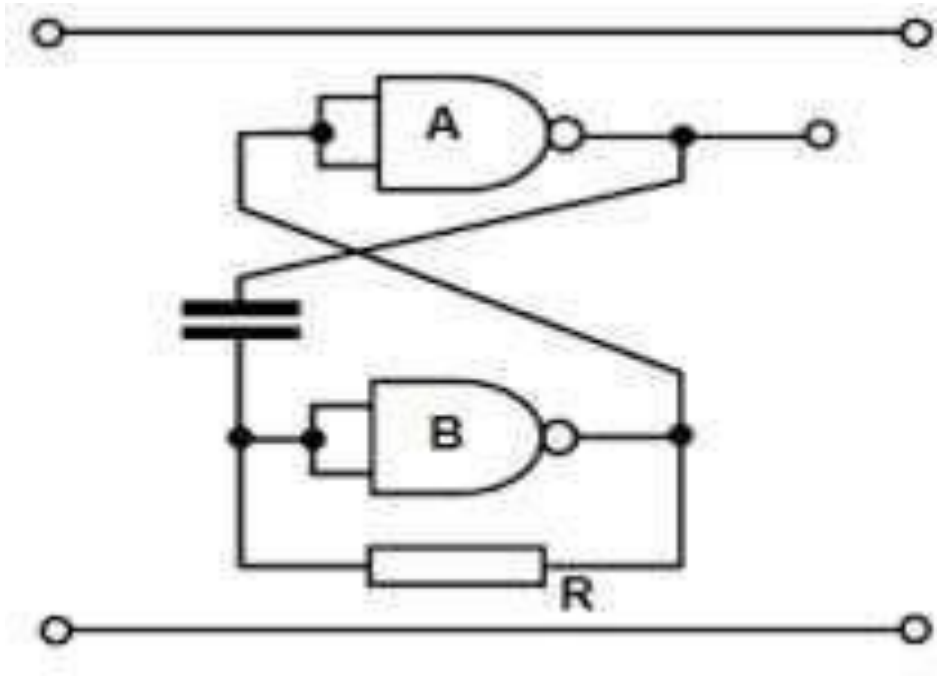
MULTIVIBRATORS

Multivibrator

- A *MULTIVIBRATOR* is an electronic circuit used to implement a variety of simple two-state systems such as oscillators, timers and flip-flops.
- It is characterized by two amplifying devices (transistors, electron tubes or other devices) cross-coupled by resistors and capacitors.
- It has two states low "0" & high "1"

