

ROAD RAGE

2015 edition

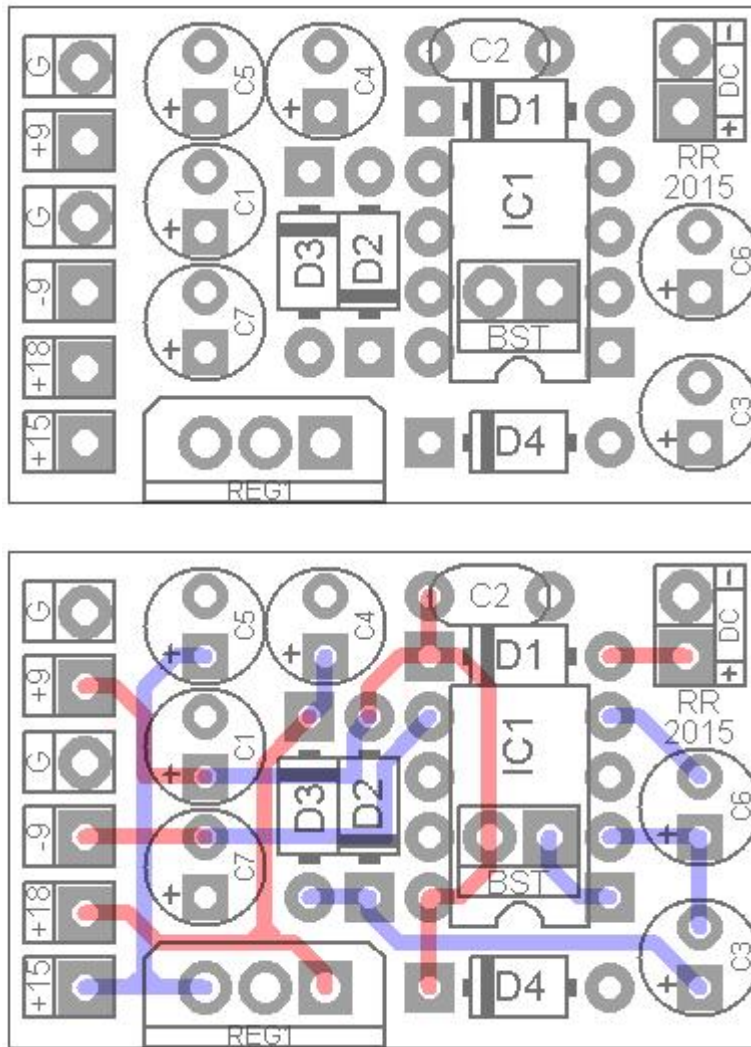
FT TYPE: Utility

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Previous version of the Road Rage:

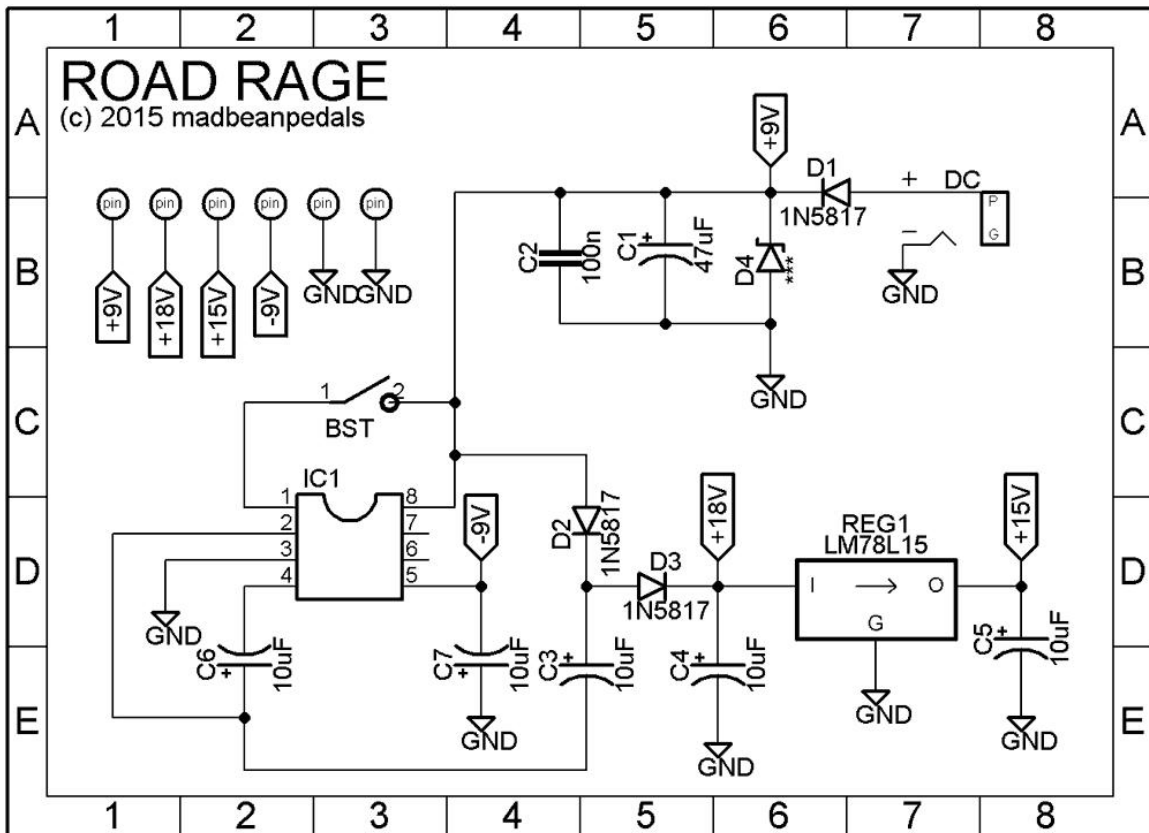
<http://www.madbeanpedals.com/projects/RoadRage/docs/RoadRage.zip>

