

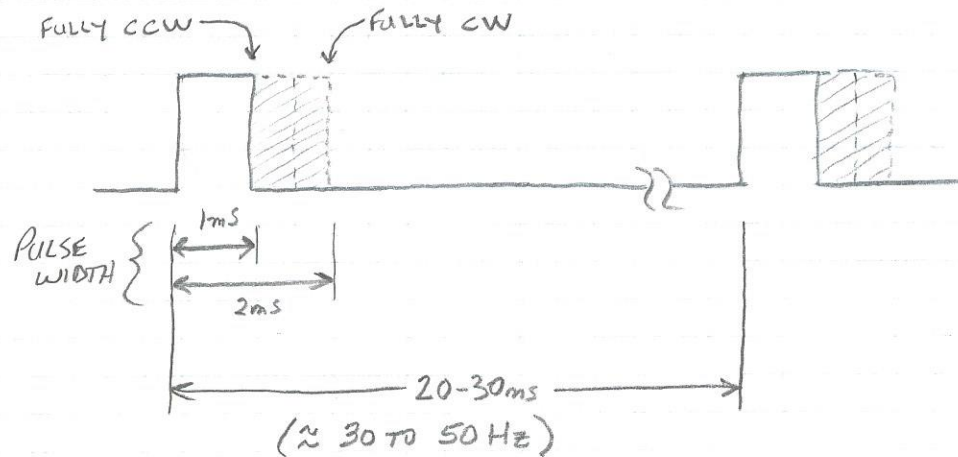
CIRCUIT FUN: ANALOG VOLTAGE CONTROL OF AN RC SERVO

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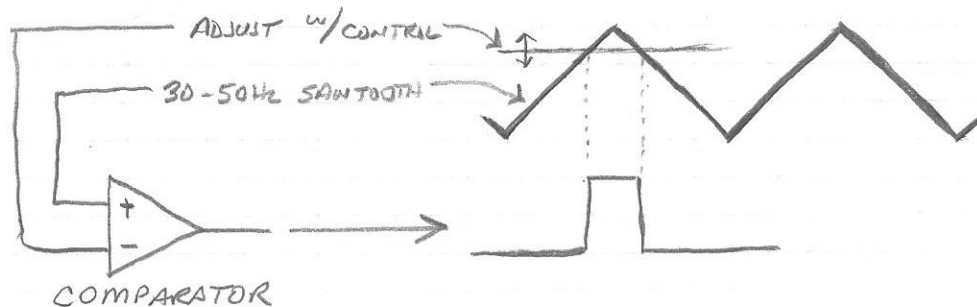
GOAL: CONTROL THE POSITION OF A TYPICAL RC SERVO WITH AN ANALOG VOLTAGE (0 TO 5V)

