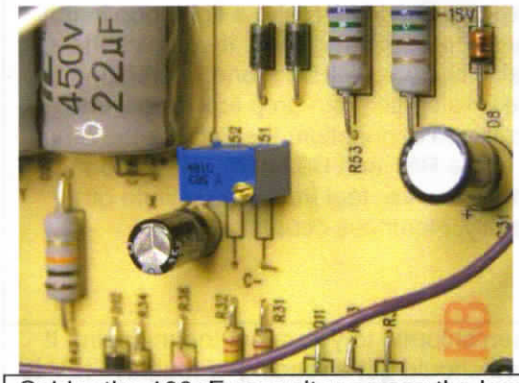
Billm Easy Bias Control for Cream Board Blues Junior

The layout of the cream board Blues Junior (mid-2001 to present, including Series III) makes it easy to add a bias adjustment trimpot. Like the stock amp, this method requires that you use matched/balanced output tubes and allows the bias level to be set cooler than the BJr's tube-roasting level. Using the Bourns 50K trimpot, you replace R51 and R52, which form a voltage divider. The voltage divider then becomes adjustable. A 25-turn trimpot is ideal, allowing very accurate adjustment. A single-turn trimpot will be impossible to adjust accurately. With this circuit you can go from full bias voltage (-26V) to zero (red-plating your output tubes). The trimpot is pre-set at the midpoint, which will give you a safe starting voltage. Do NOT run the trimpot past its limit stops. It will go click, click, click in warning, then it will break, break, break.

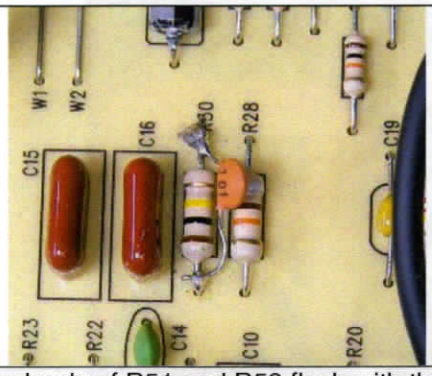


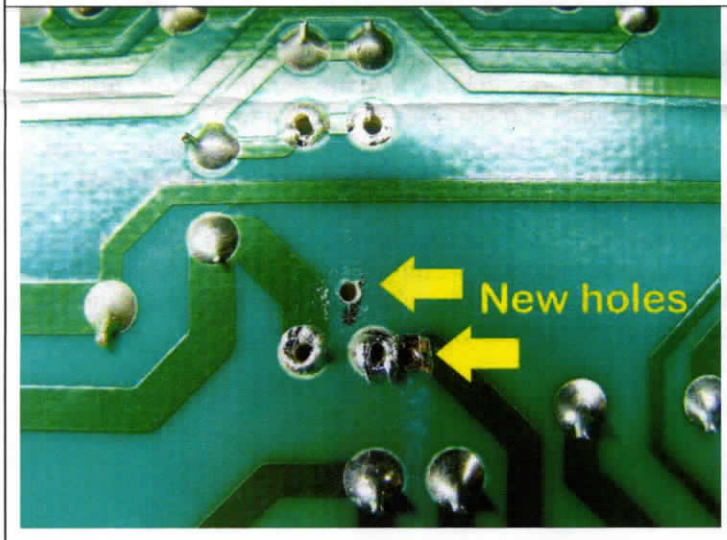
Watch this video for instructions on loosening the Blues Junior circuit board: https://tinyurl.com/bluesjun

Solder the 100pF capacitor across the leads of R30, as shown.

Hook the capacitor leads, route them under the R30 leads, crimp lightly for good contact, and solder. Leave R30 connected and take care not to overheat the leads, so that it remains properly soldered on the back side of the board. Trim the excess leads.

The capacitor prevents phase inverter oscillation, a common problem with cream board Blues Juniors.



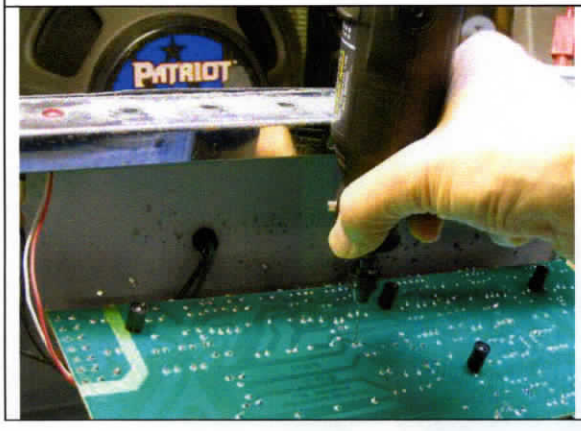


Clip the leads of R51 and R52 flush with the board. The stubs are easier to desolder and thereby prevent damage to the traces. A vacuum plunger desolderer (solder sucker) is highly recommended.