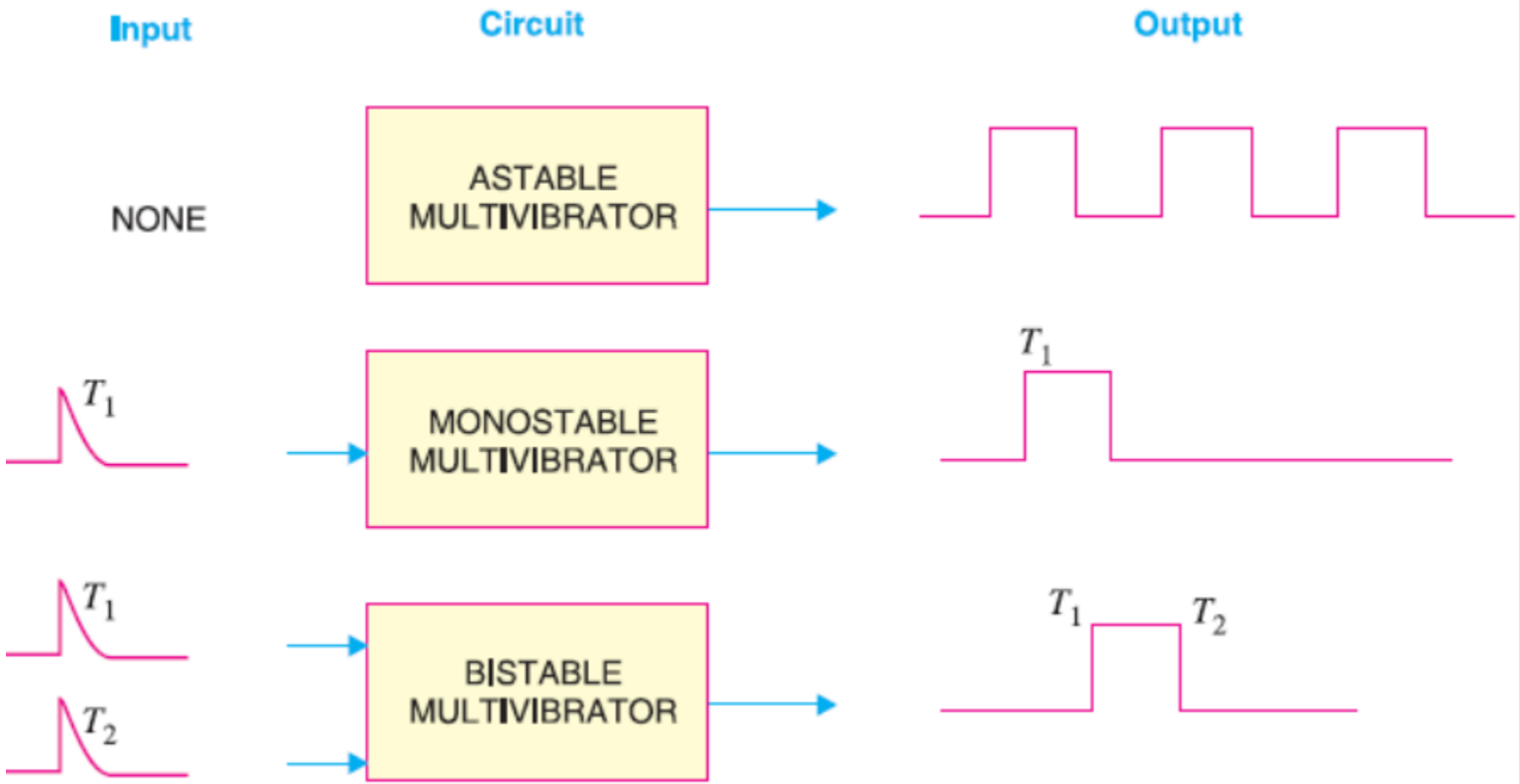


Types of Multivibrators

There are three types of multivibrators.