RC SERVO CHARACTERISTICS

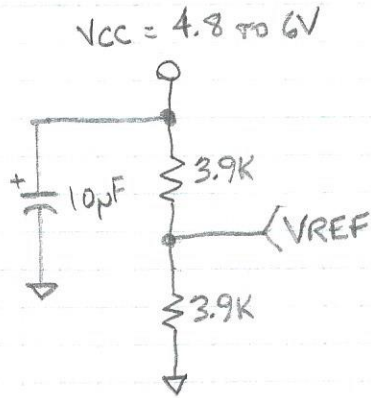
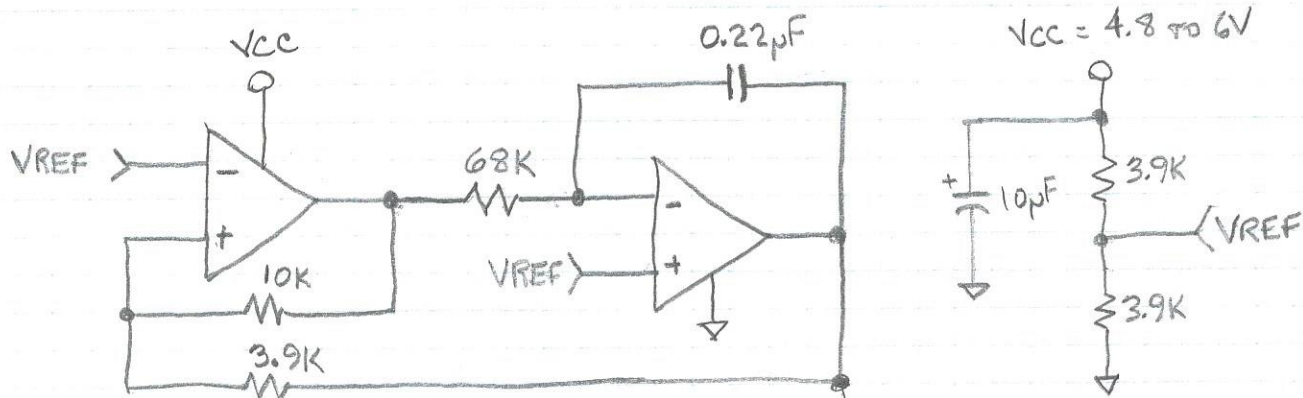
- SUPPLY VOLTAGE 4.8V TO 6V TYPICALLY
- POSITION DETERMINED BY PULSE WIDTH OF "SIGNAL" INPUT



