

Digital Servobias V4

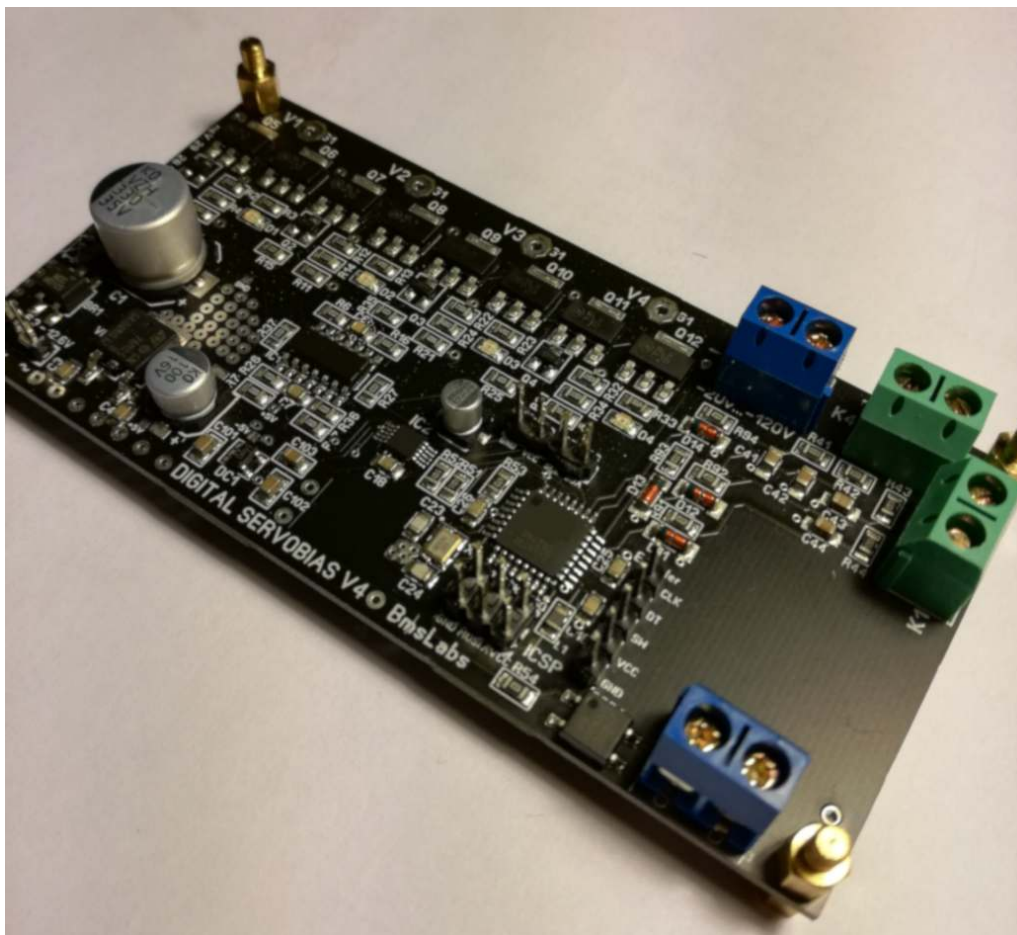
Digital Servobias is an module that control the bias voltage of the output valve/ tube and keep the current that flow trough valve (the bias current) at specified value.

Everybody know that vacuum tubes aging is not the same, even at the beginning all tubes are perfectly matched, after some time (depend on tube quality) tubes bias drift and amplifier need to be biased again. This project solve this problem and extend tubes life. Set the tube bias and is keep that way till the end of tube life.

