Vulcan Drive *(version 1.0)*

Sandbox Distortion

The Vulcan Drive originally started out as a Ross Distortion project. However, this circuit is so similar to the DOD250 and the MXR Distortion Plus I have made the changes to the PCB and bill of materials below to allow for these circuits to be built around this PCB. Adding a few SIL sockets you could create a distortion that is a combination of all 3 and assist you in learning what effect these component changes have in this simple and common op-amp circuit.

1590a

The board spacing will fit a 1590a enclosure. You can mount 9mm pots directly to the board.

Bill of Materials

Ross Distortion Variant			
Resistors		**Capacitors**	
R1	4.7k	**C1**	1nf
R2	10k	**C2**	10nf
R3	1 Meg	**C3**	47nf
R4	1 Meg	**C4**	10nf
R5	1 Meg	**C5**	1uf
R6	1 Meg	**C6**	1uf
R7	10k	**C7**	1nf
R8	1 Meg	**C8**	Empty
Diode		**IC**	
D1	1n4001	**IC1**	RC4558
D2	1n270 (any ge diode)		
D3	1n270 (any ge diode)	**Potentiometer**	
D4	Jumper	**Volume**	50ka
		Drive	500kc

Distortion Plus Variant			
Resistors		**Capacitors**	
R1	4.7k	**C1**	1nf
R2	10k	**C2**	10nf
R3	1 Meg	**C3**	47nf
R4	1 Meg	**C4**	10nf
R5	1 Meg	**C5**	1uf
R6	1 Meg	**C6**	1uf
R7	10k	**C7**	1nf
R8	2.2 Meg	**C8**	10pf
Diode		**IC**	
D1	1n4001	**IC1**	RC4558
D2	1n270 (any ge diode)		
D3	1n270 (any ge diode)	**Potentiometer**	
D4	1n270 (any ge diode)	**Volume**	10ka
		Drive	500kc

DOD 250 Overdrive Variant			
Resistors		**Capacitors**	
R1	4.7k	**C1**	Empty
R2	10k	**C2**	10nf
R3	1 Meg	**C3**	4.7nf
R4	470k	**C4**	10nf
R5	22k	**C5**	10uf
R6	22k	**C6**	4.7uf
R7	10k	**C7**	1nf
R8	2.2 Meg	**C8**	22pf
Diode		**IC**	
D1	1n4001	**IC1**	RC4558
D2	1n4148(any si diode)		
D3	1n4148(any si diode)	**Potentiometer**	
D4	1n4148(any si diode)	**Volume**	100k Log
		Gain	500k Log

Modification Ideas & Circuit Notes

Ross Distortion / Distortion Plus "2 in 1"

Compare the components in the bill of materials for these 2 circuits and you will find that they are almost identical. In fact the pull down resistor and volume control will have very little effect on the output of this circuit, these 2 component differences can be ignored. This leaves only 2 components, the ceramic capacitor, and extra ge diode on the distortion plus. These could be added to switches for an 'on the fly' 2 in 1 circuit selector. You will experience a volume drop with the distortion plus as you add the extra ge diode to the circuit (essentially, more output signal to ground).

Diodes

D3 and D4 are connected in series. If you are only going to use one diode in this position a jumper is required for the empty slot. Experiment with the diodes in these slots and the quantity. The capacitor C7 drops highs to ground. Experiment with different values for this capacitor or swap it out for another diode slot for additional clipping.

Potentiometers

The "original" potentiometer values and taper used in these circuits are inconsistent. If any of the above values are hard to find, you should be fine using a 500k or 1M linear for gain and 100k log for volume in all 3 circuits.

Gain Stage Output Cap

Capacitor C6 was originally a tantalum which is a polarized capacitor. As this capacitor is in the signal path it can be replaced with a film cap for the Distortion Plus and the Ross Distortion.