Use the trimpot's legs as a guide and use a fine-point Sharpie to mark out the positions for the holes. The one adjacent to the existing hole is the most critical: place it at the edge of the solder area just to the right of the existing hole. The topmost leg should be centered between the existing hole on the left and the new hole, as shown. It must not touch the thick trace on the left.

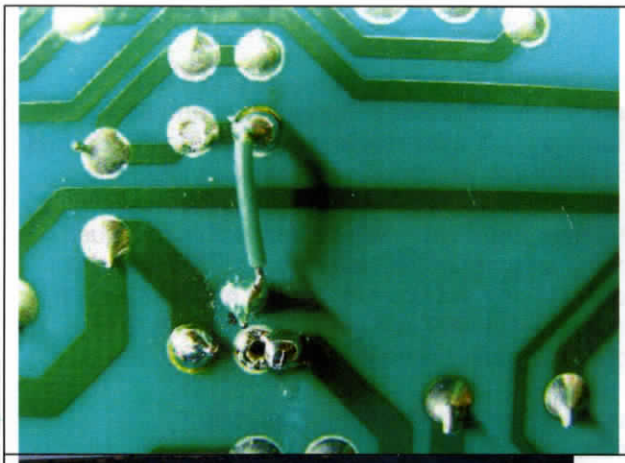
Don't be tempted to "cheat" and use the existing right hole! Bent leads on the trimpot will be wobbly on the circuit board and may break.

Use a sharp, pointed object to make a starting hole so the drill bit won't wander.



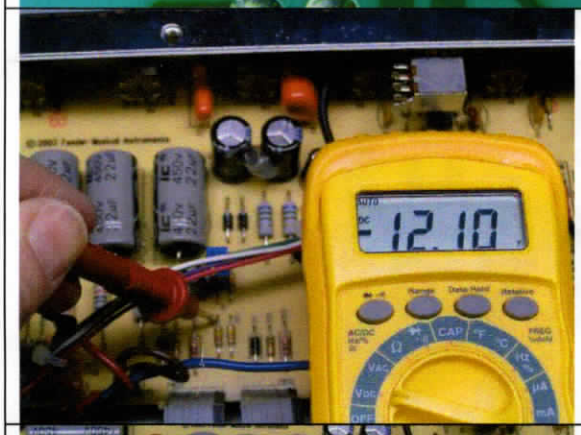
Use a #60 (.040") drill bit to make the holes. A Dremel tool with an inexpensive accessory chuck works well, but even a hand-powered "egg beater" drill will do the job. Some have had success with the Fiskars hand-cranked craft drill or a craft push drill. It's a #60 drill, so use a very light hand. You bend it, you break it!

Scrape the green coating off the trace next to the right hole. Take care not to remove the copper, just the coating.



Place the trimpot through the holes from the other side. Solder one lead into the existing hole, the other into the new hole you made.

Strip one end of the wire provided, make a tight loop in the end, and crimp it onto the remaining lead. If you nick the wire, start over again. The wire will be prone to breaking at nicks. Pre-form the wire so you can drop just drop it into place. Solder the crimped connection, then solder the other end into the either of the R51 and R52 holes. If you don't like working with this thin wire, feel free to substitute other wire, but work carefully. Neatness counts!



The trimpot has been shipped to you set at the midpoint. If you didn't turn it, you should get a reading of roughly -12V to -13V between the top of either R31 or R32 and ground. This is a safe bias voltage that won't red-plate your tubes.

Remember that if you do this test without the tubes inserted, the filter caps will hold a charge. Warm tubes will self-discharge the amp when you turn it off. I suggest you leave the preamp tubes in place.

Watch this video for instructions on setting the bias: https://tinyurl.com/setbjbias

To adjust the bias: Put a jumper clip on the red transformer lead (P2) and another on the brown (P3). Plug in speaker, insert tubes, warm up amp, turn master volume off. Adjust the trimpot until you get a reading of 2.4 to 2.7 volts across these two leads. **Remember that the actual voltages are over 330V and you're only measuring the difference between them!**
Because the output transformer resistance is 100 ohms, a 2.4 volt drop indicates 24 mA of plate current. Multiply that times roughly 335V on the plate, and you've got 8 watts of idle dissipation per tube, a good number.

Note: The Heyboer output transformers have a different resistance. Use 3.2 to 3.4V for the TO20; 4.2 volts for the TO22. If you are converting to 6V6 tubes, follow the guidelines on the Octal Conversion instruction sheet.