Specification:

- work with SE, PSE and PP class A
- size 100mm X 49mm X 15mm (W*L*H) for 1-4 tubes and 81mm X 49mm for 1-2 tubes
- hole size 3mm
- power input 6.3Vac - 12.6Vac ~ 28mA
- grid voltage -20V ... -120V (module can handle up to -200V) ~ 3.5mA per tube
- can control an external relay for HV delay (delay can be adjusted, min 5s to 1000s in one second step) to connect/disconnect HT
- small OLED display to show information and setup the module (can work without after initial setup)
- rotary encoder with push button (can work without after initial setup)
- max voltage read from tubes cathode (K1...K4 inputs) 1V
- can detect valve current runaway, in this case all valve will be maxim negativated and HT relay is decoupled
- with single click on rotary encoder Servobias go in "half mode" PDA (to preserve valve life)

There are 2 versions of the Servobias, for 2 tubes (can control 1 or 2 tubes) and for 4 tubes, that version can control 1, 2, 3 or 4 tubes.



Version for 4 tubes



Version for 2 tubes

To control and setup, the Servobias use an 0.96" OLED display and an rotary encoder with push button.

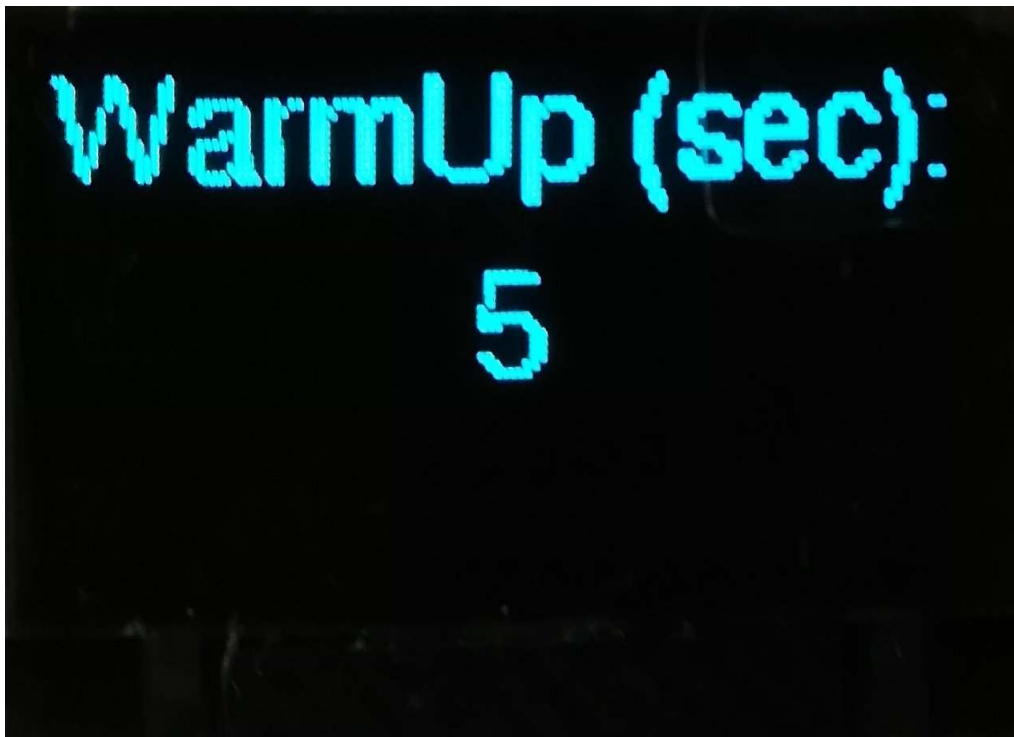
At every start-up the tubes grid voltage is maximum (tubes are blocked), the Servobias run an warmup stage to let the tubes warm the cathode.



After this stage, the HT relay is coupled (if is used) and Servobias enter in running mode.



