

- i. Clk (Clock Input)
- ii. Gate(Gate Input)
- iii. Out (Clock Output)

- The **input** clock signal is applied on the **CLK** line.
- The **counter decrements** the "**count value**" on **every pulse** of the **input clock at CLK**.
- **When** the **count** becomes **zero (Terminal Count i.e. TC)**, the **status** of the **OUT** pin **changes**.
This can be used to interrupt the μP .
- The **GATE** pin is used to **control** the **Counting**.
In most modes, the **count** value gets **decremented only if** the **GATE** pin is **high**.

Timer Modes of 8254

♦ Mode 0 --- Interrupt on Terminal Count

- 1) When this mode is selected **OUT** pin is **initially low**.
- 2) The **count** value is **loaded**.
- 3) **GATE** pin is made **high**, so **counting** is **enabled**.
- 4) **During counting**, **OUT** pin remains **low**.
- 5) **On Terminal Count (TC)** the **OUT** pin goes **high**, and remains high.
- 6) **During counting** if **GATE** is made **low**, it **disables counting**.

When **GATE** is made **high**, counting **Resumes**.

Effect of Gate:

Low → Disables Counting

High → Enables (Resumes) Counting

♦ Mode 1 --- Monostable Multivibrator

- 1) When this mode is selected **OUT** pin is **initially high**.
- 2) The **count** value is **loaded**.
- 3) **Counting begins ONLY** when a **rising edge** is applied to the **GATE**.
- 4) **OUT** pin goes **low** and remains low **during counting**.
- 5) **On Terminal Count (TC)** the **OUT** pin goes **high**, and remains high.
- 6) **During counting** if **GATE** is made **low**, it **has no effect** on the Counting.
- 7) The **GATE pin** can be used as a **Trigger**. © In case of doubts, contact Bharat Sir: - 98204 08217.

The **Counter** can be **re-triggered** by applying a **rising edge** on the **GATE**.

This would **Restart** the **counting**, and hence re-trigger it.

Effect of Gate:

Low → No Effect

High(Trigger) → Starts Counting, can also re-trigger it.

♦ Mode 2 --- Rate Generator

- 1) When this mode is selected **OUT** pin is **initially high**.
- 2) The **count** value is **loaded**.
- 3) **GATE** pin is made **high**, so **counting** is **enabled**.
- 4) **During counting**, **OUT** pin remains **high**.
- 5) The **OUT** pin goes low for one clock cycle just before the TC.
- 6) The initial count is reloaded and the above process repeats.
Thus, this mode produces a Continuous Pulse.
- 7) **During counting** if **GATE** is made **low**, it **disables counting**.
When **GATE** is made **high**, counting **Restarts**.

Effect of Gate:

Low → Disables Counting

High → Enables (Restarts) Counting

- 8) It is also called a divide by n counter, as for a count n, the input frequency is divided by n to produce the output frequency.

♦ Mode 3 --- Square Wave Generator

- 1) When this mode is selected **OUT** pin is **initially high**.
- 2) The **count** value is **loaded**.
- 3) **GATE** pin is made **high**, so **counting** is **enabled**.
- 4) **OUT** pin remains **high** for **half of the count** ($n/2$) and remains **low** for the **remaining half**.
- 5) **On TC**, the **Count** is **reloaded** and the **process repeats** itself producing a **continuous square wave**.
- 6) **During counting** if **GATE** is made **low**, it **disables counting**.
When **GATE** is made **high**, counting **Restarts**.

Effect of Gate:

Low → Disables Counting

High → Enables (Restarts) Counting

- 7) If the **count** is **ODD**, the **OUT** pin remains **high** for $(n+1)/2$ and **low** for $(n-1)/2$.

♦ Mode 4 --- Software Triggered Strobe

- 1) When this mode is selected **OUT** pin is **initially high**.
- 2) The **count** value is **loaded**.
- 3) **GATE** pin is made **high**, so **counting** is **enabled**.
- 4) **During counting**, **OUT** pin remains **high**.
- 5) The **OUT** pin goes **low** for **one clock cycle, just after TC**.
- 6) **After that OUT** pin goes **high** and remains high.
- 7) **During counting** if **GATE** is made **low**, it **disables counting**.
When **GATE** is made **high**, counting **Restarts**.

