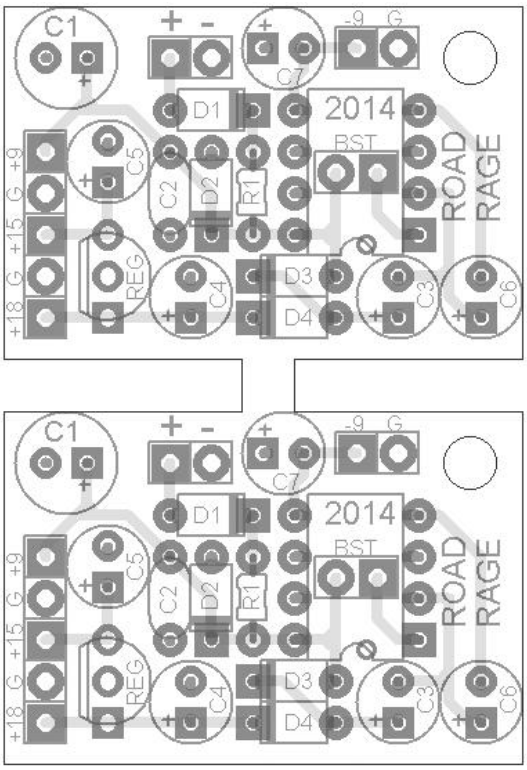
ROAD RAGE

2014 edition

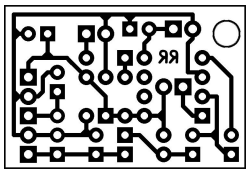
FT TYPE: Utility

Previous version of the Road Rage:
http://www.madbeanpedals.com/projects/RoadRage/docs/RoadRage2013.zip

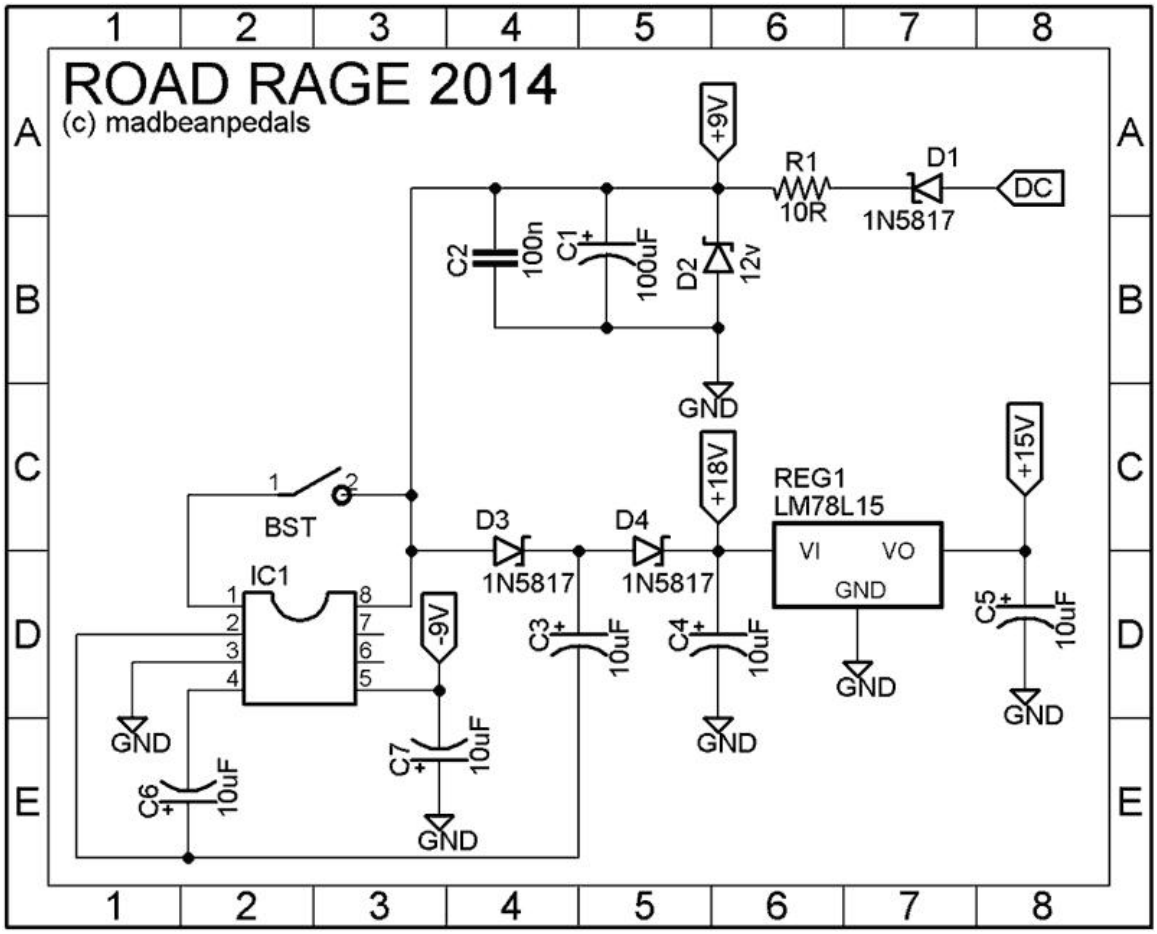
1.25” W x 0.85”H (per PCB)



