

NAYLOR AMP BIASING

As far as tubes the original output tubes that came with the amp are Sovtek 5881's but you can use 6L6's or KT66's in it also with no problem they are an exact replacement for the 5881's; you will have to adjust the bias for them though.

You can also use EL34's but the amp needs a modification before you use them **IMPORTANT!!!** (CONTACT NAYLOR ENGINEERING BEFORE USING EL34 TUBES IN YOUR AMP TO MAKE SURE THEY WILL WORK..... **YOU MUST DO THE MOD BEFORE YOU USE THEM**) **YOU HAVE BEEN WARNED!!!**

The preamp tubes are in the 12AX7 family and there are many of them that you can use in that circuit. The ones that currently ship with the amps are Sovtek 12AX7WB's. These are what the amp was designed around.

There are many brands of tubes that you can get today; I would recommend staying away from the Chinese brand tubes they do not have the quality of the US or Russian tubes.

Good brands are Electro-Harmonix, Tung-Sol, Mullard, Genalex, Svetlana, Sovtek, JJ Electronic, Winged C, Tube Amp Doctor (TAD), Valve Art, Ruby, Grove Tubes and Watford Valves.

If you can afford it and would like to get some really nice tubes for your amp then get some NOS (new old stock) tubes, 12AX7's and 6L6's or KT66's. The NOS's are harder to find and are much more expensive to get.

IMPORTANT!!! THE SETTINGS DESCRIBED BELOW ARE BASED ON AN INPUT VOLTAGE OF 120AC AT THE AMPS POWER JACK.....WHEN MAKING ADJUSTMENTS ON YOUR AMP PLEASE TRY TO GET AS CLOSE TO 120 VOLTS AS YOU CAN TO MAKE YOUR BIAS ADJUSTMENT AS CLOSE AS POSSIBLE.

If you haven't done any amp biasing in the past I recommend it to a reputable guitar amp shop in your area, it's not that hard to do with the Naylor but you do have to remove the amp out of the cabinet to get to the adjustment pot on the circuit board inside and there is always the possibility of getting shocked by the amp, (it's dangerous.)

If you're up for it though I have included a link to a picture inside the amp that shows the bias adjustment pot location, if you look at the picture you will see a 1 ohm resistor above the bias pot that has either one or two black wires at the top and one black wire coming off it and going through a hole in the middle of the circuit board, that is the place that you will attach your voltage meter probes set to read DCmV. (millivolts).....millivolts translates to milliamps due to ohm's law and the 1 Ohm resistor.

Negative (black) probe on the top of the 1 ohm resistor where the two or one black wires are attached and the Positive (red) probe on the bottom of the 1 ohm resistor where the one black wire is attached, look for a reading of about **64mV DC** on the 60 watt amps and about **84mV DC** on the 38 watt amps (**using 5881 tubes**) while you are adjusting the pot, (you might need some one to help you hold the probes while you turn the pot with a small screwdriver) once you get that number play the amp and see how it sounds to you, if you need you'll have to make small adjustments to get the correct setting and the best sound, 64 for the 60 watt amps and 84 for the 38 watt amps is not an exact number that it will be, it's just the middle of the hi and lo range of the settings that the 5881's should be set at but it won't be much more than 4 or 5 numbers higher or lower than the 64mV or 84mV. (**The 1 Ohm resistor is reading both output tubes at the same time so the per tube numbers are doubled and a matched pair of tubes is best**)

The **low** number is **54mV DC** on the 60 watt amps and **74mV DC** on the 38 watt amps, at that setting the tubes are running cooler and they will last longer, you should have a bigger and cleaner sound, but if you go to low the amp will sound grainy and lack sustain. This is called notch or crossover distortion.

The **hi** number is **74mV DC** on the 60 watt amps and **94mV DC** on the 38 watt amps, at that setting the tubes are running hotter and you will have increased sustain and compression, but if you go to hi you will drive the tubes into saturation and shorten the usable tube life, and if you continue to go higher the tubes will just burn up and not last long at all and you could even damage the transformer.

So we recommend **32mV DC** per tube on the 60 watt amps and **42mV DC** per tube on the 38 watt amps or very close to that to get the best out of your tubes.

If you are installing new tubes you might want to start with a slightly smaller number in the lo range because sometimes new tubes will drift up or down a little while settling in, after this break in time (about 2 hrs is good) the tubes should settle down and not drift anymore.

When making the adjustment make sure that you have your speakers connected to the amp to provide a load to the transformer, have the volume and gain controls turned all the way down, the standby switch in the on or operate position and no signal going to the input of the amp.

When replacing output tubes rebias the amp every time to make sure you're in the correct range.

There is no bias for the 12AX7 preamp tubes, you can just replace them and go.

If you want to do a lot of your own tube amp biasing you should invest in a tube bias meter, there are several on the market and they all work fine, just ask your local guitar amp tech and he or she will tell you something about them.

If you don't understand any of the above I highly recommend you let your amp tech do the work for you.

Here is the link to the bias page.

<http://www.naylorengeering.com/biasadjust.htm>

Here is some tube bias info for Naylor's
The numbers are per tube so double for the 1 Ohm reading:

38 WATT AMPS

5881'S

Low Bias 37mA

Mid Bias 42mA

Hi Bias 47mA

6L6GC's

Low Bias 44mA

Mid Bias 49mA

Hi Bias 54mA

KT66's

Low Bias 35mA

Mid Bias 40mA

Hi Bias 45mA

EL34's (ONLY WITH AMP MOD)

Low Bias 32mA

Mid Bias 39mA

Hi Bias 45mA

60 WATT AMPS

5881's

Low Bias 27mA

Mid Bias 32mA

Hi Bias 37mA

6L6GC's

Low Bias 32mA

Mid Bias 37mA

Hi Bias 42mA

KT66's

Low Bias 25mA

Mid Bias 30mA

Hi Bias 36mA

EL34's (ONLY WITH AMP MOD)

Low Bias 26mA

Mid Bias 31mA

Hi Bias 36mA