

## More on Bias

### Adjustable Bias:

The ability to change “adjust” the DC bias voltage placed on the grid of a tube in relation to its cathode thereby obtain proper power tube dissipation. Amps of this type will have a pot to set or “adjust” the idle (no signal) bias voltage. This is similar to Fixed bias but is adjustable. There may also be a balance control.

### Fixed Bias:

The bias voltage is developed by a fixed resistor divider. It is possible that the bias voltage will need to be changed when new or different type tubes are installed or if you want to change the operation of the amplifier. This is done by replacing one or more of the divider resistors to set the bias voltage for the proper power tube dissipation. Typically this should be done by an experienced technician as it requires knowledge of electronic circuits. There may also be a balance control.

### Cathode or Self Bias:

The bias voltage is obtained by a resistor placed on the cathode of the power tube/tubes. As the tube conducts voltage is dropped across this resistor causing the cathode to become positive in reference to ground. The grids are DC grounded. The negative relationship between the cathode and the grid is how bias voltage is obtained in this type of amp. It is possible that the bias voltage will need to be changed when new or different tubes are installed or if you want to change the operation of the amplifier. This is done by replacing the cathode resistor with a different value to set the bias voltage for proper power tube dissipation. Typically this should be done by an experienced technician as it requires knowledge of electronic circuits.



### RAISING THE BIAS?

A bias voltage that is more negative in reference to the cathode will cause the tube to draw less plate current. If the bias voltage changes in a positive direction the tube will draw more plate current. Don't be confused with terms like “raising the bias”. This is a bit confusing because raising the bias voltage I.E. making the bias voltage bigger by going from  $-40\text{vdc}$  to  $-50\text{vdc}$  will cause the tube dissipation to be reduced. Or it could mean to make the bias voltage more positive by going from  $-50\text{vdc}$  to  $-40\text{vdc}$  causing the tube to dissipate more power.

### COMPU-BIAS CALCULATIONS

Because the wattage displayed on the Compu-Bias indicates TOTAL dissipation through the cathode (Cathode current = Plate current + Screen current) using the recommended Plate dissipation will afford a safety factor as some of the power is actually being dissipated in the Screen. There is no need to take your amp apart to measure anything, keep logs or place stickers all over your amp when you use the Compu-Bias. Simply remember the tube dissipation or use the chart. Knowing the idle current is only half the answer, without knowing that and the plate voltage before doing the math you are wasting you time.

### WHAT IS THE CORRECT BIAS FOR MY AMP?

The correct bias for an amp is subjective, but should be near the reference chart supplied in the manual in any case. There is an acceptable high and low range. The tube will either be too near cutoff (indicated by crossover distortion) or will be dissipating excessive power with no signal applied if the bias is too high or too low. Setting your bias to a point where you are satisfied with the tone while maintaining power dissipation within the limits of the tube is correct. Class A and AB1 amps can have significantly different dissipation values. For example it is not uncommon to see EL84 amps idling at 12 watts. To extend the life of your power tubes use the lowest setting that provides the tone you are looking for. Remember candles that burn very bright typically don't burn very long. Under biased amps typically do not sound pleasing, this condition is easily verified with a scope if you don't understand what you are hearing.

### CAUTION:

**Do not plug the Compu-Bias into a broken amplifier. It won't fix anything and may damage the Compu-Bias. Do not use the Compu-Bias if the probes or leads are damaged. Potentially Lethal voltages exist inside any vacuum tube amplifier this includes the tube sockets.**



**If you need to change the bias and do not poses the technical knowledge required to perform this task. Take the amp to experienced technician as it requires knowledge of electronic circuits and high voltage safety.**