Effect of Gate:

Low → Disables Counting

High → Enables (Restarts) Counting

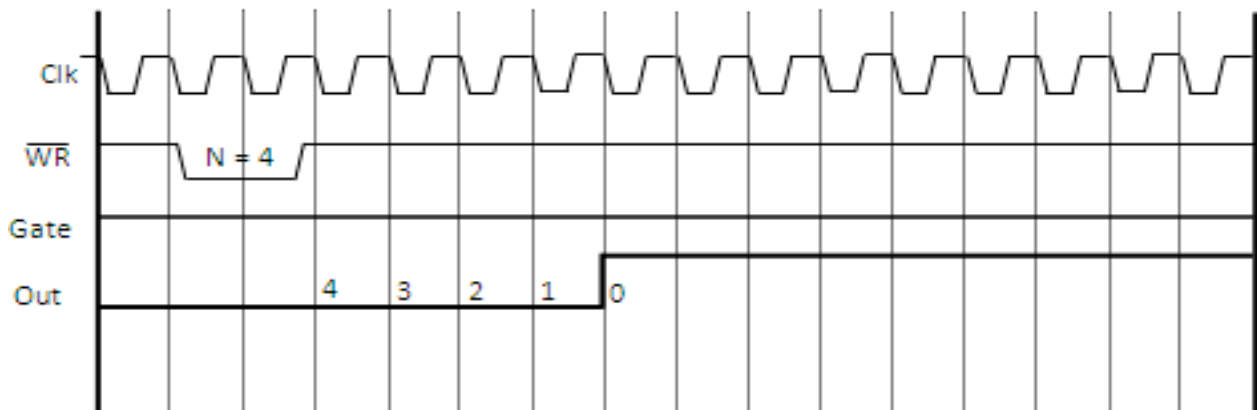
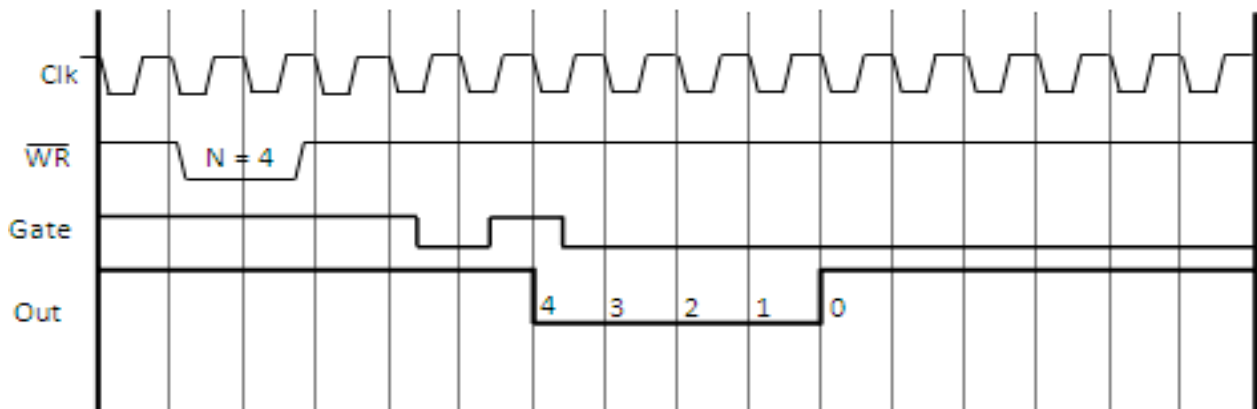
♦ Mode 5 --- Hardware Triggered Strobe

- 1) When this mode is selected **OUT** pin is **initially high**.
- 2) The **count** value is **loaded**.
- 3) Counting starts **ONLY** after a trigger is applied to the **GATE** pin.
- 4) Also, the **GATE** pin need not remain high for the counting to continue.
- 5) **During counting**, **OUT** pin remains **high**.
- 8) The **OUT** pin goes **low** for **one clock cycle, just after TC**.
- 9) **After that OUT** pin goes **high** and remains high.
- 6) **Thus GATE is used as a Trigger**.

I.e. It has to be triggered to start counting.**Effect of Gate:**

Low → No Effect on counting

High (Trigger) → Starts Counting, can also re-trigger it.

Mode 0: Interrupt On Terminal Count**Mode 1: Monostable Multivibrator****Mode 2: Rate Generator**