Waveform Generation

Lecture - 12

(24/04/2021)

B.Sc (Electronics)

TDC PART - III

Paper – 6

Unit – 8

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➢ Transistor Mono-Stable Multivibrator Circuit Details (PART – 2)

⇨ A **Mono-Stable Multivibrator** or a **One-Short Multivibrator** or a **Univibrator** has **one stable state**, i.e., **Permanent** and the other as **Temporary**, i.e., **Quasi-Stable State**. When an **External Trigger** is applied to the **input**, the multivibrator changes the state from **Stable State** to **Quasi-Stable State**. It **stays** in **Quasi-Stable State** for a **predetermined length of time** and after which the **circuit returns** to its **Original Stable State** automatically. The circuit produces the **output pulses of variable width** at the required moment (time).

⇨ A generalized circuit of a **Mono-Stable Multivibrator** using two **Active Devices A1** and **A2** is shown below in **Figure (3).** Next **Figure (4)** shows below the **Collector-couple NPN Transistor Mono-Stable Multivibrator.**

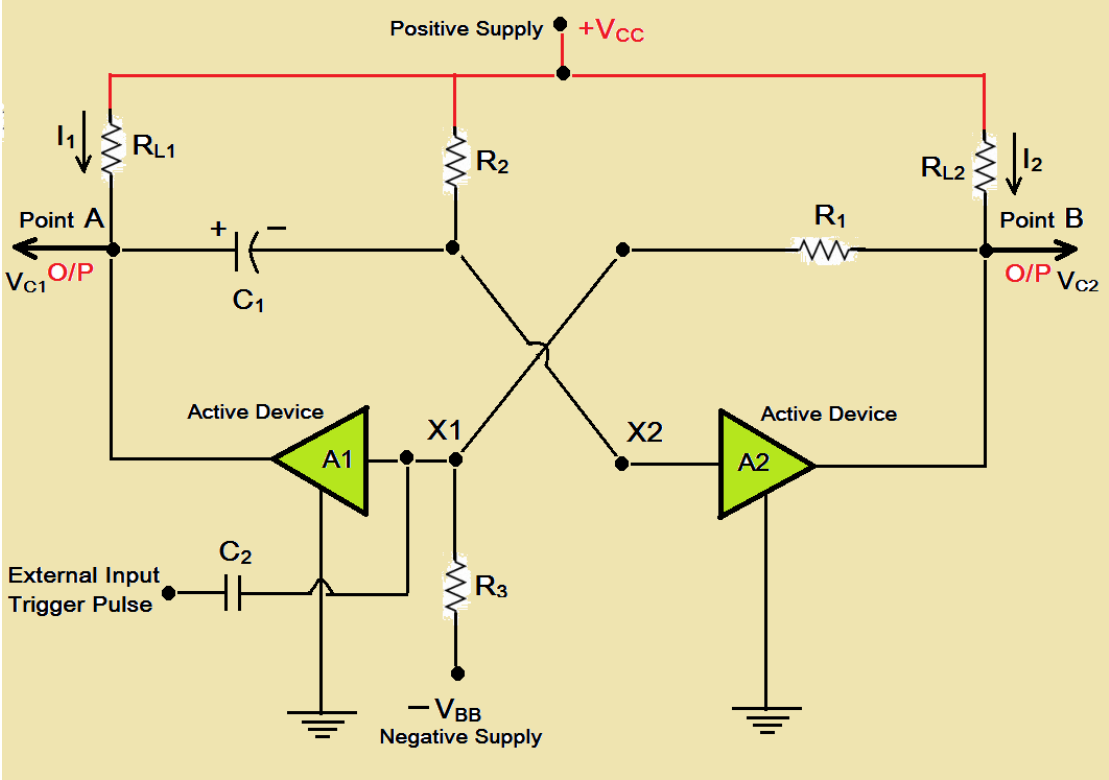

Fig. (3) Shown A generalized Circuit Configuration of a Mono-stable Multivibrator

⇨ Suppose that a **signal trigger** is applied to **X2 terminal** and a **regenerative action** takes place which drives **Active Device A2** to completely **Cut-OFF**. The **Voltage** at **Point B** rises approximately to **Positive Supply** $+V_{CC}$ **.** Now **Active Device A1** comes in **Conduction**. The device **may be driven** into **Saturation** or it may operate within its **Active region**. In either case a **Current** I_1 exists in **Load Resistor** R_{L1} which causes a **Voltage Drop** I_1R_{L1} at **Point A** and thereby **decreasing** the **Voltage** at **terminal X2** by the same amount because the **voltage** across **Capacitor C1** cannot change instantaneously. The **multivibrator** is now in its **Quasi-Stable State**. The **circuit will remain** in this state only for a **finite time** because **terminal X2** is connected to **Positive Supply** $+V_{CC}$ through **Resistor** R_2**.** Now **terminal X2** will rise in voltage.

