GNA University

# Counter Type A/D Converter

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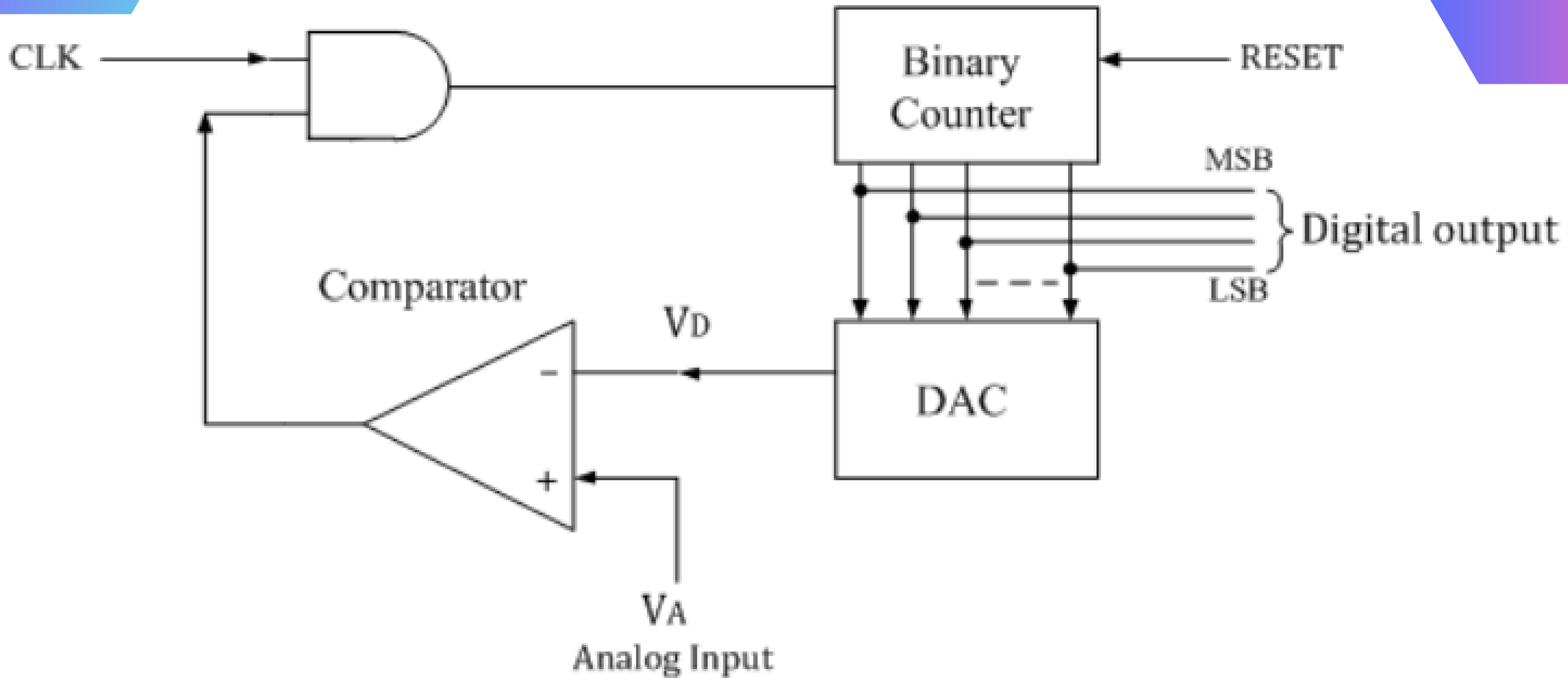
# Agenda

- Counter Type ADC
- Main Points
- Working Of ADC
- Advantages and Disadvantages

# Counter type ADC

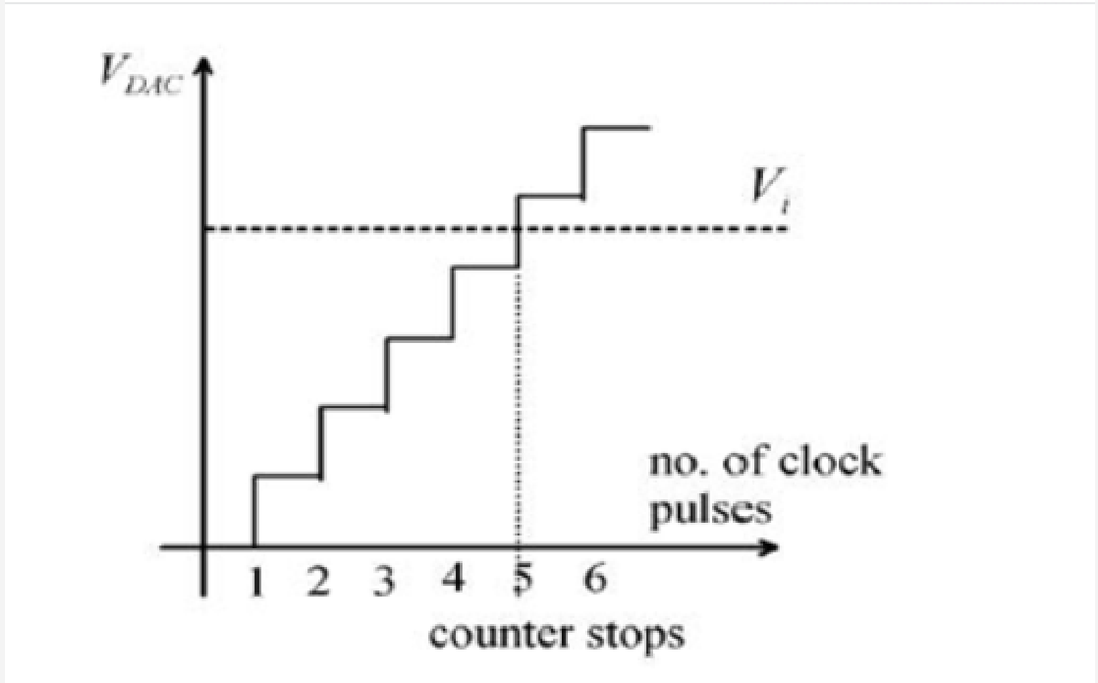
- It allows a digital counter to increment till it becomes equal to an equivalent of unknown analog voltage.
- It consists of the comparator,digital to analog converter,the control circuit,the AND gate ,and the latches.

