighten as the spacers break easily.

## Initial Testing

Now it's time to check a few things prior to plugging the tubes back in. We will be measuring a few voltages with the amps turned on so take care.

1. Set your meter to DCV and clip the black lead to the negative end of the big 47uF 450V capacitor used earlier the check the supply voltage. Use the meter red lead to check for the following **approximate** voltages ( see diagram). If you hear any buzzing or unusual noises from the speaker immediately turn off and find the cause before proceeding any further.




2. If you find any discrepancies fix the issue before continuing.
3. Replace the five tubes.
4. Power up, check that you can see the heaters glowing red in all five of the tubes. Test taking care to avoid touching any internal parts with the cover off.
5. Replace the rear cover and screws.

## Using the bias test points

When fitted, the bottom of the board is exposed. On the left the two bias test points, one for each EL84 are indicated by two white circles. With no input signal and volume turned down, use a DC voltmeter to measure the voltage on these points with respect to the chassis. 1mV corresponds to 1mA of bias current. The current should be in the range 20-35mA, 25mA is a good compromise.

When you fit new matched EL84's the bias current needs to be checked and possibly adjusted. If you do not have a bias trim pot, to lower the bias current add a resistor in parallel with the 33K resistor (orange orange orange gold). To increase the bias current add a resistor in parallel with the 22K resistor ( red red orange gold).

## Handy tips

If there is a current difference between the the two EL84 of more that 20% you should replace them with a matched pair.

When you replace the tubes with new, write the new bias current inside the rear cover on a note. You can then check their performance at a later date. If the bias current has dropped significantly to say 70% of the original then it's time to replace with new.

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