

Staircase Wave Generation using Analog and Digital Blocks

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Abstract—This paper presents the design of a Staircase wave generator circuit. A digital logic block is constructed which can provide logic level output for a staircase generation. An analog block which consists of opamp is the summing amplifier that adds all the output from the digital block so as to produce the necessary staircase output.

Index Terms—Staircase Wave, OpAmp, Mixed Signal Staircase Wave Generation

I. DESCRIPTION

Staircase Waveform circuit is built using a digital logic block with output 0001, 0011, 0111, 1111, for a 4 level stairs circuit. The digital output is mapped to an analogous voltage pulses to make it work with the next analog block. Using positive logic, 1 is mapped to 1Volt and 0 to 0Volts. The pulse signal which is given as clock to the digital block is analog in nature which is converted to logic bits before the digital realization is done. The second block is a summing amplifier(inverting negative feedback) realized using opamp. As there are four output pins from the digital block, we consider here a summing amplifier that adds four different voltages. To the inverting terminal of the opamp, the four output from the digital logic block is connected using equal resistances.

II. CIRCUIT DIAGRAM

The circuit diagram of staircase waveform generator is as shown in figure 1. The staircase logic block provides the necessary logic and also converting of digital data into equivalent pulses so that it can be sent to the succeeding analog block. The analog block considered is the summing amplifier. The staircase pulse increases every time the digital block is triggered using the pulse source and is reset once the MSB is also set to one (that is after 3 more levels).

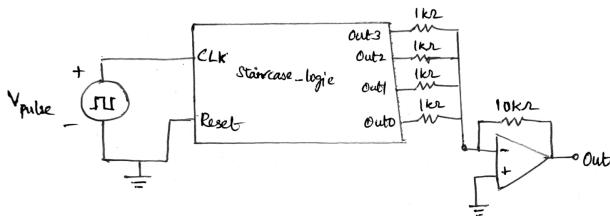


Fig. 1. Circuit Diagram

III. WAVEFORM

The figure 2 shows the staircase result obtained from the circuit presented in figure 1.

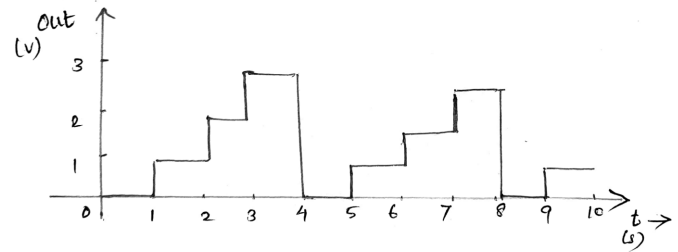


Fig. 2. Staircase Waveform

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