# Counter Type ADC

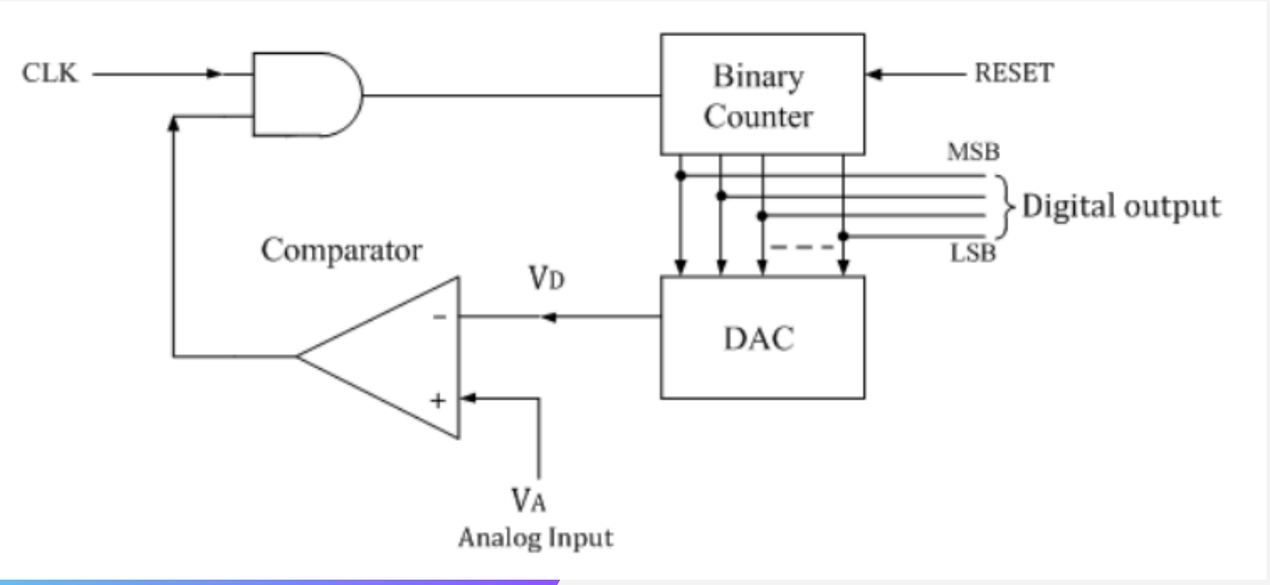


# Main points

- The output of counter is given to the ADC.
- And as the counter increments its count,the output of DAC increases in the ramp fashion.
- Ramp fashion means it looks like a staircase.