Etching Artwork



B.O.M.				
	Resistor	QTY	Rating	Type
R1	10R	1	1/4W	Metal Film
	Caps			
C1	100uF	1	25v or more	Electrolytic
C2	100n	1	25v or more	Film/MLCC
C3	10uF	5	25v or more	Electrolytic
C4	10uF			
C5	10uF			
C6	10uF			
C7	10uF			
	Diodes			
D1	1N5817	3		
D2	12v Zener	1		
D3	1N5817			
D4	1N5817			
	IC			
IC1	Charge Pump	1	see notes	
	Regulator			
REG1	LM78L15	1		T0-92



Overview:

The Road Rage is a utility PCB with multiple functions:

1- Voltage Inverter: Allows you to flip a +9v supply to a -9v supply. This is useful for positive ground effects such as PNP fuzzes. Using the Road Rage will allow you to use your standard negative tip power supply or wall wart instead of a special power supply or battery.
2- Charge Pump: Steps up the supply voltage for effects that require something more than the standard 9v operation. It has one output for 18v (unregulated) and one for 15v (regulated). Both the voltage inverter and charge pump sections of the PCB can be used simultaneously giving you a -9v to +18v/15v option.
3- There is also one additional output marked 9v. This output is filtered via C1 and C2 and can be used to daisy chain the DC supply to another effect or an LED.
4- The circuit board has two complete boards connected by a small bridge. Simply use a small knife or wire cutter to score and break the PCB into two halves. There are no copper planes connecting the two halves, so there is no risk of damaging them when you break them apart.
5- The Road Rage PCB allows for different types of charge pumps. Some charge pumps require connecting pins 1 and 8 together for best operation. Accordingly, there is a pair of pads labeled "BST" under IC1 which should be connected in those cases.

IMPORTANT: You should connect the wires from your DC jack to the "+" and "-" pads at the top, NOT the "+9" pad on the left side. The +9v pad on the left side is 9v OUTPUT, not input.

Charge Pumps:

Type	Suffix	Connect BST Pads?	Max Voltage	Max Current
LT1054	-	**NO**	14v	100mA
ICL7660	SCPA	**YES**	12v	45mA
MAX1044	CPA	**YES**	10v	20mA
TC1044	SCPA	**YES**	12v	20mA

Type: These are the four most common charge pumps used in guitar effects. However, you should be able to use any pin compatible charge pump so long as it will accept a 9v input.

Suffix: When ordering parts, make sure you get the ones with these exact suffix. The ICL and TC brands have both "CPA" and "SCPA" types. You need the "SCPA" type. The MAX one only has the CPA, but that is the correct one to use for the Road Rage. The LT1054 does not have the CPA or SCPA category.

Connect BST Pads? The two pads labeled "BST" on the PCB must be connected according to the list above. Failure to connect the BST pads correctly will result in an audible whine in your audio path. The LT1054 is the only one that does NOT need the pads connected.

Max Voltage: This is the maximum input voltage the charge pump can accept. When using the MAX1044 IC, it would be better to use a 9.1V Zener for D2 rather than a 12v one. Not totally critical, but there is always a chance that plugging a 12v supply into a MAX1044 would fry the chip without the 9.1v Zener present in the circuit. Note that when you use higher input voltages, your outputs will scale accordingly. So, 12v in means 24v out instead of 18v. The 15v output will still be 15v since that is determined by the regulator.

Max Current: This is very important. This is the maximum amount of current the charge pump can supply. So, why not use the LT1054 for everything since it has the most current output? Because it is

more expensive. If you are using the Road Rage to run a dirt pedal at 18v, one of the other charge pumps will suffice 99% of the time since dirt pedals tend to draw low current. However, some effects (like an analog delay or Univibe) will have higher current consumption. In those cases, the LT1054 is necessary.

How to use the Road Rage:

I need -9v output to power a fuzz circuit
Solder D1, R1, D2, C1, C2, C6 and C7 to the PCB. Omit D3, C3, D4, C4, REG1 and C5. Connect your DC jack to the "+/-" pins and take your output from the -9/G pins (-9v and ground). BTW: ground is ground. No matter if you are using a positive or negative ground circuit always connect ground from the Road Rage to the ground on your circuit. In the case of a fuzz, we just connect -9 to the -9v supply pad on the fuzz circuit board. It is that simple.

I need +18v output for my overdrive pedal (or whatever)
Solder everything except C7, REG1 and C5 to the Road Rage PCB. Connect your DC jack to the +/- pads and take the output from +18/G.

I need +15v output for my overdrive pedals (or whatever)
Solder everything except C7. Connect your DC jack to the "+/-" pads and take the output from +15/G.

I need all the voltage outputs to use a power supply for my breadboard or really weird effect pedal
Solder everything. Connect all the outputs.

Lastly, there is a small hole in the upper right corner of the PCB. This is to allow for a small mounting screw if that is your thing. The hole should be large enough to accommodate the mounting screws available at smallbear or similar suppliers.

TC1044SCPA: http://www.mouser.com/ProductDetail/Microchip-Technology/TC1044SCPA/?qs=cC9UkDmCsZtU9kTPnqaTBA%3D%3D

MAX1044CPA: http://www.mouser.com/ProductDetail/Maxim-Integrated/MAX1044CPA+/?qs=sGAEpiMZZMtitjHzVIkrqUa%2f3DrsydEwOqnTvjSnIoI%3d

ICL7660SPCA: http://www.mouser.com/ProductDetail/Intersil/ICL7660SCPA/?qs=sGAEpiMZZMtitjHzVIkrqV%252bHSB1sTPSiEqkubgSAyfE%3d

LT1054: http://www.mouser.com/ProductDetail/Texas-Instruments/LT1054CP/?qs=sGAEpiMZZMtYFXwiBRPs0842JnZv3v5p