1.25" W x 0.825"H



2015 change-log: Removed 10R current limiting resistor. Made space for TO-220 sized regulator.

Terms of Use: You are free to use purchased **Road Rage** circuit boards for both DIY and small commercial operations. You may not offer Road Rage boards for resale or as part of a "kit" in a commercial fashion. Peer to peer re-sale is, of course, okay.



Part	Value	Part	Qty	Rating
C1	47uF	47uF	1	25v min
C2	100n	100n	1	25v min
C3 - C7	10uF	10uF	4	25v min
D1 - D3	1N5817	1N5817	3	
D4	Zener	9.1/12/15v Zener	1	1W
IC1	Charge Pump	IC1	*see notes	
REG1	Regulator	REG1	15v	To-92 or To-220

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 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 pads marked “DC” on the PCB, 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 Input Voltage	Max Current	Zener Diode (D4)
LT1054	-	NO	16v	100mA	15v
ICL7660	SCPA	YES	12v	45mA	12v
MAX1044	CPA	YES	10v	20mA	9.1v
TC1044	SCPA	YES	12v	20mA	12v

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.

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. Note that when you use higher input voltages, your outputs will scale accordingly; a 12v in means 24v out instead of 18v. The 15v output on the RR PCB 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.

Zener Diode: This diode will protect your IC from an over-voltage supply. This is optional (the Road Rage will work without it) but if you need to protect the circuit from using a wrong power supply, then use this list to determine what value Zener to use.

Regulators:

The Road Rage is laid out for a TO-220 style regulator. However, you can use the TO-92 style (these come in the familiar transistor packaging) instead. If using the TO-92 style, flip the transistor 180° from the drawing on the RR PCB (since it has the opposite pinout).

220 regulator advantages: Higher current output and efficiency. Better heat dissipation.

92 regulator advantages: Smaller package (less than half of the 220).

The TO-92 will probably suffice in most cases as it is rated at 100mA output (which coincides with the highest current output available from the charge pump list on the previous page). However, the

efficiency and heat dissipation of the TO-220 style may be more appropriate in cases of circuits with higher current draws.

How to use the Road Rage:

I need -9v output to power a fuzz circuit

Solder D1, D4, C1, C2, C6 and C7 to the PCB. Omit D2, D3, C4, C5, and REG1 . Connect your DC jack to the “DC” pads 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 C6, C7, REG1 and C5 to the Road Rage PCB. Connect your DC jack to the “DC” pads and take the output from +18/G. Jumper the two C7 pads to connect pin5 of IC1 to ground.

I need +15v output for my overdrive pedals (or whatever)

Solder everything except C6 and C7. Connect your DC jack to the “DC” pads and take the output from +15/G. Jumper the two C7 pads to connect pin5 of IC1 to ground.

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.

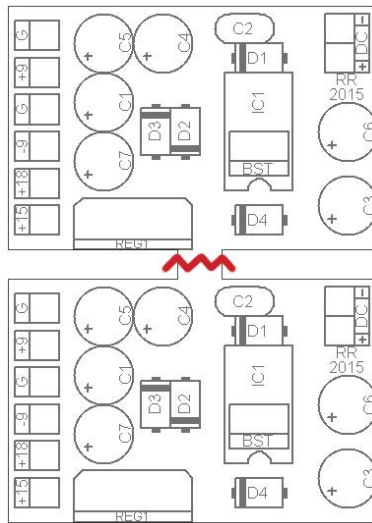
TC1044SCPA: <http://www.mouser.com/ProductDetail/Microchip-Technology/TC1044SCPA/?qs=cC9UkDmCsZtU9kTPnqaTBA%3D%3D>

MAX1044CPA: <http://www.mouser.com/ProductDetail/Maxim-Integrated/MAX1044CPA+/?qs=sGAEpiMZZMtijtHzVlkrqUa%2f3DrSydEwOqnTvjSnlol%3d>

ICL7660SPCA: <http://www.mouser.com/ProductDetail/Intersil/ICL7660SPCA/?qs=sGAEpiMZZMtijtHzVlkrqV%252bHSB1sTPSiEqkubgSAyfE%3d>

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

Cut at the bridge between the two PCBs to separate.



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.
