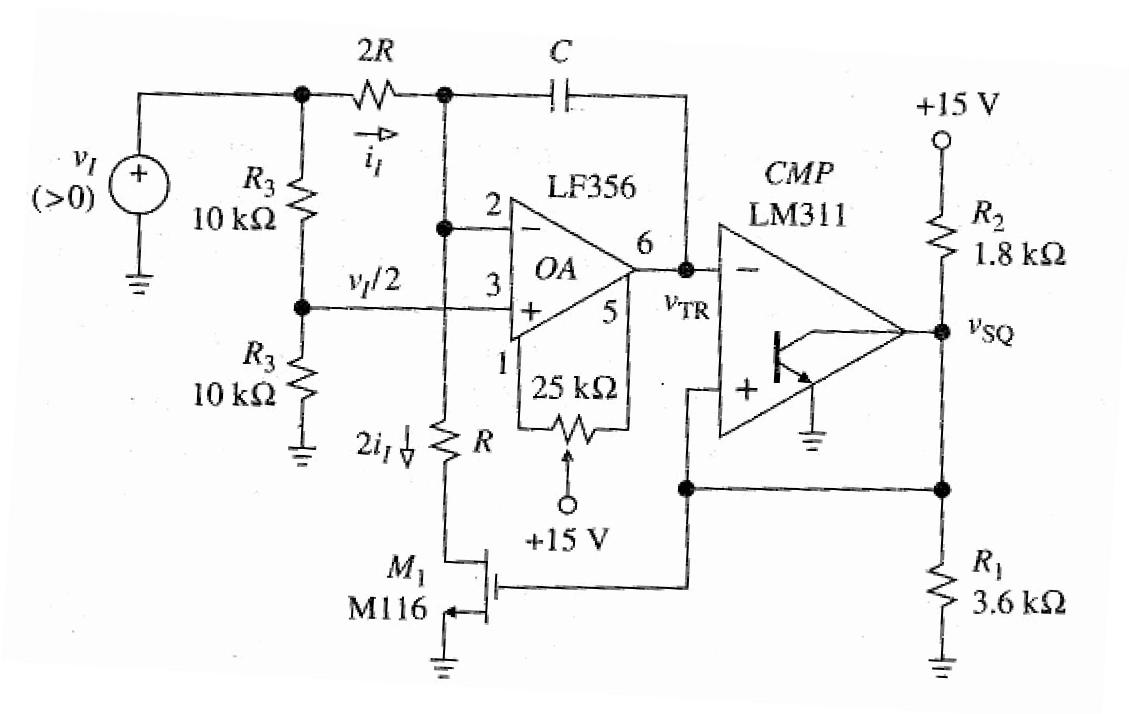
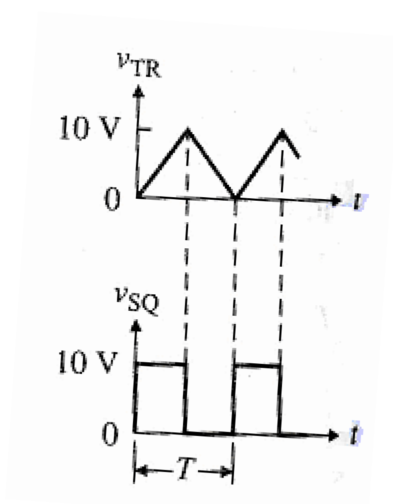
TRIANGULAR WAVE GENERATOR

Circuit:

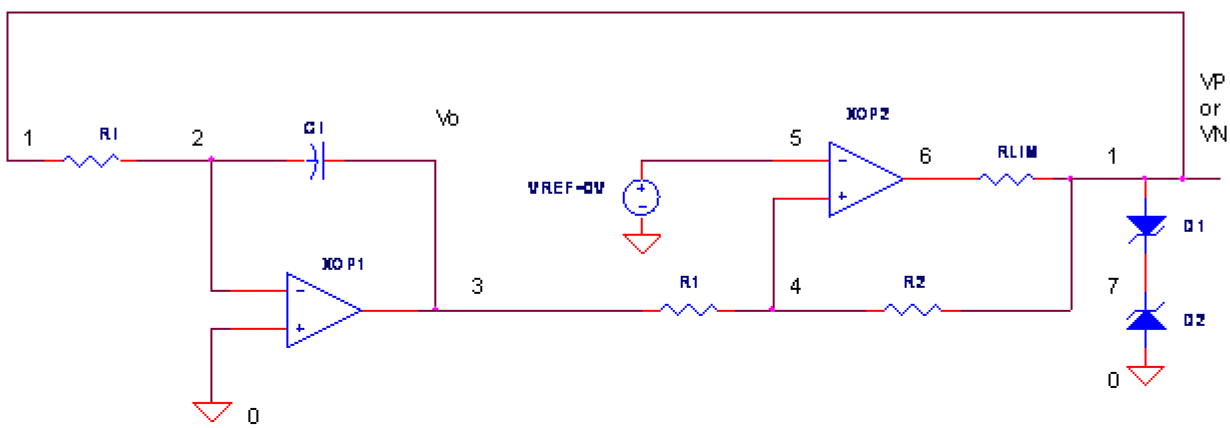


This signal generator gives you two waveforms for the price of one: a triangle-wave and a square-wave. The central component of this circuit is the integrator capacitor CI. Basically we are interested in performing two functions on CI: *charge it, discharge it - repeat indefinitely.* The output waveforms are shown here and it is apparent that a square wave generator followed by an integrator acts as a triangular wave generator.



Suppose our design calls for a +/-10 V triangle wave, cruising along at 10 kHz. This means that Vth+ = +10 V and Vth- = -10 V. Given VP = +5 V, VN = -5 V, let's choose R2 = 10 kΩ and then calculate R1 = 20 kΩ from the equation above. If the value of Capacitor is1 nf, then what value of RI is needed for 10 kHz (T = 100 μs) can be calculated, because Vo needs to swing ΔVo = 10 - (-10) = 20 V in an interval ΔT = 50 μs, we solve the above equation in the Linear Ramps section for RI.

Changing the voltage thresholds also changes the time required to reach the thresholds. Also, make sure Vth+ and Vth- are not outside the +/-15V limits of the op amp model. And don't forget the option of changing the reverse voltage of the zener diode via the BV parameter. Just remember the charging currents and thresholds will change too.



You may have noticed that the triangle peaks and period may not accurately meet our +/-10V swing at 100 us. The main reason is that our current source and thresholds are derived from zener diodes - not exactly the most accurate reference. Some designs use improved means for deriving and switching the current sources that charge CI.