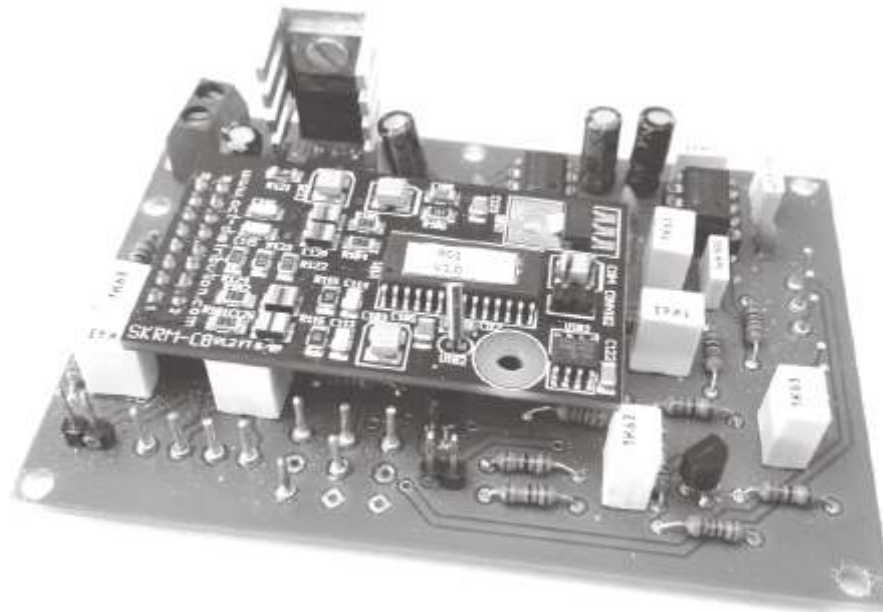


FET Biasing Optimisation Flowchart Procedure to Improve Sound and Versatility.

eTap2hw

A VINTAGE ECHO EMULATION



Flowchart for Optimising FET Bias Conditions:

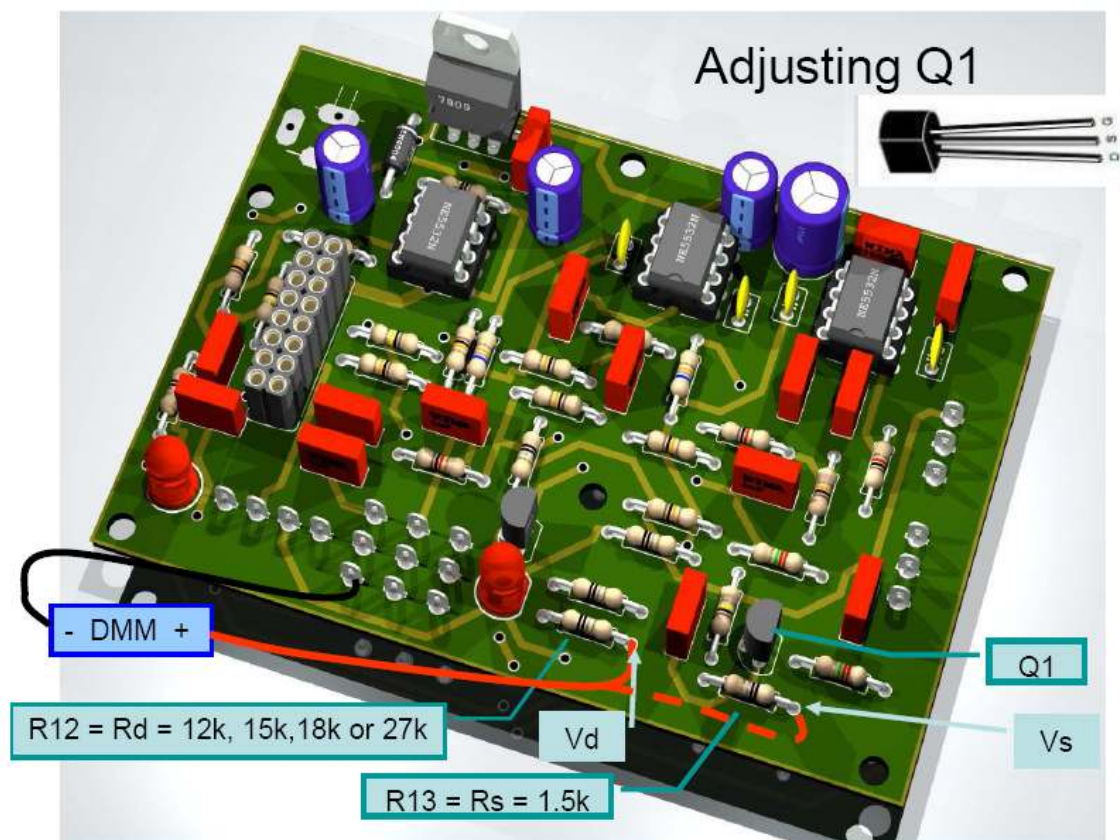
This bulletin is targeted at existing owners who may feel that the sound is just a little harsh, which is a sure sign that the standard FET biasing resistors could be changed to improve the biasing of the JFETs that were originally supplied.

