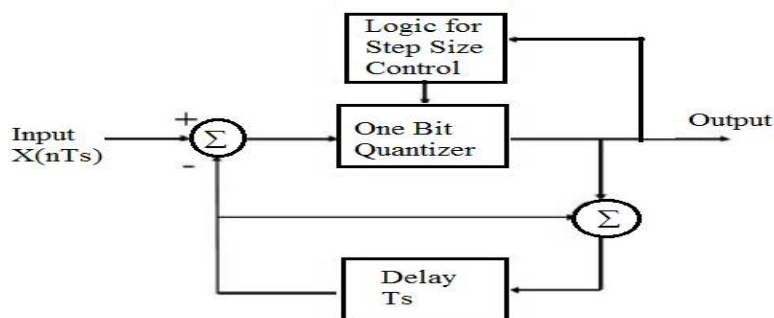


Adaptive Delta Modulation:

This Modulation is the refined form of delta modulation. This method was introduced to solve the granular noise and slope overload error caused during Delta modulation

This Modulation method is similar to Delta modulation except that the step size is variable according to the input signal in Adaptive Delta Modulation whereas it is a fixed value in delta modulation.

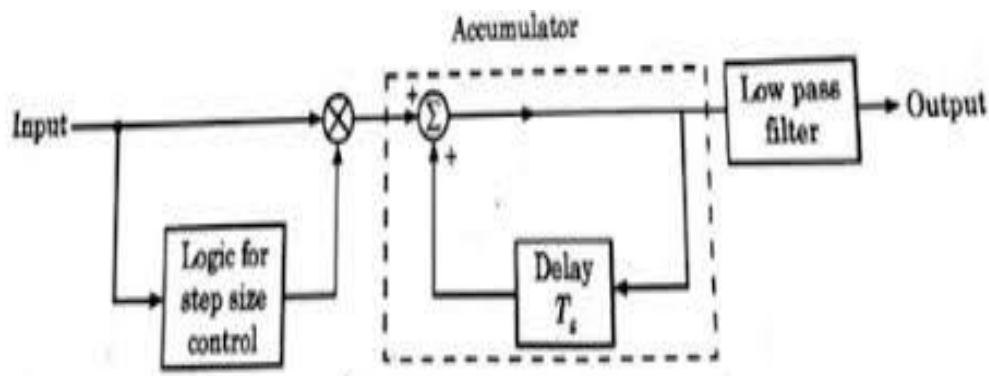
Transmitter Part:



The transmitter circuit consists of a summer, quantizer, Delay circuit, and a logic circuit for step size control. The baseband signal $X(nT_s)$ is given as input to the circuit. The feedback circuit present in the transmitter is an Integrator. The integrator generates the staircase approximation of the previous sample.

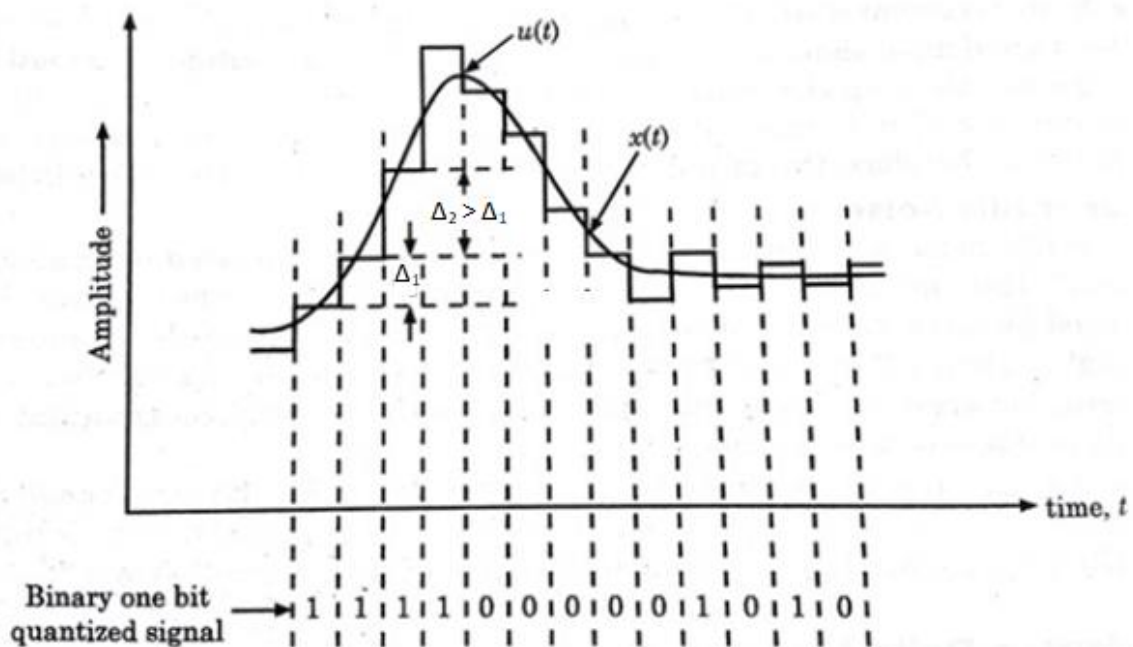
At the summer circuit, the difference between the present sample and staircase approximation of previous sample $e(nT_s)$ is calculated. This error signal is passed to the quantizer, where a quantized value is generated. The step size control block controls the step size of the next approximation based on either the quantized value is high or low. The quantized signal is given as output.

Receiver part:



At the receiver end Demodulation takes place. The receiver has two parts. First part is the step size control. Here the received signal is passed through a logic step size control block, where the step size is produced from each incoming bit. Step size is decided based on present and previous input. In the second part of the receiver, the accumulator circuit recreates the staircase signal. This waveform is then applied to a low pass filter which smoothens the waveform and recreates the original signal.

Waveform of adaptive delta modulation:



Advantages of Adaptive Delta modulation:

- The signal to noise ratio of ADM is better than that of DM because of the reduction in slope overload distortion and idle noise.
- Because of the variable step size, the dynamic range of ADM is wider than DM.
- Utilization of bandwidth is better in ADM than DM.

Disadvantages of Adaptive Delta modulation:

- For a relatively constant magnitude of input signal $x(t)$, the system will produce high granular noise.
- Lower bit rate than PCM

