Charge Integrator

$$V_{OUT} = \frac{1}{RC} \int V_{IN}\, dt$$

$$i_1 = \frac{V_{IN}}{R}$$

$$i_2 = C\frac{dVc}{dt} = C\frac{dV_{OUT}}{dt} = i_1$$

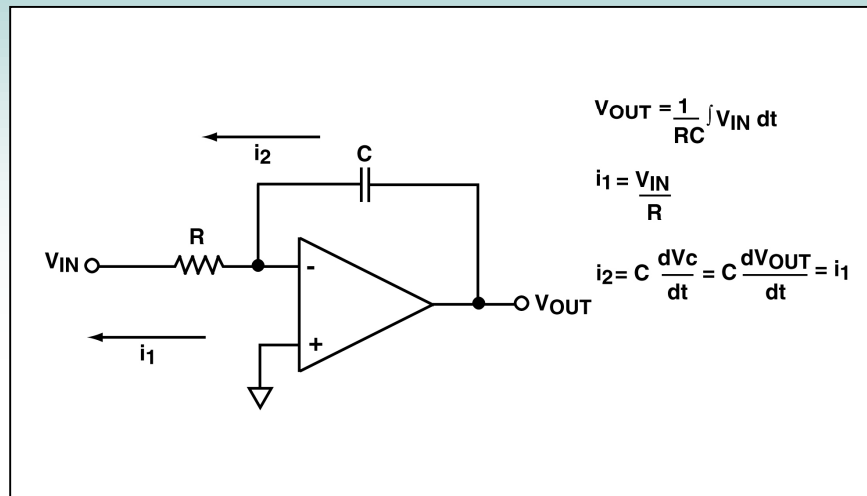### Description

This circuit is a basic integrator circuit. The integration current I_1 is produced by input V_{IN} and is directly proportional to V_{IN} (see the equations given in the figure). The feedback integration capacitor C is charged with this integration current, assuming there is no loss of charge at the negative input terminal of the integrator amplifier. The time required in charging the integrating capacitor depends directly on the magnitude of V_{IN} and is proportional to the product of resistor value R and capacitor value C. Note that this integrator circuit may require additional circuitry to either reset the output voltage or limit the output to a certain range to prevent it from eventually becoming saturated at one of the supply rails. Selection of the operational amplifier requires a) extremely low input leakage current b) low input offset voltage c) sufficient slew rate and output current to be able to charge the capacitor.

Recommended Components

ALD1706, ALD1701, ALD1702, ALD1704, ALD2701, ALD2702, ALD2704, ALD2706, ALD2711
Precision versions: ALD1721, ALD1722, ALD1724, ALD1726, ALD2711A, ALD2721

Other Related Circuit Ideas

Schematic no. int_42005.0 Precision Charge Integrator
Schematic no. int_42002.0 Differential Integrator with Frequency Controlled Gain