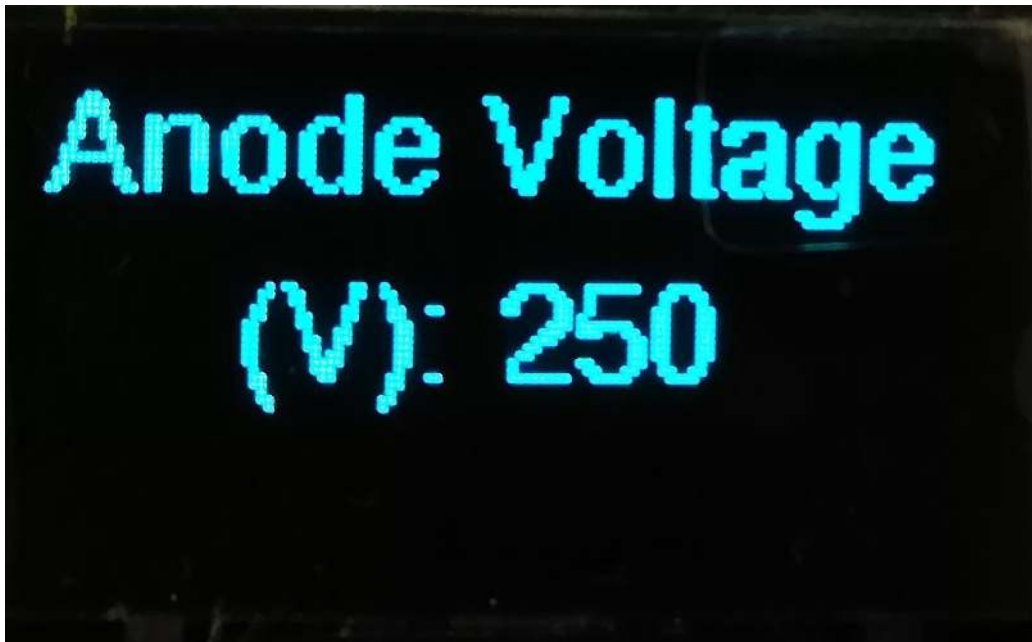
To enter in setup mode, press the rotary encoder for at last 1s. In the first step we can set the warmup stage period in seconds (min 5s max 1000s) confirm the settings with short click on rotary button.



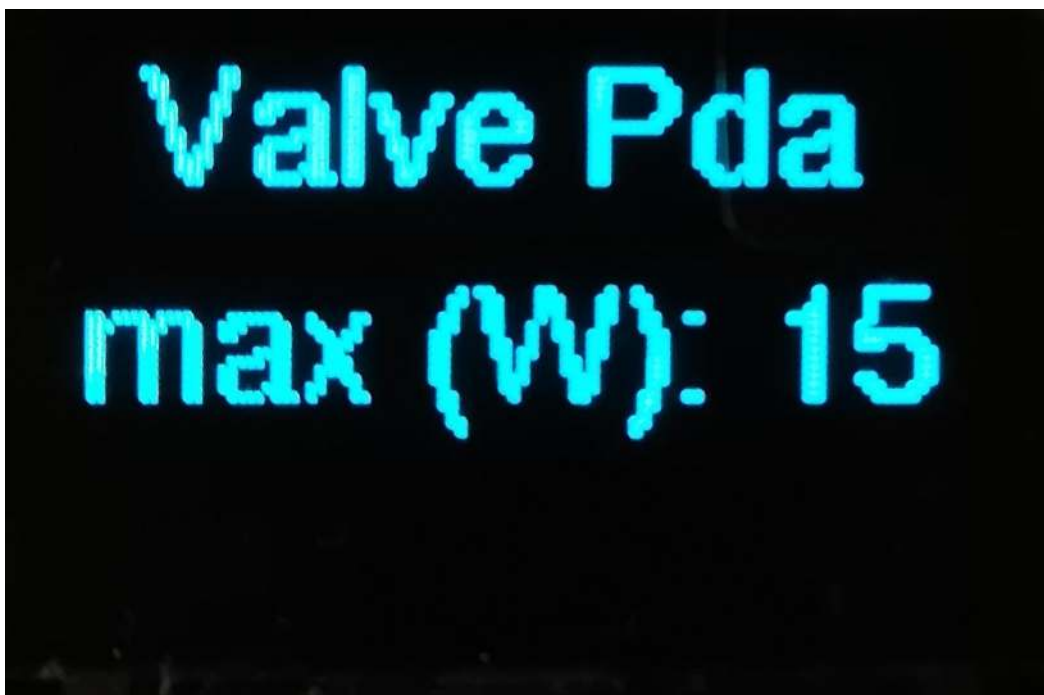
In the next page we can setup the cathode resistor in +/-0.01 step.