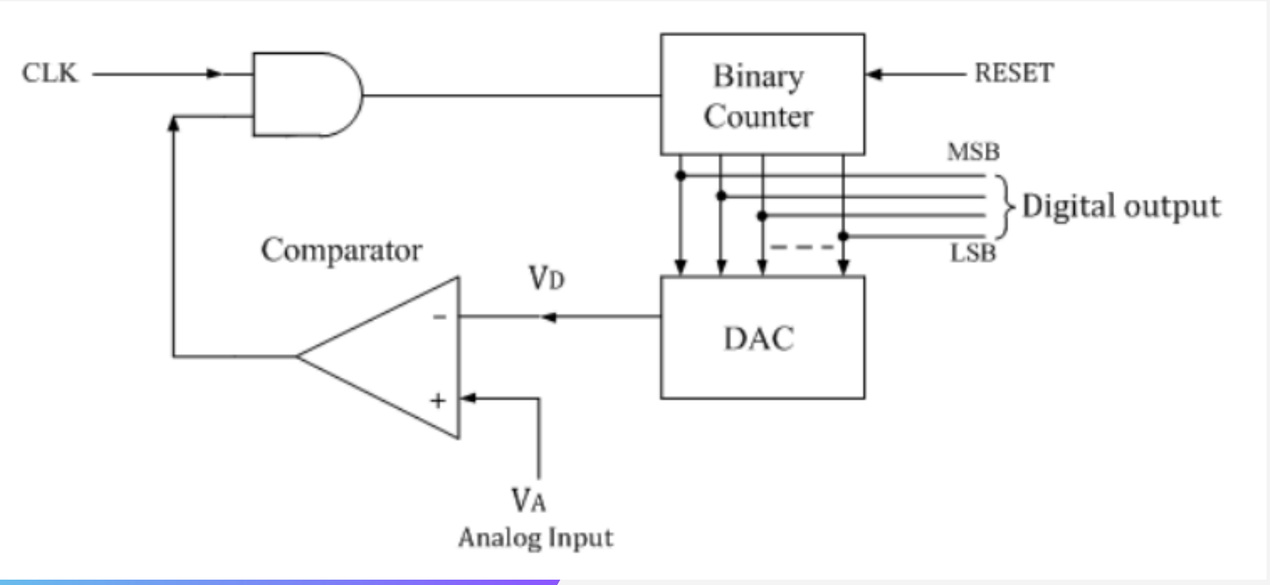


# Working



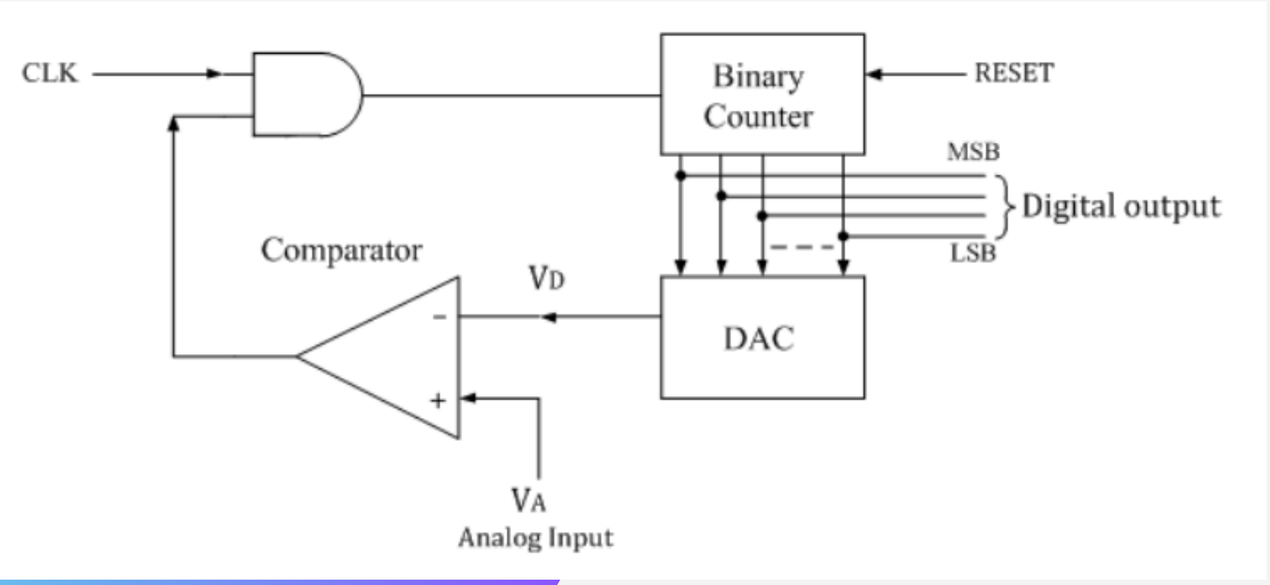

- The input voltage is applied at the non-inverting terminal.
- The output of the DAC Is given at the inverting terminal of the comparator.
- The output of the counter is given as an input to this digital to analog converter.
- Initially when the conversion starts then the counter is RESET,so the output of the DAC is equal to Zero.
- Initially the input voltage is greater than the output of the DAC,due to this the output of the comparator is high.

# Working




- Clock Pulses are applied to this counter using the AND gate.
- So,when the output of the comparator is high ,clock pulses will be applied to the counter.And the counter starts counting.
- As the counter increment its count, the output of the DACwill also increase in the staircase fashion.
- The output of the DAC is continously compared with the input voltage.
- So as far as this voltage of DAC is less than the input voltage,the output of the comparator will be high.

# Working




- Due to that these clock pulses will be applied to the counter.
- And hence,the output of the DAC will increase gradually in staircase fashion.
- As soon as the voltage of DAC is greater than the input voltage,then the output of the comparator will low.
- And no clock pulses will be applied to this counter.
- Max conversion time=

$$(2^N - 1)T_{clk}$$

(N is the number of bits of the ADC)

- So as the number of bits increases then the conversion time will also increase.

# Advantages

- Counter type ADC is very simple to understand and also to operate.

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- Counter type ADC design is less complex, so the cost is also less.

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# Disadvantages

- Speed is less,since each time the counter has to begun from zero.

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- There may be conflicts if the next i/p is sampled before completion of one process.

# THANKYOU