- Astable
- Bistable
- Monostable

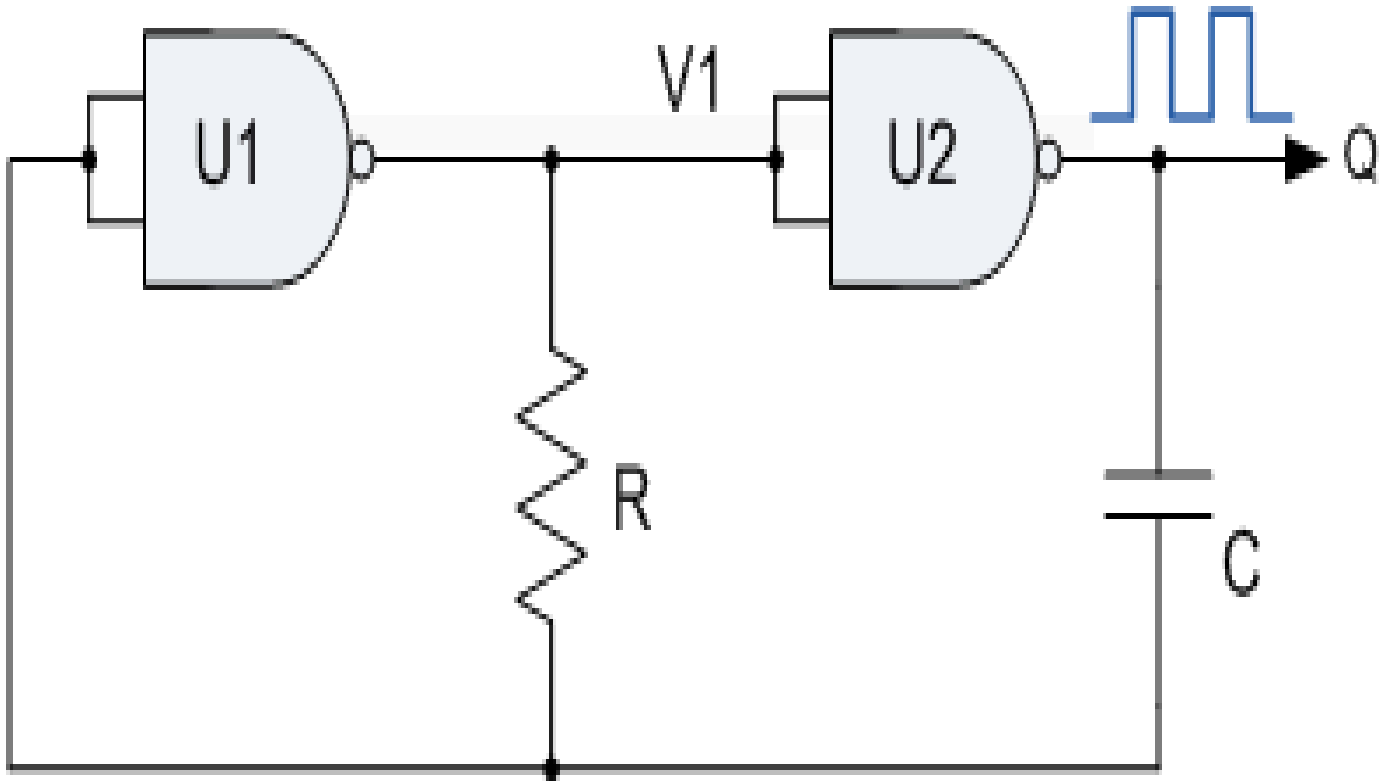
Types of Multivibrators



Astable Multivibrator

- Astable, in which the circuit is not stable in either state— it continuously oscillates from one state to the other. Due to this, it does not require an input (Clock pulse or other).
- **Astable Multivibrators** are a type of "free running oscillator" that have no permanent "Meta" or "Steady" state but are continually changing there output from one state ("LOW") to the other state ("HIGH") and then back again to its original state.
- This continual switching action from "HIGH" to "LOW" and "LOW" to "HIGH" produces a continuous square wave output whose timing cycle is determined by the time constant of the ResistorCapacitor, (*RC Network*) connected to it.

NAND Gate Astable Multivibrator



Applications

- Astable multivibrators are used in amateur radio equipment to receive and transmit radio signals.
- Astable multivibrators are also used in morse code generators, timers, and systems that require a square wave, including television broadcasts and analog circuits.

Advantages

Astable multivibrators continuously switch between one state and another.

This allows astable multivibrators to power themselves and perform work at a consistent rate without influence from any outside forces or events.

Additionally, astable multivibrators are inexpensive to produce, are relatively simple in design, and can remain functional for extraordinary amounts of time.

Disadvantages

- Astable multivibrators do not transfer the entire output signal to the input.
- This is due to resistance within the circuit, lack of a completely closed loop at the output terminals, and the tendency for one capacitor or transistor to absorb energy at a slightly different rate than the other.
- Although the amplifier restores the lost energy when it amplifies the signal, the signal will eventually be too small to be of any use.

Bistable Multivibrator

Bistable Multivibrators circuit, both states are stable, and the circuit will remain in either state indefinitely.

This type of Multivibrator circuit passes from one state to the other "Only" when a suitable external trigger pulseT is applied and to go through a full "SET-RESET" cycle **two** triggering pulses are required.