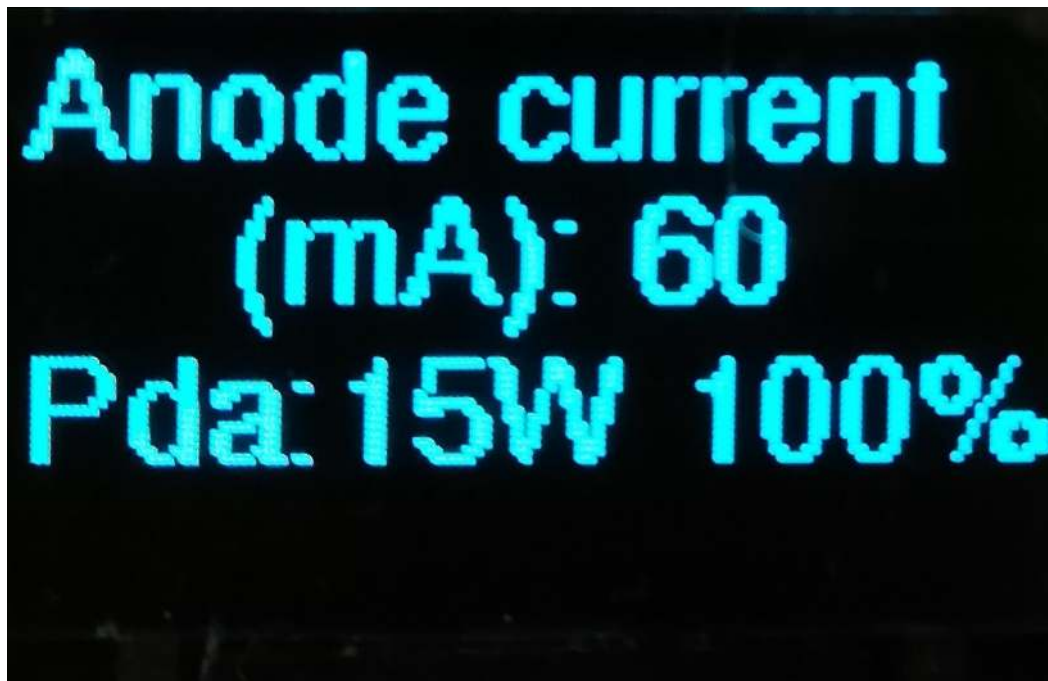
Next step we enter the anode voltage (this is used later to calculate the tube PDA).



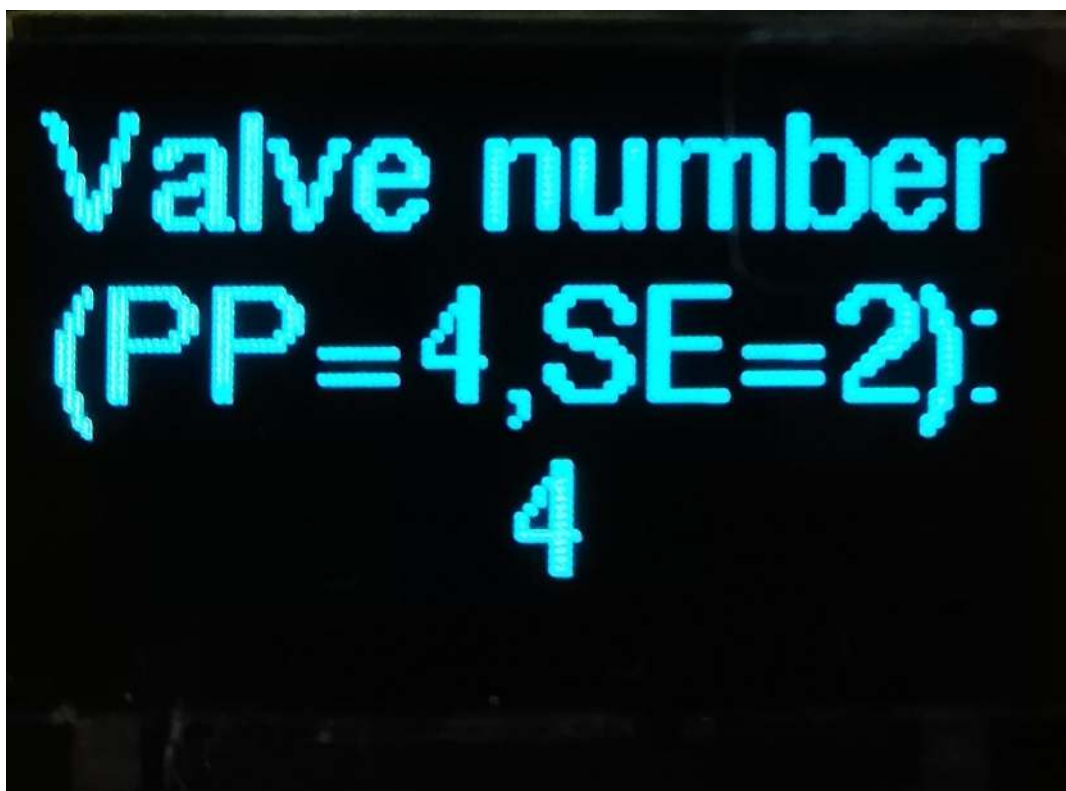
Next we enter the PDA of the tube.



