

We'll dispense with the warnings first.....

DISCLAIMER: Tube amplifiers contain potentially lethal, high voltages **even after they are unplugged**, that may cause personal injury or death. Do not attempt to repair, modify, or work on any amplifier unless you are absolutely certain you know what you are doing. If you do not dream about shunt resistors and the like, then, please, take it to your amp tech. You are dealing with hundreds of volts (upwards of 350) and milliamps into the double, sometimes triple, digits. This combination is enough to kill a human. Remember, 18 milliamps across your chest is enough to cause the diaphragm to contract and prevent breathing. 30 milliamps is enough to stop the heart.

OK, on to the fun stuff.

Biasing is something that is talked about a lot and seems to carry a mysterious aura that few know much about it.

There is no real magic in setting the bias in your amp.

I have seen the need for setting the bias compared to your car's idle RPM.

If the RPM setting is set too high, you will need to apply more pressure to the brake pedal when coming to a stop light.

If the idle is set too low, the car will stall.

Just like your car, your amp has a recommended setting for it's 'RPMs'.

As far as biasing is concerned, there are two basic types of tube amps, the Fixed Bias and Auto Bias (or Self Biasing).

Auto Bias amps cannot be adjusted. Some Fenders and Mesas fall in this category.

Auto bias amps require no adjustment and may work with a wide range of tube plate currents. They are "self adjusting."

Auto Bias amps use a fixed resistor to bias the tubes. These amps are designed to run tubes that have a specific current draw and you should use tubes that fall within that range. (Actually, the bias can be changed, but it requires soldering different resistors in place. Not a simple adjustment.)

Fixed (or Adjustable) bias amplifiers are just that - the bias can be changed easily. It is not difficult and does not take long assuming you know what to do and have the tools and equipment needed.

By the way, the ratings on tubes such as "early breakup" and "late breakup" is only valid when you are installing them in a fixed bias amp. In an adjustable bias amp, you can move that "breakup point" wherever you want it to be.

Here's the general idea...

If the bias is set too low, the amp will sound cold, brittle and will have excessive crossover distortion at higher volumes. This will sound dissident and your guitar will sound out of tune.

If you set the bias too high, the amp will sound harsh, will distort quickly, and will lose all focus at high volumes.

Each type of output tube has a range that it can safely operate and these same ideas carry over into the tube's acceptable operating ranges.

Within the tubes proper bias range, the lower end of the scale will sound clean and will not distort so easily. Set towards the upper end of the scale, the amp will sound full and distort easily. It will also be harder to get or maintain a good clean sound.

The trick is to find the spot within that range that works for you and your setup.

There are many different methods for measuring and setting the bias.

Every tech has their preferred method but the results are all basically the same.

I will not bore you with the details – most techs know them and they are widely available from the Internet.

The Plate/Cathode Current method is the one used on my bench. Before you start sending the emails, let me say that I understand the problems inherent in this method. Every method has its own set of problems. In fact, I have used the other methods in the past and do not find the results worth the risks of damaging the amp, the tools or myself.

As for matched tubes. No matched set is going to be perfectly matched. The idea is to get a pair or quad or sextet or whatever that are as close as possible, usually within 5% of each other, sometimes it's 10%. Years ago, 25% was considered acceptable.

Each manufacturer has their own set of parameters. Again, I will not go into all the details but if it is a reputable company, you can trust that the tubes are 'matched'.

In the case of NOS tubes, you must test each tube to find the tolerances of each tube and then match those to similar types.

Everyone has their preference for tube brands and you can't argue with that.

Personally, I rather like the new Groove Tubes overall.

For NOS, I like Tung-Sol (or RCA) and Mullard. And, in particular, the Tung-Sol 6550s.

I can supply tubes for your amp or you can send the amp with your own tubes.

Here are some links to new tube manufacturers and suppliers. They supply tubes to end users.

[New Tubes](#)

[Groove Tubes](#)

[EH](#)

[Tube Depot](#)

Here is a short list of some of the NOS tubes I have available and in stock. (Tubes that are marked **SOLD** only means those particular tubes are sold. More are available. For tube types not listed, call or email me for availability.)

NOS Tubes

RCA 12AX7 A

Guaranteed original, not a fake or rebrand

Original red box

These AX7s are the finest of the USA made preamp tubes. These are the real thing and sound great. Each one has been tested in an amp and are quiet and solid.

I got a deal on a couple cases of these a while back and bought all I could. I have seen these selling on the Internet for \$80.00 - \$100.00 **each**.

~~You can get them here for \$25.00 each.~~ **SOLD OUT**

Sorry, at this point, I cannot get anymore of these at that price.

6550

RCA 1977

1st tube - 95ma

2nd tube - 96ma

~~Pair \$299~~ **SOLD**

6550 Tung-Sol NOS branded RCA in white boxes same date codes 1975

1st tube - 95ma

2nd tube - 92.5ma

Pair \$410

Tung-Sol

1st tube - 107ma 1971 original box

2nd tube - 105ma 1975 white box

~~Pair \$425~~ **SOLD**

6550 Tung-Sol NOS branded RCA in original boxes

1st tube- 108ma 1965

2nd tube - 105.2ma 1966

3rd tube - 106ma 1965

4th tube - 105.9ma 1965

~~Quad \$835~~ **SOLD**

Mullard EL34

"FAT DARK BROWN BASE", double "o" getter halo like new 1961 in white boxes, fair to good printing

1st tube - 51ma

2nd tube - 49.5ma

~~Pair \$650~~ **SOLD**