⇨ When the **Voltage at terminal X2** is equal to the **Cut-IN Voltage** of **Active Device A2**, a regenerative action take place. This turns **Active Device A1 Cut-OFF** and eventually **returning the multivibrator** to its **initial stable state**. A **Collector-couples Mono-Stable Multivibrator** circuit using **NPN Transistors** is shown below in **Figure (4).**

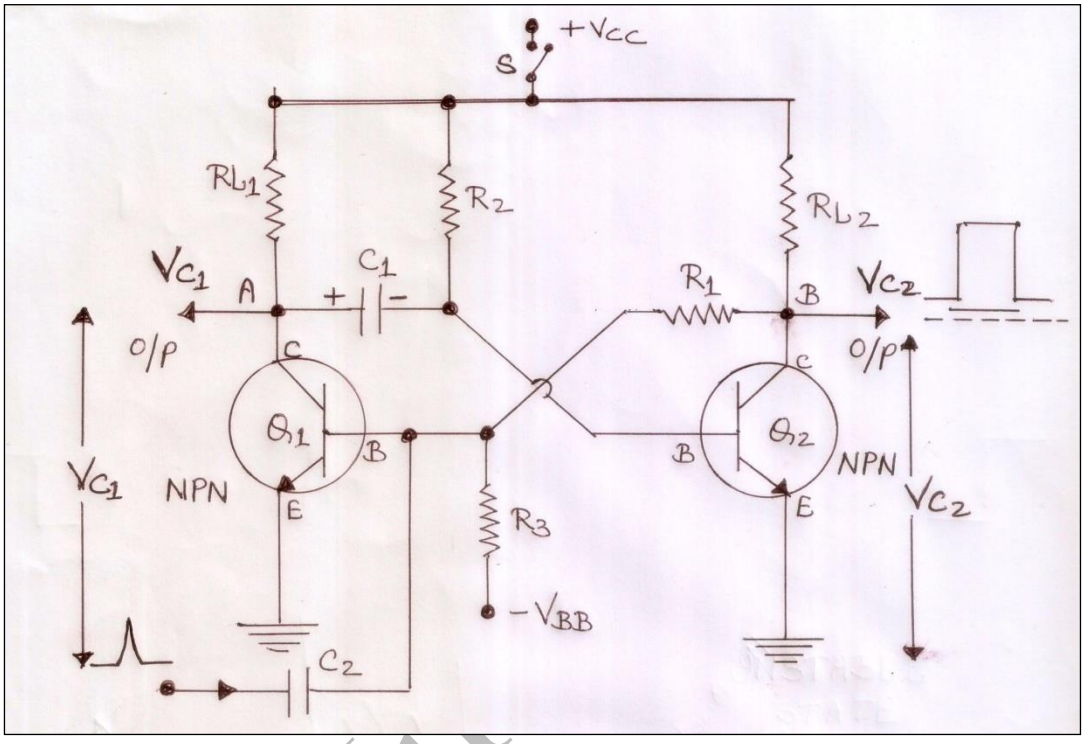

Fig. (4) Shown the Circuit Diagram of a Transistor Mono-Stable Multivibrator.

⇨ Above **Figure (4)** shows the circuit diagram of a transistor **Mono-Stable Multivibrator**. Here, **Collector terminal of Transistor Q1** is coupled to **Transistor Q2 Base** through **Capacitor C1** as in an **Astable Multivibrator** but the other coupling is different. It consists of **two similar NPN Transistors Q1** and **Q2** with **equal Collector Loads i.e. R_{L1} = R_{L2}.** The values of negative supply **$-V_{BB}$** and **Resistor R_3** are such as to **Reverse bias NPN Transistor Q1** and **keep it at Cut-OFF.** The **Collector Supply $+V_{CC}$ and Resistor R_2 Forward bias NPN Transistor Q2 and keep it at saturation.** The **External Input Trigger Pulse** is given through **Capacitor C_2 to the Base terminal of NPN Transistor Q1.**

⇨ To obtain the **Square Wave Output** again it can be taken from **Collector terminal of NPN Transistor Q1 at Point A or NPN Transistor Q2 at Point B.** In the **Mono-Stable Multivibrator** circuit diagram the Function of **Resistors R_{L1} and R_{L2}** is to limit **Collector current** of both **Transistors Q1** and **Q2**. **Resistors R_1 & R_2** will provide base current for **Transistors Q1 & Q2** respectively during **ON condition**. In this **Mono-Stable Multivibrator**, a **single narrow Input Positive Trigger Pulse** produces a single **Square Wave** or **Rectangular Wave pulse** whose **amplitude, pulse width** and **wave shape** depend upon the values of **circuit components (RC)** rather than upon the **trigger pulse.**

⇨ Detailed **of the Transistor Mono-Stable Multivibrator Circuit Operation** is discussed in next **Lecture – 13.**

to be continued .....

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