Next we set the desired anode current, in this step we can see the PDA in W and percentage.



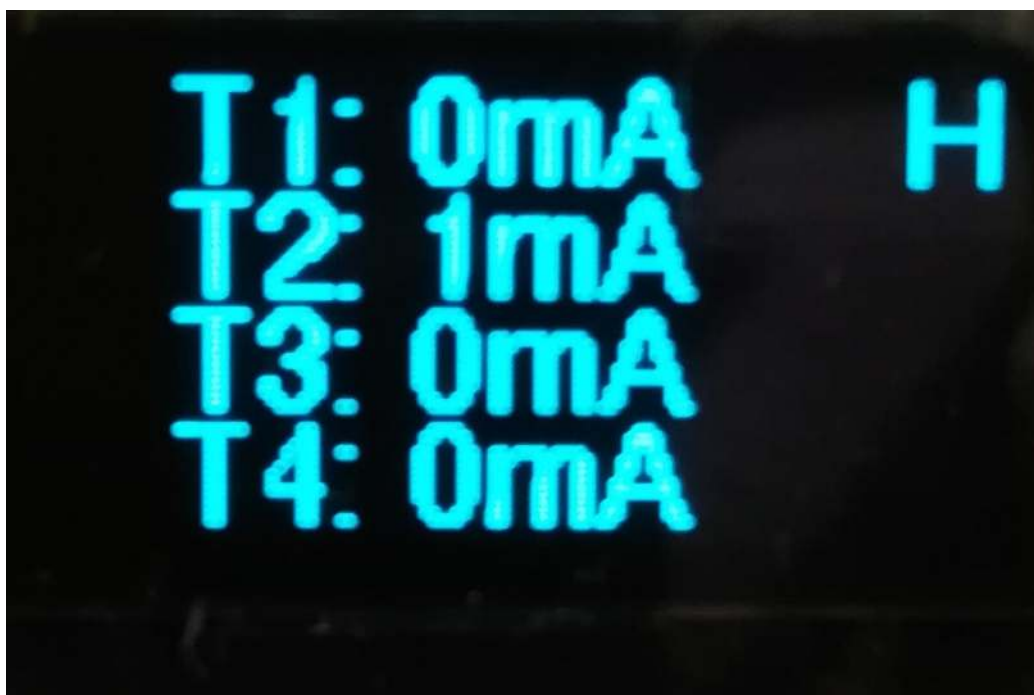
Next we enter the number of tubes, 1,2,3 or 4 tubes for 4 tubes versions, and 1-2 tubes for 2 tube version.



The last screen we see the info about the firmware.