Dual Op-Amp

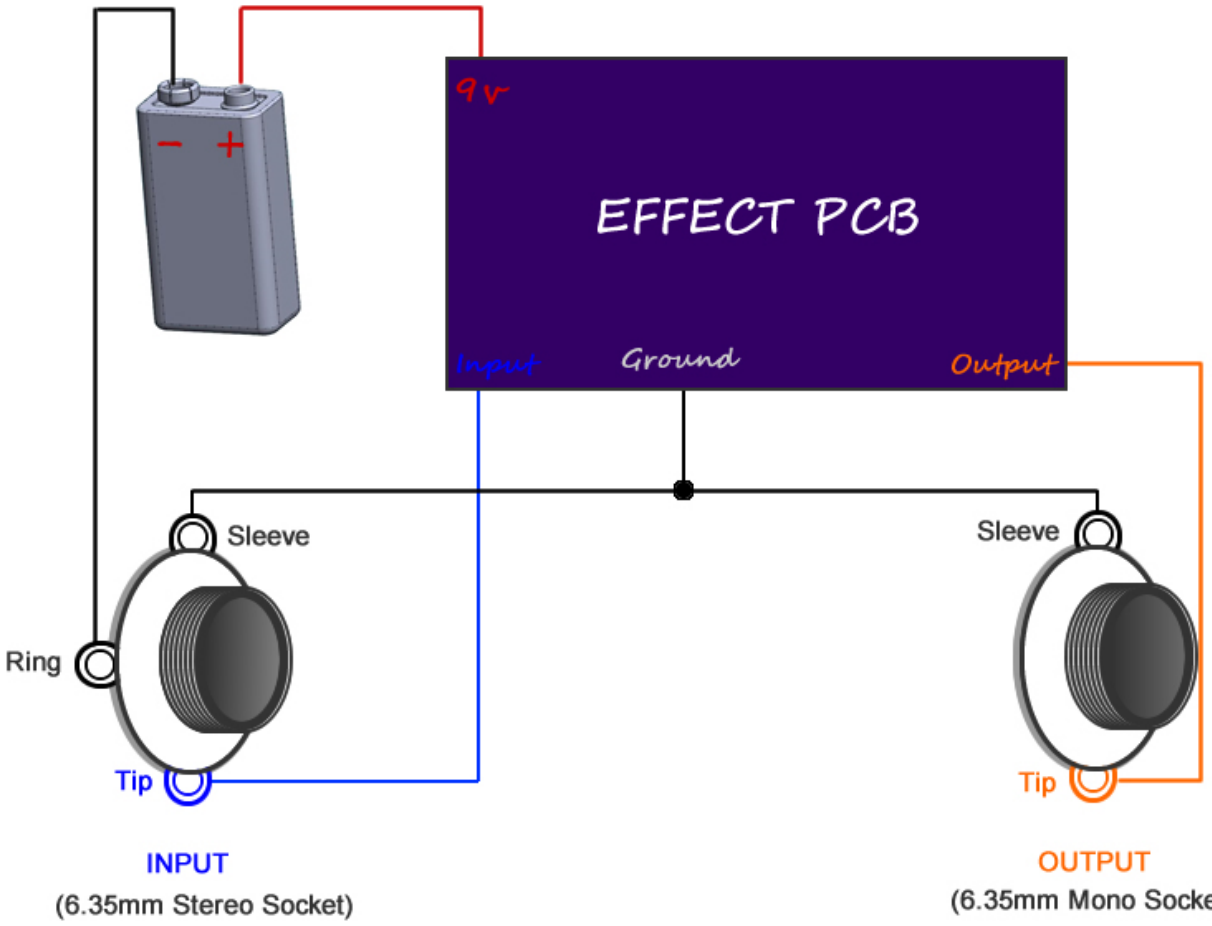
This pcb layout is essentially true to the original (including the gain pot). However the Ross Distortion uses an RC4558 (dual op-amp) whereas the Distortion Plus and DOD250 use the single op-amp LM741. To 'standardize' I have opted to use a dual op-amp pinout for this layout and terminating the 2nd, unused op-amp. There are a slew of dual op-amps with the same pinout as the RC4558 that you can use in its place so don't forget to socket the IC! Changing the IC will have a subtle effect on the resulting tone of the circuit.

The following are a handful of possible substitutes for the RC4558:

RC4559	NE5532	LM833	LM1458
TL072	LF353	NTE928M	OP275
OPA2604	OPA2111	OPA2132	OPA2134

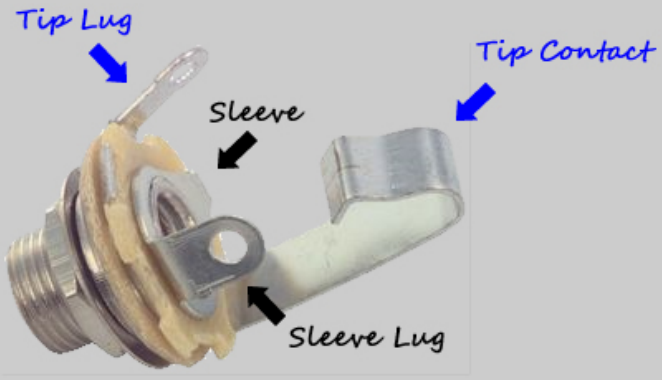
Testing Your Effect

Using aligator clips or soldering directly, wire your effect as in the following...



Input and Output Sockets

Pay close attention to the lugs of your sockets. Look at them side on so that you can distinguish the sockets individual layers. For instance the tip lug is connected to tip contact. The stereo jack looks the same as the socket below except it has an extra lug and contact for "Ring".



Boxing up your effect

Watch my offboard wiring tutorial for information on wiring this effect up inside an enclosure (with LED, stompswitch, etc)

http://www.youtube.com/watch?v=z6fpwU8RY_0