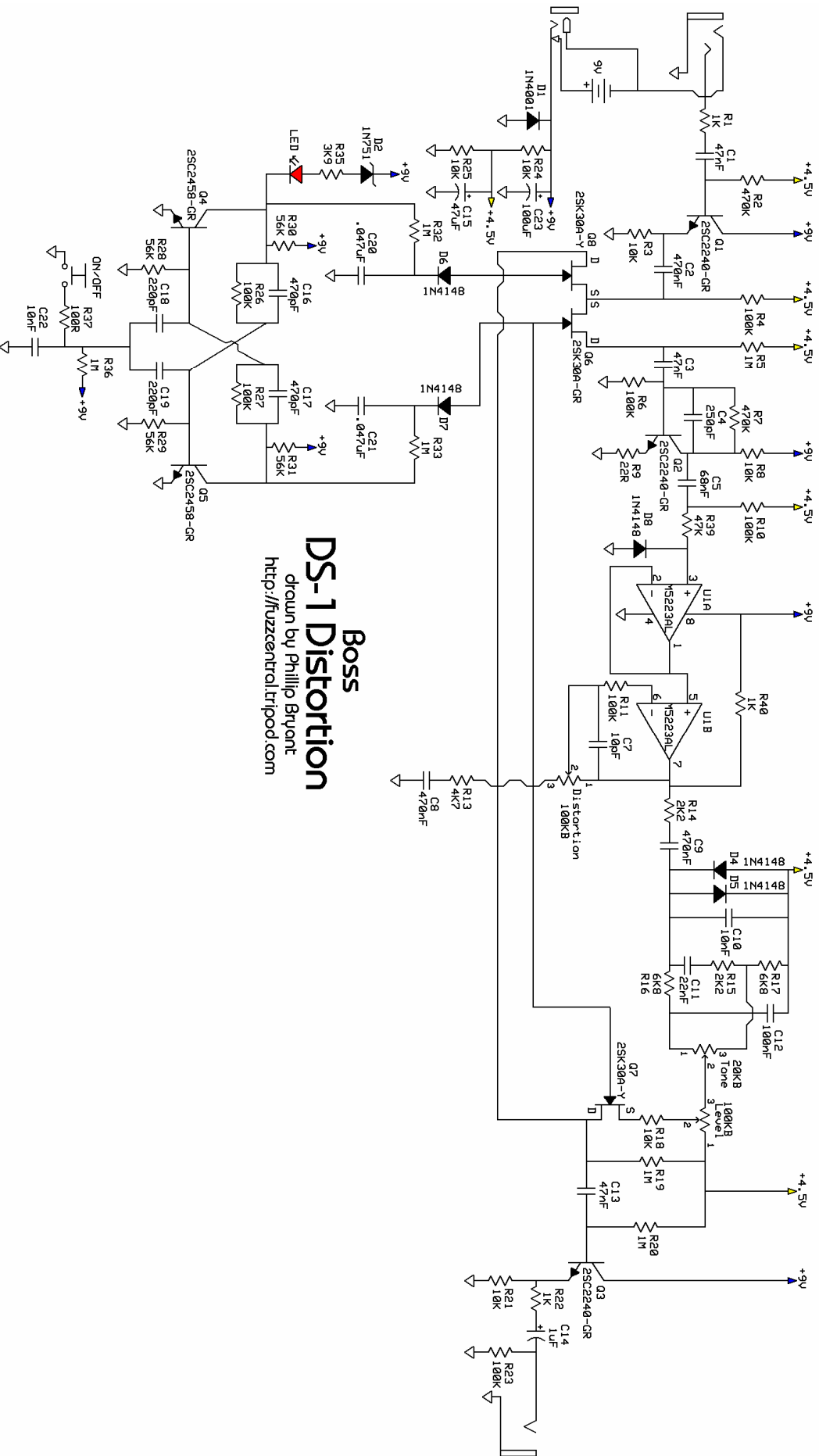


## Boss DS-1

The Boss DS-1 is probably one of the most famous distortion pedals in guitarland...and there's a good reason for it too. The DS-1 is a decent sounding pedal, and it's so cheap that it's almost a crime for a guitarist to not have one. You can pick these thing up from Musicians Friend when they're on sale for \$39.99, and for about \$49.99 when they're priced at their regular price. Even guitar greats like Steve Vai uses the DS-1, except his have been modified by Robert Keeley to fill out the sound and to help enhance the fidelity. Here's the description of the DS-1 from the Boss website:

*"A wildly popular stomp box that delivers hard-edged distortion tones for guitar and keyboard, while keeping the quality of your sound intact, even at low levels. Faithfully reproduces all the subtle nuances of your playing dynamics—from soft and quiet to 'get me outta here' loud."*

Okay, so the Boss description of the sound quality isn't quite as accurate as it is for the SD-1. The DS-1 tends to be a bit on the "shrill" side of the sound spectrum, even with the tone control turned to 12 o'clock. I had to turn the tone to about 10 o'clock to work out some of the harsh treble. With the distortion control turned all the way clockwise, things get VERY distorted, and it also cleans up really well when the distortion is backed off. It's especially nice that you can dial in a very subtle amount of dirt to your sound in lesser degrees of the distortion pot's rotation. Sweet! Overall, it's a very 80s sounding distortion pedal, but it does make a good starting point for a great sounding distortion! Here is a schematic of the DS-1, unmodified from its out-of-the-box condition. It also has the corresponding part numbers that appear on the Boss circuit board...you can thank me later ;)

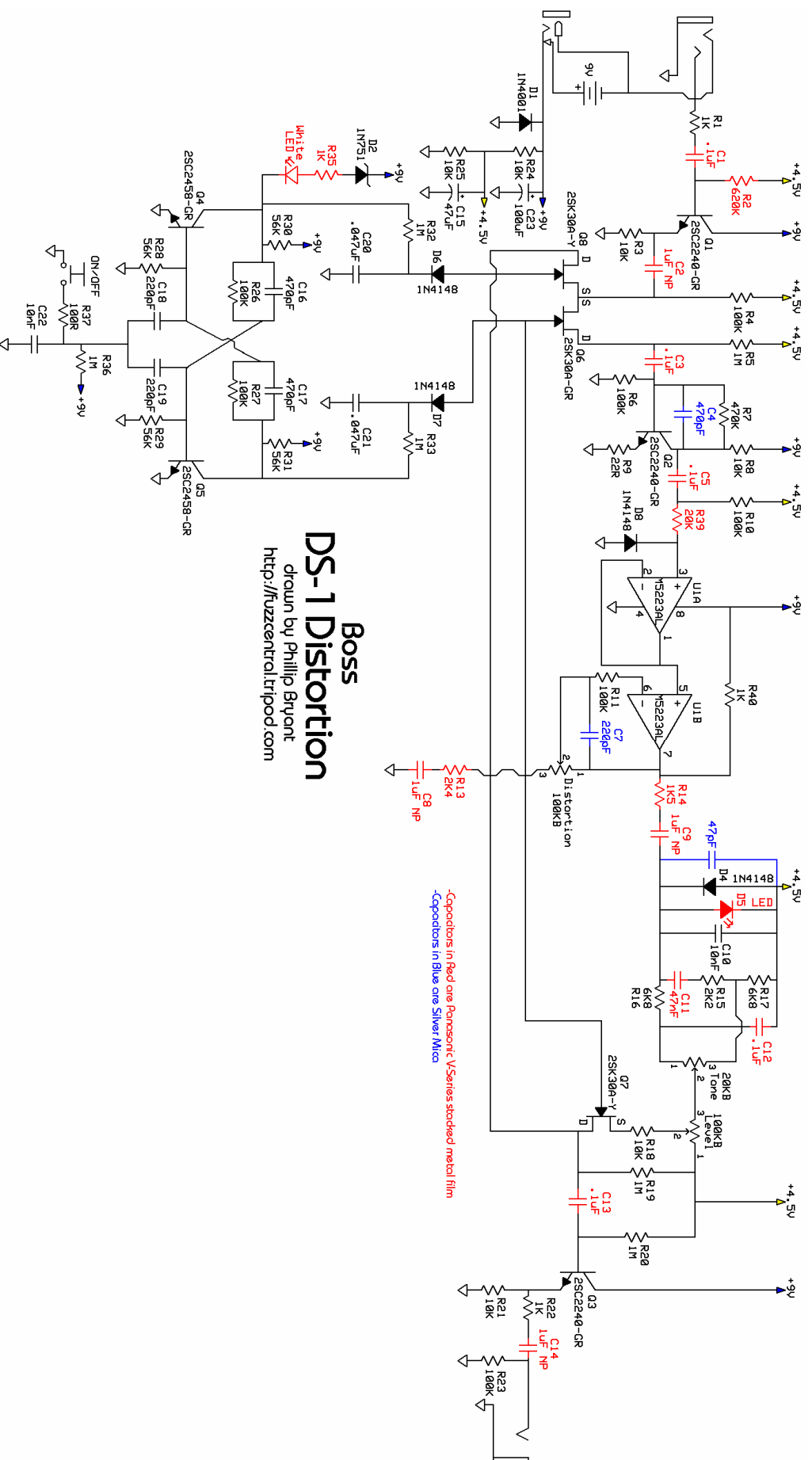


**Boss DS-1 Distortion**  
 drawn by Phillip Bryant  
<http://fuzzcentral.tripod.com>

## Modifications

**I only recommend these modifications for the newest version of the Boss DS-1,** which comes with the Mitsubishi M5223AL IC. There are other versions that use different ICs, so they have a few different components. Performing these modifications on an earlier version may not work well. Before beginning modifications, make sure that yours has the M5223AL and the components on the board match the values of the components on the schematic of the unmodified pedal.

Here are the mods that I performed on my DS-1s. These mods are once again based on the Keeley "Seeing Eye" and "Ultra" mods. I made a hybrid version of these two mods by using all of the capacitor and resistor changes as the Ultra (plus an extra resistor change that he doesn't make...R2), but I left the clipping section mods at the "Seeing Eye" level, replacing only one of the diodes in the clipping section, D5, with a 3mm red LED (the former on/off indicator). Here is a schematic that has the changed components highlighted in red and blue. The capacitors in red are Panasonic V-Series Stacked Metal film, and the capacitors in blue are Silver Mica. The 470pF and 220pF Silver Mica capacitors are fairly large, so they make take some squeezing to get the on the board. Below is a table that lists all the changes made to the Boss DS-1 circuit.