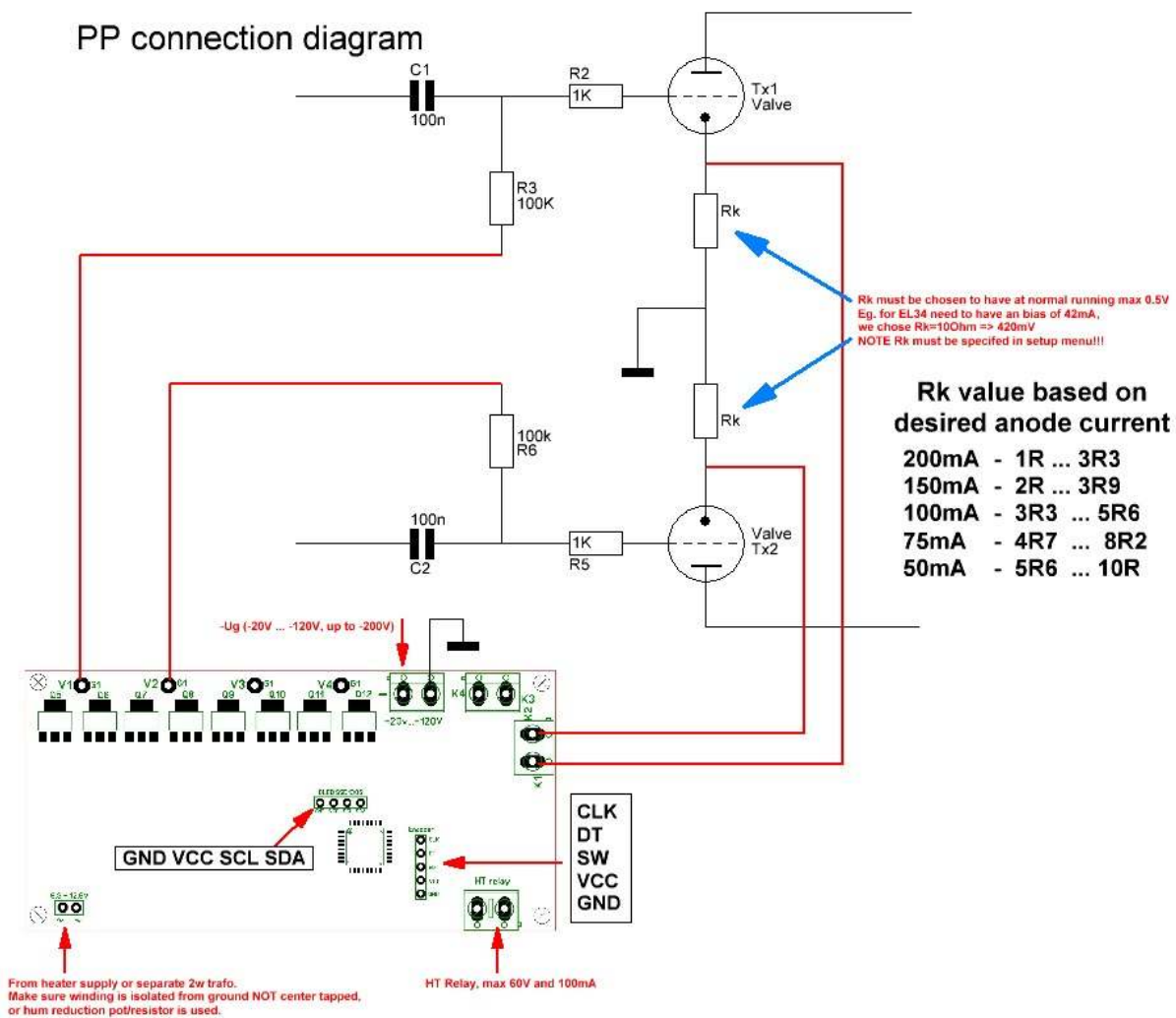


One feature of Servobias is ability to set PDA to “half mode”. Let say we set the anode current to 100mA, with short click from main screen, we enter in “half mode” PDA, anode current is will become 50mA that is indicated with an H an upper right corner.

