555 Timer IC: Basic modes of operation

Monostable (One-Shot) Operation

Temporarily connecting pin 2 to ground (a negative trigger pulse) turns off a transistor that otherwise shorts C1 to ground. The output (pin 3) then goes high as C1 charges through R1. When the charge on C1 is 2/3 of the supply voltage, the 555 discharges C1 to ground. The output then goes low and stays that way until pin 2 is triggered again (shorted to ground.) Timing duration is determined by R1 and C1. With R1 = 100K and C1 = 100uF the pulse duration is approximately a second.

Astable (Oscillator) Operation

Pins 2 and 6 are connected so the circuit will trigger itself each timing cycle, thereby functioning as an oscillator. C1 charges through R1 + R2 but discharges through R2. The duration of the on/high state of the cycle (t1) is a function of R1 + R2 * C1, and the off/low state (t2) is a function of R2 * C1. If R1 + R2 = 100K and C1 is 100uF, the oscillator frequency will be approximately 1 Hz. (cycle/sec.)