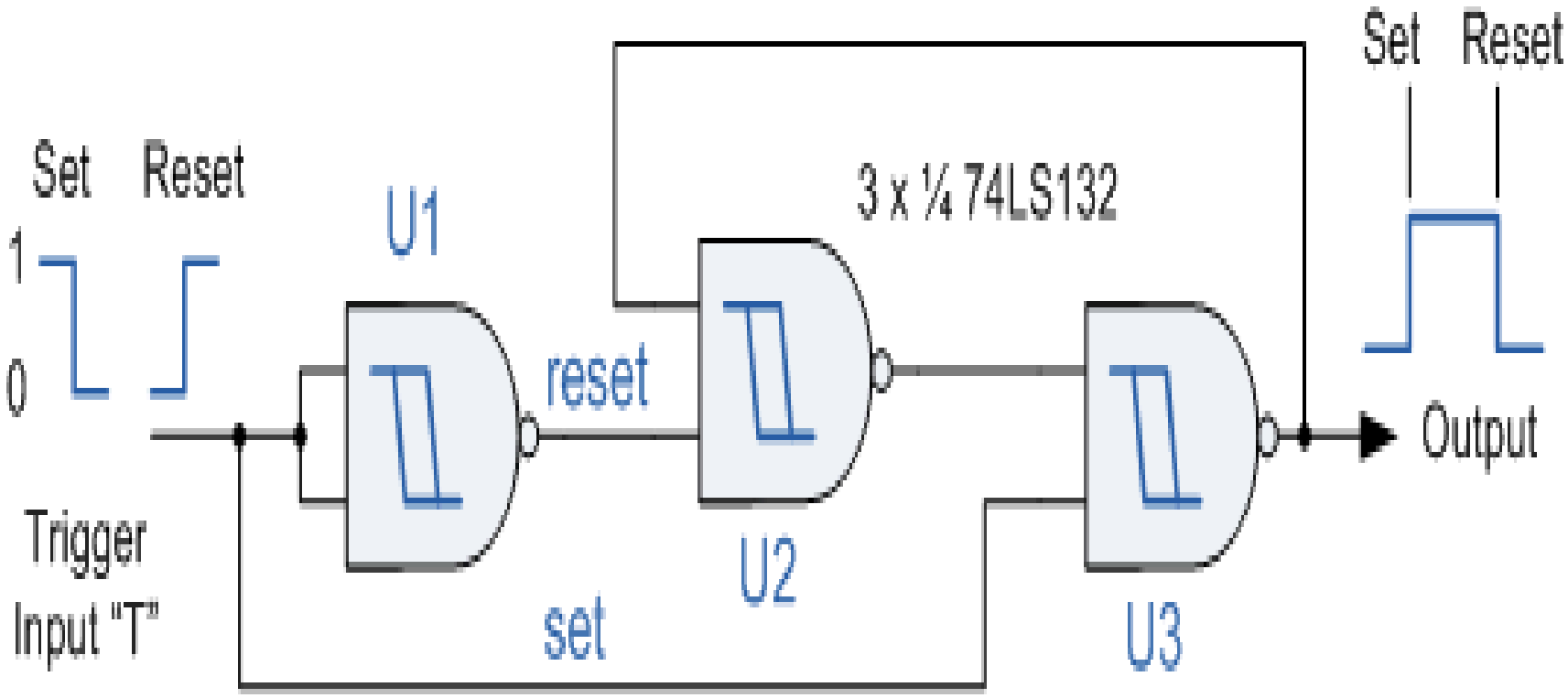
This type of circuit is also known as a "**Bistable Latch**", "**Toggle Latch**" or simply "**T-latch”**, “**flip-flop”**.

Such a circuit is important as the fundamental building block of a register or memory device.

Then a **Bistable Latch** or "Toggle Latch" is a two state device in which both states either positive or negative, (logic "1" or logic "0") are stable.

Bistable Multivibrator

NAND Gate Bistable Multivibrator.