CIRCUIT APPROACH

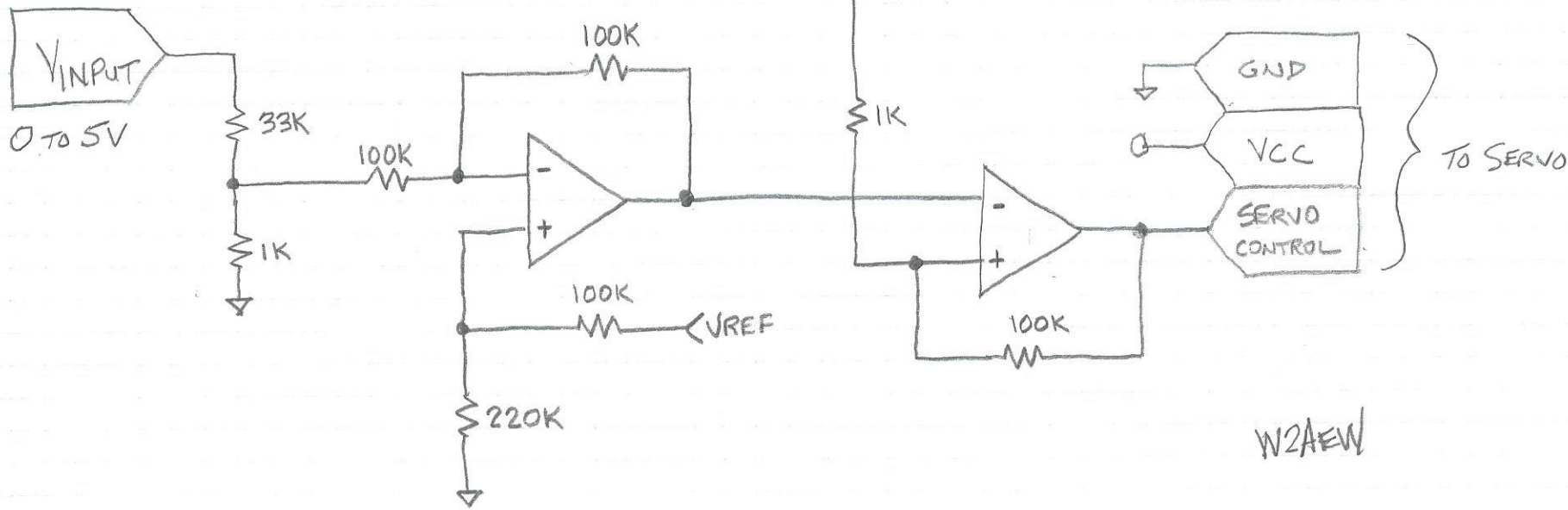


ANALOG VOLTAGE CONTROL OF A RC SERVO



- USE RAIL-RAIL OP AMP LIKE LMCG482 / LMCG484

EXT. CONTROL INPUT



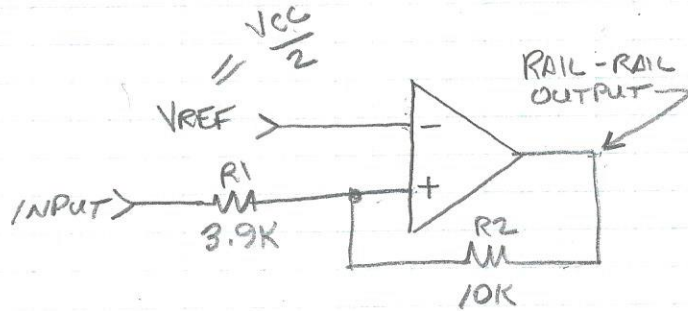
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BUILDING BLOCKS

SAWTOOTH GENERATOR

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HYSTERESIS COMPARATOR + INTEGRATOR



SWITCHING THRESHOLDS

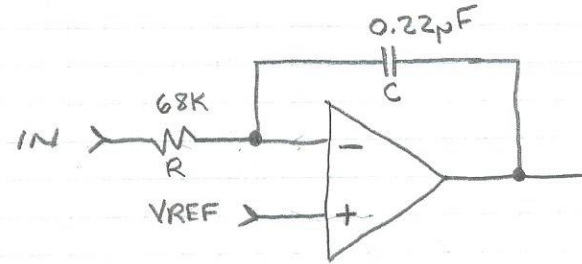
$$\left\{ \begin{array}{l} V_{REF} + V_{REF} \cdot \frac{R1}{R2} \\ V_{REF} - V_{REF} \cdot \frac{R1}{R2} \end{array} \right.$$

$$V_{REF} = \frac{V_{CC}}{2}$$

FOR VALUES CHOSEN, SWITCHING OCCURS $\approx +1$ & $-1V$ AROUND V_{REF}

$$\frac{5V}{2} \cdot \frac{3.9K}{10K} = 0.975$$

$$\frac{6V}{2} \cdot \frac{3.9K}{10K} = 1.17$$



$$\text{SLEW RATE} = \frac{(V_{REF} - V_{IN})}{R} \div C$$

(V/s)

$$= \frac{V_{REF} - V_{IN}}{R \cdot C} = \frac{I}{C}$$

WE WANT $\approx 2V_{pp}$ SAWTOOTH

$$\approx \frac{2V}{10ms} = 200V/s$$

$V_{REF} = V_{CC}/2$ & OUTPUT IS R-R (0 or V_{CC})