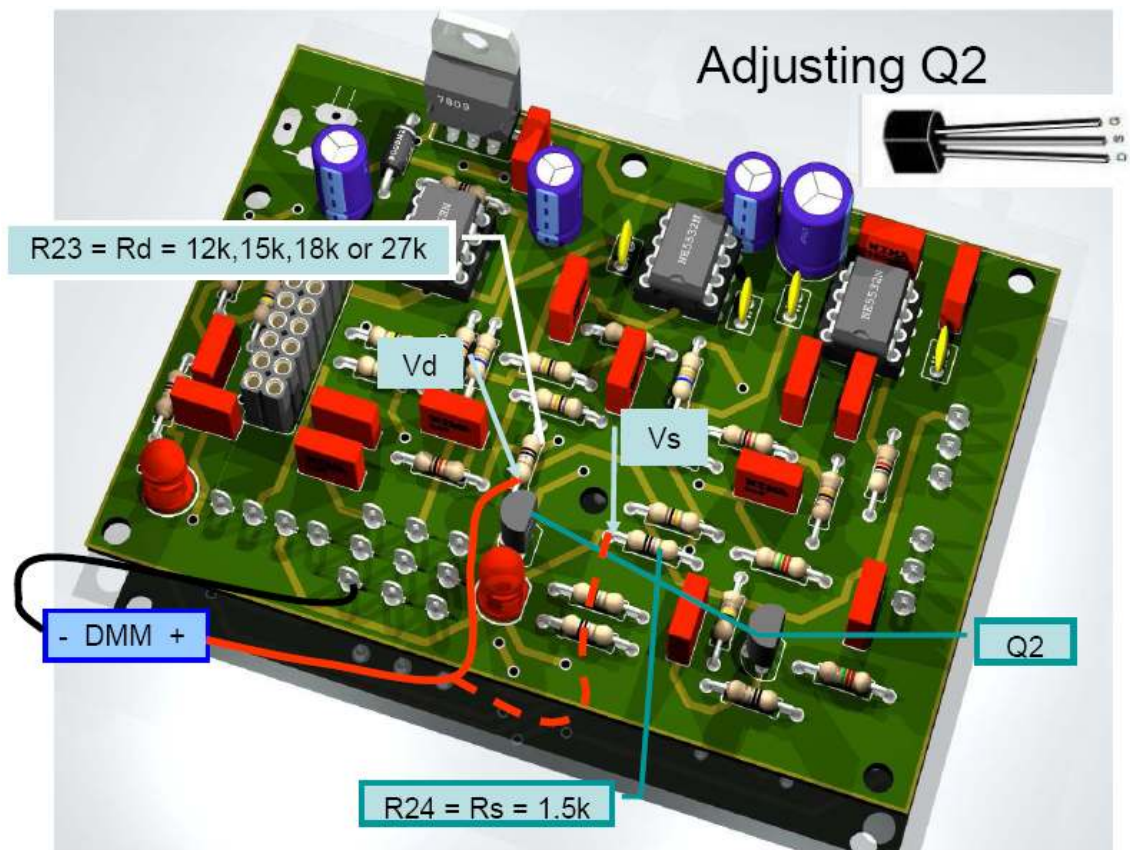
JFETs are notorious for having wide manufacturing tolerances hence it is important to adjust the biasing resistors to ensure that each one is set to its correct quiescent (idling) current. This will maximise the gain and sensitivity of each FET (Q1 and Q2). A further benefit is that by keeping the drain current small then noise is also minimised.

R22 and R26 can be removed from the motherboard as they are not needed anymore and could lead to clipping at high guitar input level. (See Bulletin No. 1 Ver. 1.0 August 2013)

There are 8x forked pins supplied for mounting the 2x FET 'Drain' resistors & 2x 'Source' resistors. Solder these pins in positions R12, R13, R23 and R24.

Initially solder the 2x 18k resistors to the forked pins at positions R12 & R24 and the 2 x 1k5 resistors to the forked pins at positions R13 & R23.





Now measure, using a high impedance, Digital Multimeter, the voltage V_D for each FET in turn between the FET side of the drain resistor and power supply ground. This should lie in the working range 5.8 - 6.8V. To adjust this voltage, if out of range, proceed as follows:

1. If V_D is less than 5.8V then R_D must be changed to 12k and the voltage V_D measured again.
2. If V_D is greater than 6.8V then V_D must be changed from 18K to 27k and V_D measured again.
3. If V_D is now in range measure the voltage across R_S the 1k5 source resistor, which should be in the 0.18 to 0.35V range. If outside this range the values can be fine tuned as follows:
4. If $V_S < 0.12$ then increase R_S from 1k5 to 1k8 and re-check the voltage to ensure it sits in the correct range.
5. If $V_S > 0.35V$ then decrease R_S from 1k5 to 1k2 and re-check the voltage to ensure it sits in the range.
6. If the Source resistor(s) has (have) been changed then check that R_d for the adjusted FET(s) still sits in the 5.8-6.8V range and if necessary adjust the drain resistor(s) using steps 1 & 2 above. ***If absolutely necessary intermediate drain resistors could be used for fine tuning, e.g. 33k, 22k, 15k or 10k.***

Do not be too fussy about the drain voltage as, once it is in the range, the amplifier will self-bias as soon as it receives a guitar signal. The selected range should ensure that as the input level potentiometer is rotated clockwise you will hear more harmonics being generated and a small amount of compression similar to an ECC83/12AX7 triode tube. With experience you will soon recognise the sound of the guitar “sweet spot”.