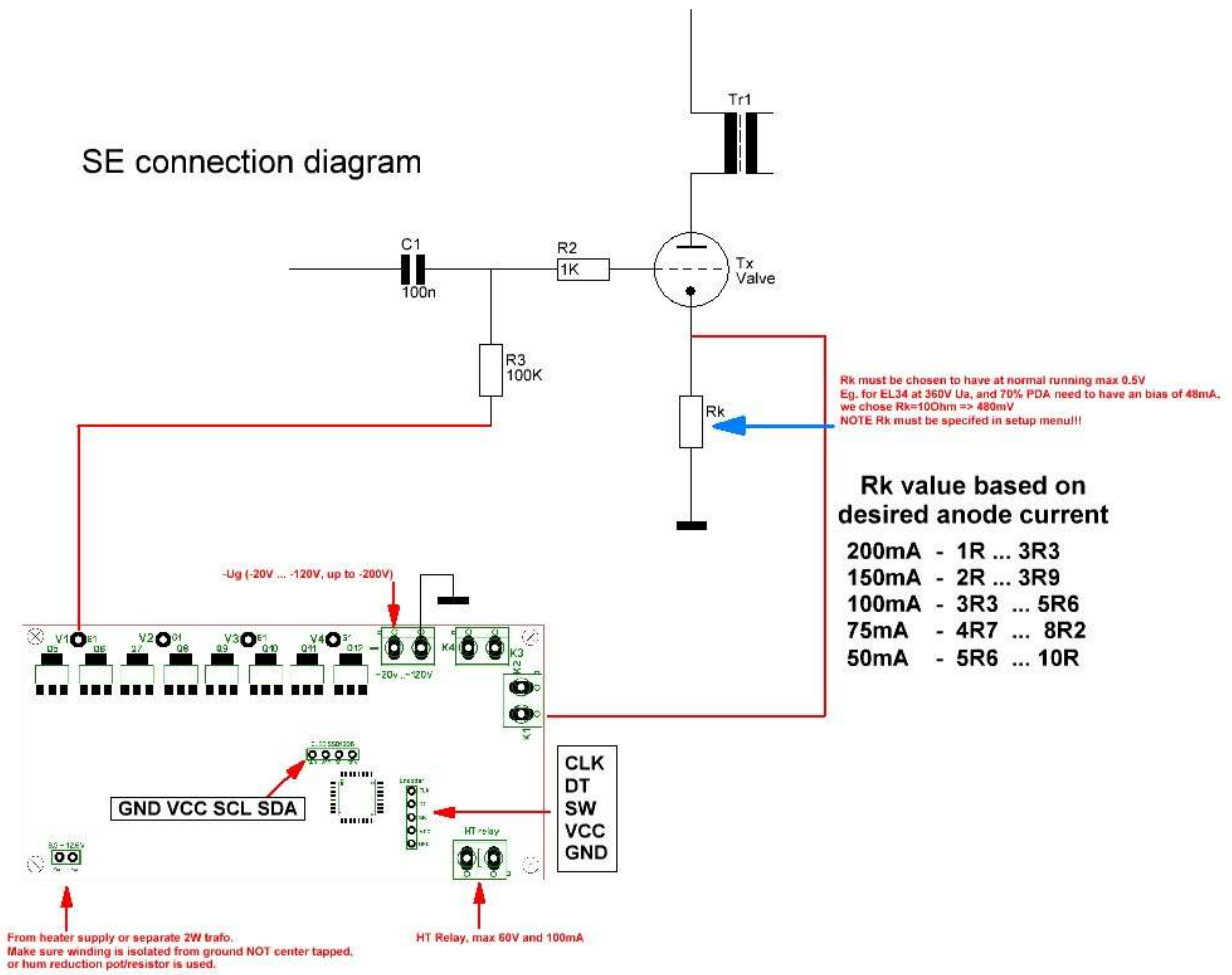


With another shot click we enter in “full mode”.

Another feature is to detect the run away of one or more tube, this mean when current of the tube exceed the desired value with 50%, Servobias enter in protection mode, showing on display the tube with problem “close” the tubes (tubes are connected to negative supply) and HT relay is open to disconnect HT from tubes.



Typical connection for an PP amplifier



Typical connection for an SE/PSE amplifier