$$S.R. = \frac{200V}{s} = \frac{V_{REF}}{RC}$$

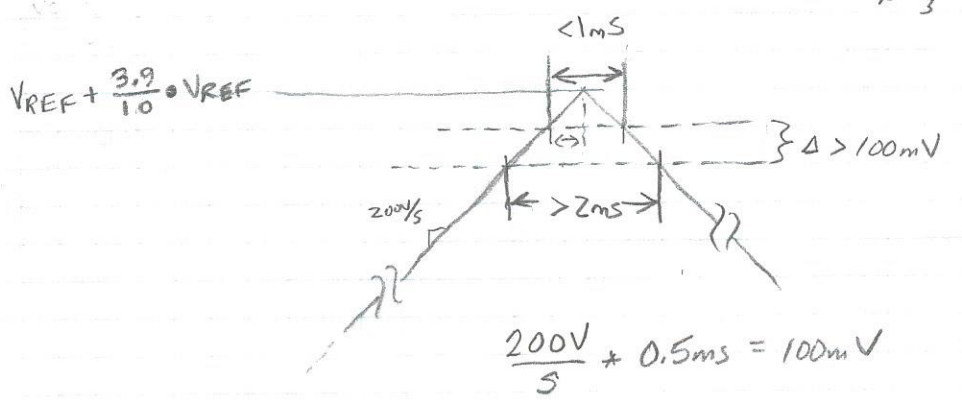
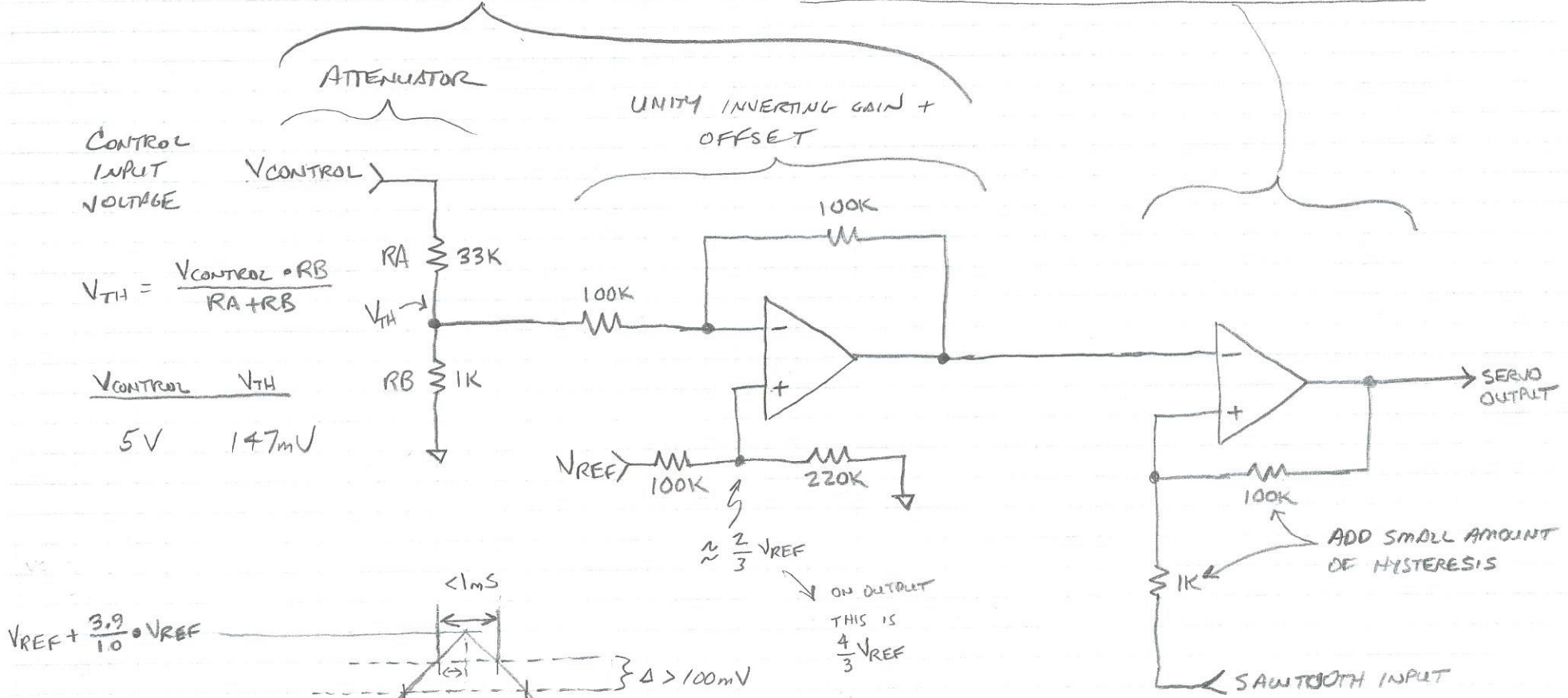
IF $C = 0.22\mu F$

$$R = 68K$$

BUILDING BLOCKS

WZAEW

CONTROL SIGNAL CONDITIONING + OUTPUT COMPARATOR WITH A LITTLE HYSTERESIS



USE $\approx 150mV$ TO ENSURE 1-2ms