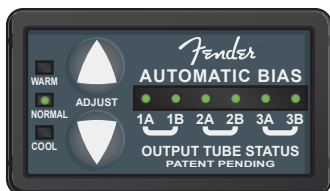


Fender Automatic Bias

Many musicians desire the rich and full tones produced by a tube amplifier, but heavy amps full of glass tubes which must be maintained and occasionally serviced can be intimidating. The goal of Automatic Bias is to maximize tube life and ensure peak performance, allowing the musician to focus on what is important... the music!



BIAS – What is it? Why is it important?

The bias setting on your tube power amplifier determines the idle current flowing through each tube. In other words, the bias setting (WARM/NORMAL/COOL), determines how much power is flowing through each tube at idle (while the amplifier is not being played).

Tubes are complex devices that are difficult to manufacture in a consistent way. To account for this, tubes are often measured and then given "grades" to sort them by performance characteristics. All tubes of the same grade can be set at the same bias, which is why in traditional tube amplifiers (without Fender Automatic Bias) it is necessary to replace all output tubes at the same time and with a "matched set" of the same grade. Furthermore, if the new matched set is not the same grade as the old matched set the amplifier would need to be taken to a service center to have the bias adjusted.

Fender Automatic Bias monitors the bias of each tube individually. If one tube fails, it is not necessary to replace all output tubes with a matched set. Simply replace the single failed tube with a tube of the same type and grade. When it is necessary or desired to replace all six (6550C) output tubes at the same time, a matched set (of six tubes) of ANY grade may be used. Visit www.groovetubes.com for more information about the tube grading system.

The bias setting affects amplifier tone, dynamics, tube life, and power consumption in the following ways:

WARM: More aggressive (dirtier) tone, faster attack. Shorter tube life, higher power consumption.

NORMAL: Typical setting. Good balance between tone and tube life.

COOL: Less aggressive (cleaner) tone, smoother attack. Longer tube life, lower power consumption.

Adjusting the tube BIAS:

Press the up/down ADJUST buttons for WARM/COOL settings. Each button may be pressed 5 times from the NORMAL setting for the full range of bias adjustment. The range of bias (per tube) is 23mA (COOL) to 28mA (NORMAL) to 33mA (WARM). The amplifier does not need to be in standby for this adjustment. Allow 10-20 seconds for the adjustment to be completed. The LEDs will stop blinking when the adjustment is complete.

NOTE: To preserve the amplifier's rich tube tone, Fender Automatic Bias will not make any bias adjustments while the amplifier is being played. Fender Automatic Bias will always wait until the amplifier is at idle or being played at very low levels before making any adjustments.

Press and hold both the up and down arrows to restore the bias to factory settings (NORMAL). Always restore the bias settings to factory setting after installing an entire set of new tubes with a different grade than the previous set.

Output Tube Status LED indicators:

Fender Automatic Bias has one LED indicator for each output tube, corresponding to the location of each output tube from left to right on the back of the amplifier. These LEDs show the current status of the output tubes and can aid in service and trouble-shooting. Here is a definition of each of the LED's display functions:

GREEN LED moving left to right:	The tubes are warming up. You should always wait longer than one minute before taking the amplifier out of STANDBY. The SPEAKER OUTPUT switch must be ON or the amplifier will remain in the warmup state. NOTE: If the STANDBY switch is set to ON before one minute (not recommended), the display will not update until after the one minute warm up period has passed.
LED is solid green:	The tube is OK and operating at the desired bias level (WARM/NORMAL/COOL).
LED is green and blinking:	The bias for that tube is being adjusted. It can take up to 20 seconds to complete the adjustment. NOTE: If an LED blinks continuously for longer than 5 minutes (after power-up or bias adjustments), that tube is worn out and should be replaced.
LED is orange:	The tube is wearing out and should be replaced with a new tube with the same tube rating.
Within any pair (1A/1B, 2A/2B, 3A/3B) one LED is red and the other LED is orange:	The tube indicated with the red LED has failed, and should be replaced (refer to the Tube Replacement section on next page for instructions). The tube indicated with the orange LED, has been shut off to allow the amplifier to run safely with the remaining pair(s) of tubes (green LEDs). NOTE: In this condition the amplifier will continue to operate safely (and allow you to finish your gig), but will operate with only the remaining power tubes at reduced power.
Within any pair (1A/1B, 2A/2B, 3A/3B) both LEDs are red:	Sometimes, if a tube fails under certain high level signal conditions, Fender Automatic Bias cannot determine which tube of the pair has failed, and displays both in the pair red. It is still safe to operate the amplifier in this mode, but it will operate at reduced power (as discussed above). There are two service options in this situation (refer to the Tube Replacement section for tube replacement procedure): 1) Replace both tubes that were indicated red, and the appropriate fuse {BB}. -OR- 2) Troubleshoot to replace only the failed tube. This is the best option if replacing both tubes is not practical (like on a gig), and spare fuses are available. a. Replace either of the tubes that were indicated red, with a new or known good tube. Keep the removed tube handy, in case it was not actually the failed tube. b. Replace the appropriate tube fuse {BB} with the same type and rating. c. Turn POWER {M} on, keep the amplifier in STANDBY {N} at least 1 minute. d. Take the amplifier out of STANDBY, wait 10-15 seconds for Fender Automatic Bias to determine the tube status and update the display . e. If all LEDs are now green, the bad tube was replaced (dispose of the removed tube properly). f. If the two LEDs remain red, the wrong tube was replaced. Keep the removed tube and proceed to step g. g. Remove the other tube in the pair with the red LED indicator and replace it with the tube that was removed during step a. Repeat steps b-e. h. If there are still two red LEDs, both tubes had failed. Replace the tube from step g with a brand-new tube (dispose of the removed tube properly). Repeat steps b-e.
All LEDs are red or orange:	Multiple tube failures, the amplifier will be silent. Service each pair of tubes as described above. This is not likely to occur. NOTE: If any tubes are missing (not installed), the LED indicator for that tube will display orange. A pair of tubes may also display orange if the fuse for that pair of tubes is missing and Fender Automatic Bias did not detect a tube failure.
All LEDs flash at a slow rate:	The amplifier has been placed in STANDBY {N} or the SPEAKER OUTPUT switch {Q} has been set to MUTE.