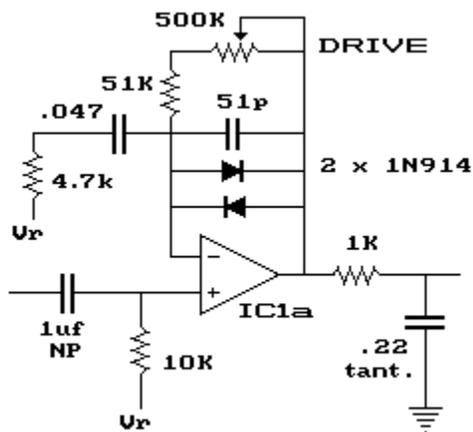


amzfx

Flat Response for Tube Screamers

The Tube Screamer family of distortion circuits has one distinct characteristic; it has a very pronounced mid range boost that increases as the drive control is turned up. The boost produces a nasal quality to the sound that many people find appealing but others (including myself) do not like. This article describes a simple modification that may be performed on the Tube Screamer circuit to reduce the low frequency rolloff that is common among the TS variations and clones.



Here we see a circuit fragment from the TS-9 schematic that is available for download on the [AMZ Schematics page](#). This opamp stage provides both gain and clipping but the response is shaped by the 51pF capacitor across the drive control and also by the interaction of the capacitor and resistor connected to the inverting input.

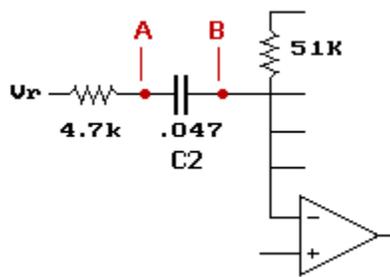
The reactance of the capacitor (C2) works with the 4.7k resistor to form a high pass filter with a corner frequency of 720 Hz. This means that the response of the low E string of a guitar is down over 20db! The intent of using these values to create such an extreme rolloff of low frequencies was to avoid flabby sound from bass clipping and to create a high boost that will cut through better in a band situation. The treble boost is common among the TS series of overdrives, the Boss SD-1, the Son of Screamer from [the AMZ CD-ROM](#) and most other clones of the TS circuit.

The most simple way to flatten out the response is to change the value of the C2 capacitor**. Increasing the capacitance will lower the corner frequency of the filter and thereby increase bass response. The following table demonstrated some selected values and how they lower the cutoff of the filter.

Capacitor	Corner Freq.
0.047uF	720 Hz
0.1uF	339 Hz
0.22uF	154 Hz
0.47uF	72 Hz
1.0uF	34 Hz

A 1.0uF or larger capacitor will essentially extend the response down far enough to cover the full range of the guitar or bass. A small non-polar electrolytic capacitor will suffice though a standard electrolytic may be used with the negative side oriented to the opamp.

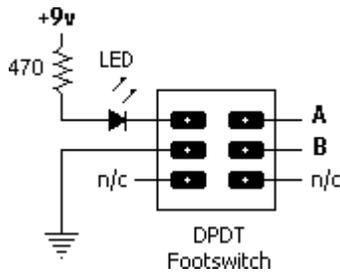
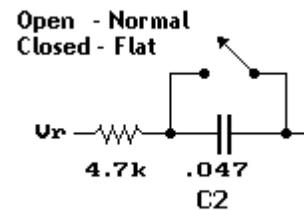
Changing the capacitor to extend the frequency response is a permanent fix that works with any of the TS models, clones or DiY projects that may be found online. An alternate fix may be used that allows switching between the normal response and the full range mod but it requires that the 4.7k resistor has to be connected to Vr (+4.5v) instead of ground. This is shown properly on my schematic and I have traced it on my original TS-9 pc board several times to verify that it actually connects to Vr. It is the same way on the Son of Screamer except the capacitor is closest to ground (not the 4.7k resistor) but that has no effect on the sound or this mod.



The opamp is shown here with two points marked A and B that are used for the second mod. Find the 0.047uF that connects to the opamp (or C2 on the Son of Screamer) and solder a thin wire to each of the solder pads on the capacitor. The other ends of the wires are soldered to the terminals of an SPST switch. When the switch is open, the circuit operates in the normal mode as when unmodified. If the switch is closed, the capacitor is bypassed and the low end frequency

response extends down as far as allowed by the Vr bias network (below even the E string of a bass or your speaker response).

It may be a toggle switch or for more versatility, an SPST footswitch may be used so you do not have to bend down to reach the box to change response. You can even use one of the heavy-duty DPDT footswitches and add an LED indicator to tell you when the flat response is active as shown below.



The indicator switch could be modified to use two LEDs or a bicolor by adding the second connection to the open lug on the left side of the switch. Be sure to limit current through the second LED as needed (though there is a simple way to do it with just the one existing resistor).

This modification is simple and a worthwhile addition to any TS clone. Try it out and see which of the tonal responses work best with your equipment.

Note: The capacitor and resistor coming from the inverting input of the opamp must be connected to Vr (+4.5v) and not to ground for the switch mod to be implemented - you did listen to me on this, didn't you? If they are connected to ground, bypassing the C2

capacitor will upset the dc bias on the opamp and make it function improperly (and sound bad too).

**The capacitor is designated C2 because that is the label that is used on the Son of Screamer schematic.

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