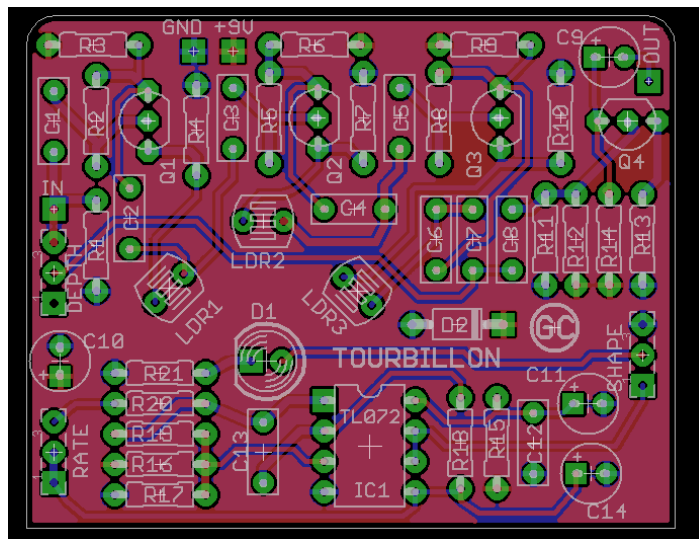




## Tourbillon - Phaser



R1	1M
R2	2M2
R3	10K
R4	10K
R5	2M2
R6	10K
R7	10K
R8	2M2
R9	10K
R10	10K
R11	1M
R12	1M
R13	10K
R14	4K7
R15	100R
R16	150K
R17	150K
R18	150K
R19	150K
R20	1K
R21	100R

C1	100n (box)
C2	22n (box)
C3	100n (box)
C4	22n (box)
C5	100n (box)
C6	22n (box)
C7	100n (box)
C8	100n (box)
C9	10u (electro)
C10	100u (electro)
C11	100u (electro)
C12	100n (box)
C13	10n (box)
C14	22u (electro)

LDR1	See notes
LDR2	See notes
LDR3	See notes
Q1-Q4	2N5089
IC1	TL072
D1	LED 5MM
D2	1N4001
DEPTH	B100K
SHAPE	B10K
RATE	B50K

## Overview

The Tourbillon is a three-stage optical phaser utilizing LDRs as the variable resistive element in each phase stage. The circuit grew from a single-stage vibrato circuit by Tim Escobedo (The Wobbletron) in to a three-stage phaser. The LFO is closely based on the oscillator from the Causality 4 Phaser by frequencycentral.



## Parts Sourcing

The only consideration on this project is the LDR elements. All other parts are common, cheap, and not critical in terms of value or tolerance. The circuit has been tested with LDRs available from Tayda Electronics (P/N: KE-10720), Electronics Goldmine (P/N: G15177 and G15178), Smallbear Electronics (P/N: 8002), and Radio Shack (276-1657).

## Build Notes

The LDRs should all face the LED. Proximity matters in this circuit, and you may find you like the sound with the LDRs as close as possible to the LED, or you may like the tone with them not as close. Experiment!

The "Shape" control is what would normally be called "Depth" on most other circuits, but it controls the tone of the phasing, from traditional phasing to more filter-like vowel sounds. The "Depth" control is what would generally be called "Feedback" on a more traditional phaser, but it behaves more like Depth.

The values of C2 / C4 / C6 can be changed to alter the tone of the phasing. Try swapping out the value of one at a time and listen to hear the change. You may prefer them all to be the same, or you may find that having each at a different value yields a more pleasing sound. It is very subjective.

