

Several years ago one car manufacturer added a rapid flasher to their brake lights. Wow! Those things really got your attention when the driver stepped on the brakes. But, if you ever had to stop behind one at a traffic light at night, you were likely to go into seizures from the strobing, rear lights covering your field of vision. I think they dumped the idea after a couple of years (Tony's note: same year), because I haven't seen them for a long time. As I recall, it was about the time 'road rage' started.

The solution for me, was a circuit that would flash the brake light for a short period when I press and hold the brakes. After several flashes (adjustable up to 8), the light would stay on continuously, until I released the brakes. The short burst of flashes certainly gets the other drivers' attention, especially for motorcycle I feel much more safe. The short duration of the flashing solved the problem of irritating the people behind you. From my observations in my mirrors, this circuit does exactly what I set out to accomplish: it gets the attention from those driving behind you.

Check State, Provincial, and Federal laws before implementing this circuit. In the USA, the flasher was approved for use in 47 States (2000). In Canada the flasher and headlight modulators were approved in 2002 for use in all provinces.

Parts List:

Semiconductors:

- IC1 = CD4093UBE, CMOS (4093B)
- Q1 = 2N2222 (RSU-11328499)
- Q2 = TIP117 (RSU-12163846)

Resistors:

All resistors are 1/4W, 5%, unless otherwise indicated

- R1,R6 = 50K, trimmer (271-283)
- R2,R5,R7,R9 = 10K (271-1335)
- R3 = 100K (271-1347)
- R4 = 47K (271-1342)
- R8 = 2K7 (RSU-11344942)

Capacitors:

- C1 = 33µF, 25V (RSU-11939048)
- C2 = 3.3µF, 25V (RSU-11295904)

Radio Shack catalog #'s in parentheses ()

If you wish, a construction **KIT** is available, which now includes a PCB! [\[Click Here\]](#)
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The Circuit:

The circuit is built around a Schmitt Trigger Quad Nand IC, forming a half-monostable/astable and a gate. The output is a PNP darlington for high-side switching of the brake light and components were soldered and point-to-point wired on a small, perforated circuit board. The circuit board was mounted in a small piece of heat-shrink. There are two internal trim pots to set the flash rate and flash duration. All components can be purchased through Radio Shack

The schematic shows the circuit for the brake light control. It consists of four sections that are un-powered when the brakes are off. When the brakes are applied, +12VDC (13.8V) is connected to the circuit (point A). The circuit then controls the voltage to the brake light. When the brakes are released, the +12VDC is removed, and the circuit and brake light are no longer powered.

The first section provides a pulse delay to allow the brake light to pulse for only a short period of time. R1, R2, R3, C1, and IC1a form a half-monostable inverter. When the brakes are applied, C1 is charged through R1 and R2. When the voltage across R3 reaches the trigger level of C1 the output at pin 3 goes from +12 volts to zero (point B). Trimpot R1 allows the pulse delay time to be adjusted.

Resistor R3 provides a discharge path for capacitor C1 after the power to the circuit is removed (via the brake switch wire). What this means is that there is no delay for the brake light to come on in between brakes; the flasher works as it should all the time. You can press the brake pedal as fast as you can and as often as you can; the flasher will work every time!

The second section provides the pulse rate for the brake light. R4, R5, R6, C2, IC1c, and IC1d, form a free-running astable oscillator. When the brakes are applied, the circuit is powered and starts oscillation. The pulse rate is determined by the time constant of resistors R5 + R6 and capacitor C2. Trimmer R6 allows the pulse rate to be adjusted to your personal liking. The pulse rate output is taken from pin 11 of IC1d (point C).

The third section combines the pulse rate signal and the pulse delay signal. IC1b 'NANDS' the two signals to produce a series of pulses followed by a constant high level (point D). This will form the On-Off sequence of the brake light.

The fourth section is the driver that controls the output to the brake light bulb. Resistors R7, R8, R9, and transistor Q1 form an inverting amplifier. This drives the pull-up power transistor, Q2. The brake light will light as Q2's collector is pulled to +12VDC (point E). The return path to ground is the chassis or frame. The negative of the battery is connected here also.

Hooking it Up:

Installation all depends on your bike's wiring system but most of them are all the same. Look for the wire coming from your handbrake and footbrake, mostly combined into a single wire underneath your seat. Cut this wire and mount the flasher unit in between these two wires. One end that goes to your brake switches is the +12V and goes to point 'A'. The other end connects to point 'E'. One wire more to connect and that's the negative or ground wire; that one connects simply to your bike's chassis. In short, cut your brakelight wire and connect this circuit in between. And that's all for the 'hookup'. Simple huh?

Oh, one more thing. I did not use a plastic case or whatever to house the flasher in. Since the unit needs to be mounted somewhere underneath the seat, I used heat-shrink with a dab of silicon on both ends. After shrinking I tightened the ends with a needle-nose plier the whole unit is dirt and waterproof. Don't forget to adjust the unit ***first*** before heat-shrinking!

Couple more notes:

This design works much better and more reliable than the 555 timer design of the same, elsewhere listed on the circuits page. The 4093 design does away with the delay. There is no delay for the brake light to come on between quick brake pedal presses and the circuit overall works fantastic and very reliable (in my case over 8 years!).

For the [TIP117 \(Q2\)](#) I used a replacement type made by NTE Electronics, the [NTE262](#). Works great. But a TIP125 or TIP127 will also work.

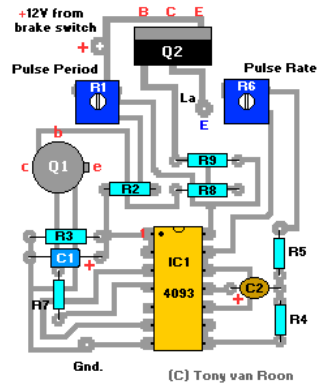
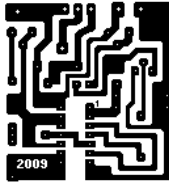
For the capacitors I used Tantalum types because I had them in stock, but they are not as reliable as standard electrolytic caps (for this application that is).

The "Case and PCB" as listed in the Parts List, can be purchased at Radio Shack ("The Source" in Canada). The 'PCB' is a vero-board design with copper pads/tracks on one side. This 'PCB' is made to fit the enclosure. Good enough for this simple schematic diagram.

If you wish to make and etch your own, my pcb and layout are below. This pcb is copyright © Tony van Roon and is only available when ordering the KIT.

01/08/2009

Motorcycle Brake Light Flasher



NOTE: PCB is NOT to scale.

Updates:

6-06-2007 - Readers reported problems that the flasher was not working, or that it didn't oscillate. Initial checks today shows that the lay-out conforms with the printed circuit board, so no errors here. More testing is underway so be patient!

6-14-2007 - No problems found. Circuit, pcb, layout, everything is correct and checks out as it should. It appears, these same readers installed the TIP117 (Q2) backwards, which of course will not work... ;-0

Copyright:

The original schematic design and article called "*Improved Third Brake Light*" belongs to and is Copyright (C) 1996 by Ken Moffett, a Scientific Instrumentation Technician at Macalester College, St. Paul, Minnesota USA.

I found this article in a box with other stuff and circuits I had stored in the attic since my move. I was unable to locate Ken's website and the email address listed in the article came up inactive. Credits and © go to Ken.

I have modified and re-written the article for use with motorcycles. Printed Circuit Board and Layout are copyright © Tony van Roon.

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