Applications

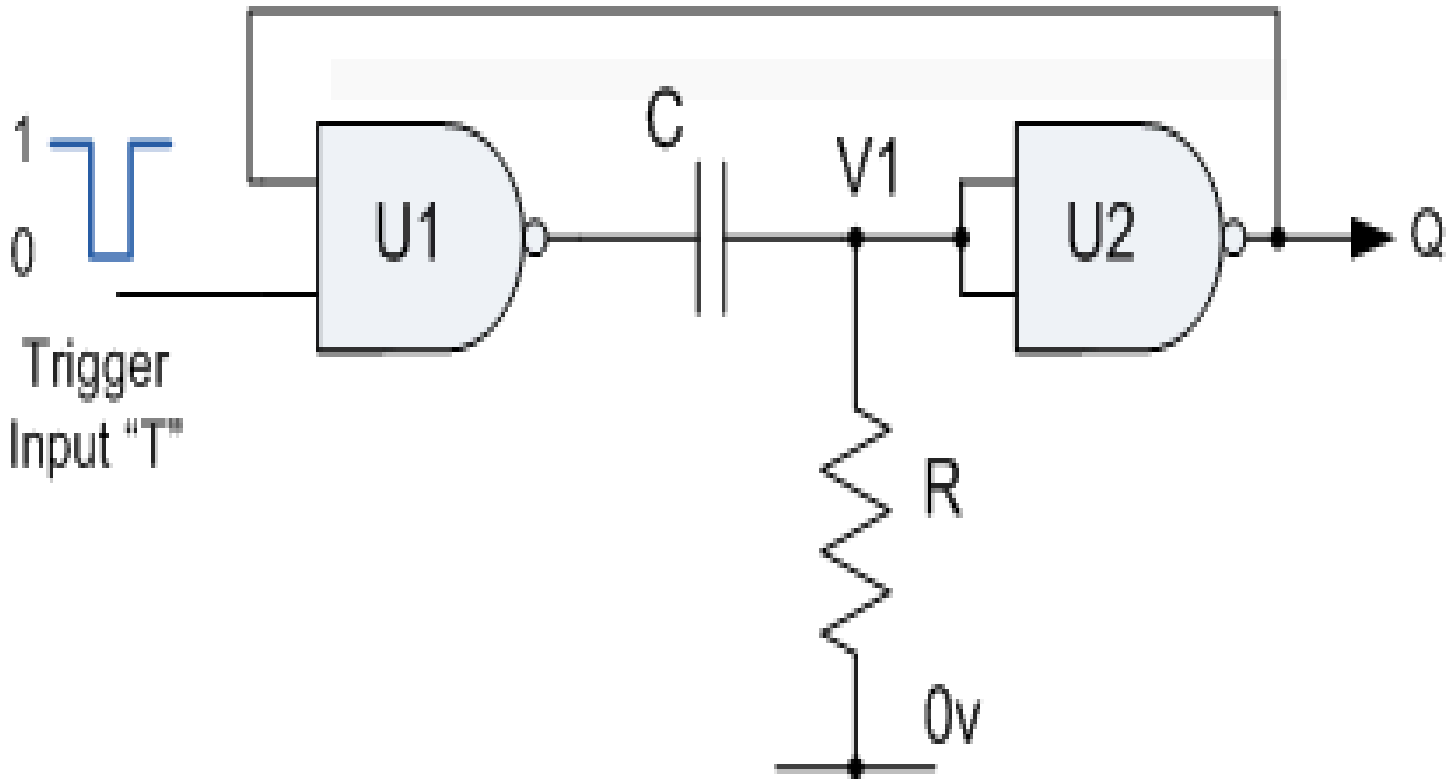
- **Bistable Multivibrators** have many applications such as frequency dividers, counters or as a storage device in computer memories but they are best used in circuits such as Latches and Counters.

Monostable multivibrator

- Monostable - has only **ONE** stable state and is triggered externally with it returning back to its first stable state
- **Monostable Multivibrators** or "One-Shot" pulse generators are used to generate a single output pulse, either "High" or "Low", when a suitable external trigger signal or pulseT is applied.
  - Time constant isT = o.8RC +Trigger in seconds

Monostable multivibrator

NAND Gate Monostable Circuit .



Applications

- Monostable multivibrators are used in a number of applications and can be found wherever a square wave or timed interval is necessary for the success of a system.
- For example, monostable multivibrators were once used in analog systems to control an output signal's frequency, synchronize the line and frame rate of television broadcasts, and even moderate the tunes of different octaves with electronic organs.
- Additionally, before the integrated circuit's invention, monostable multivibrators were connected together in a series to divide frequencies.

Advantages

- Monostable multivibrators generate output signals at timed intervals in the form of square waves. They are half the size of astable multivibrators and can, therefore, be used in more diverse situations.
- Monostable multivibrators can be connected to one another to provide additional functionality. They are relatively simple in design and are inexpensive when compared with other types of oscillators.

Disadvantage

- One main disadvantage of Monostable Multivibrators is that the time between the application of the next trigger pulse T has to be greater than the RC time constant of the circuit.