# Boss DS-1 Distortion

drawn by Phillip Bruant  
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-Capitors in Red are Panasonic V-Series stocked metal film  
 -Capitors in Blue are Silver Mica

Component Number	Original Part	New Part	Digikey Part Number
C1	0.047 $\mu$ F	0.1 $\mu$ F Metal Film	P4525-ND
C2	0.47 $\mu$ F Electro.	1 $\mu$ F NP* Metal Film	P4675-ND
C3	0.047 $\mu$ F	0.1 $\mu$ F Metal Film	P4525-ND
C4	250pF Ceramic Disc	470pF Silver Mica	338-1043-ND
C5	0.068 $\mu$ F	0.1 $\mu$ F Metal Film	P4525-ND
C7	10pF Ceramic Disc	220pF Silver Mica	338-1046-ND
C8	0.47 $\mu$ F Electro.	1 $\mu$ F NP* Metal Film	P4675-ND
C9	0.47 $\mu$ F NP* Electro.	1 $\mu$ F NP* Metal Film	P4675-ND
C11	0.022 $\mu$ F	0.047 $\mu$ F Metal Film	P4521-ND
C12	0.1 $\mu$ F	0.1 $\mu$ F Metal Film	P4525-ND
C13	0.047 $\mu$ F	0.1 $\mu$ F Metal Film	P4525-ND
C14	1 $\mu$ F Electro.	1 $\mu$ F NP* Metal Film	P4675-ND
D5	1N4148 Silicon	3mm Red LED	--
LED	3mm Red LED	3mm White Super Bright LED	67-1606-ND
R2	470K, 5% Carbon Film	620K, 1% Metal Film	P620KCACT-ND
R13	4K7, 5% Carbon Film	2K4, 1% Metal Film	P2.40KCACT-ND
R14	2K4, 5% Carbon Film	1K5, 1% Metal Film	P1.50KCACT-ND
R35	3K9, 5% Carbon Film	1K, 1% Metal Film	P1.00KCACT-ND
R39	47K, 5% Carbon Film	20K, 1% Metal Film	P20.0KCACT-ND
--	--	47pF Silver Mica	338-1084-ND
* NP = Non Polar			

These are some really great modifications to make to the circuit. They add a whole lot of fidelity to the overall sound of the DS-1, and they also increase the bass response and distortion range of the pedal. You'll notice that the last item on the table has no part number or original part value. This 47pF Silver Mica capacitor is soldered to the solder side of the circuit board across the clipping diodes (D4 & D5). It's put there to help smooth out the distortion a bit to take some of the hard edge off, but it's very subtle. You can use any value from 47pF - 100pF, but I used 47pF since I had one in my parts bin. The one extra mod that I've added on top of Keeley's mods, replacing 470K R2 with a 620K resistor, helps to increase the input impedance of the circuit, which helps add some more clarity when the pedal is on or off.

Here's a picture of the circuit board of one of my DS-1s, post modification:

