Waveform Generation

Lecture - 11

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B.Sc (Electronics)

TDC PART - III

Paper – 6

Unit – 8

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➢ Introduction of Transistor Mono-Stable Multivibrator (PART – 1)

⇨ It is also called a **Single-Shot** or **Single Swing** or a **One-Shot Multivibrator.** Other names are: **Delay Multivibrator** and **Univibrator.** It has

(i) One absolutely stable (stand-by) state i.e., permanent and

(ii) One quasi-stable state i.e., temporary.

⇨ The **Mono-Stable or One-Shot Multivibrator** has **One Stable State** i.e., **permanent** and **One Quasi-Stable (i.e. half-stable) State** i.e., **temporary.** When an external trigger pulse is applied to the input, the multivibrator changes the state from stable state to quasi-stable state.

- The application of **external input pulse** triggers the circuit into its **Quasi-Stable State**, in which it **remains for a period of time** determined by circuit constants.

- After this **period of time**, the **circuit returns** to its **Initial Stable State**, the process is repeated upon the application of each **external trigger pulse**.

- Since the **Mono-Stable Multivibrator** produces a **single output pulse** for each **input trigger pulse**, it is generally called **One-Shot Multivibrator**. **It has one energy-storing element i.e. one-capacitor.**

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- The **mono stable multivibrator** (sometimes called a **One-Shot Multivibrator**) is a **square or rectangular wave generator** with have just **one stable condition** and one **quasi stable condition**. With no input signal (quiescent condition) one **Transistor** (transistor as a switch) **Conducts** and the **other Transistor** (transistor as a switch) is in **Cut-OFF.** A **multivibrator** in which **one transistor is always conducting** (i.e. in the **ON State**) and the **other is non-conducting** (i.e. in the **OFF State**) is called a **Mono-Stable Multivibrator.**

- The **operation** of the **Mono-Stable Multivibrator** is relatively simple. The **input is triggered with a pulse of voltage**. The **output changes** from **one voltage level** to a **different voltage level**. The **output remains** at this **new voltage level** for a definite period of time **determined by RC circuit component. After this period of time, the circuit automatically return** to its **initial original voltage level** and remains **there until another trigger pulse is applied to the input.**

⇨ **Mono-Stable Multivibrator** is also called a **Single-Shot or Single Swing or a One-Shot Multivibrator.** Other names are: **Delay Multivibrator and Univibrator.** The monostable or **one-shot multivibrator** has

(i) one **absolutely stable** (stand-by) state and

(ii) one **quasi-stable state** i.e. half-stable state

⇨ The application of **External input triggers pulse** the circuit can be **switched** from **Stable State** to the **Quasi-Stable state**, in which it **remains for a time period determined by RC circuit component.** After this period of time, the circuit **returns to its initial Stable state. This process is repeated** upon the **application of each trigger pulse.** Since the **Mono-Stable Multivibrator produces a single output pulse for each input trigger pulse,** it is generally called One-Shot multivibrator.

⇨ A **Mon-Stable** (**mono means single or one**) **Multivibrator** has only **One State Stable** and **One Quasi-Stable State** i.e. **half-stable state** In other words, if **one transistor** is **Conducting (ON)** and the other one is **Non-Conducting (Cut-OFF),** the circuit will remain in this position**.** It is only with the **application of external input triggers pulse** that the circuit will interchange the states. The application of **External input triggers pulse** the circuit can be **switched from Stable State** to the **Quasi-Stable State,** in which it **remains in this position** for a **time period determined by RC circuit component. After this period of time, the circuit will automatically switch back to the Original Stable State and remains there until another input triggers pulse is applied.** Thus a **Mono-Stable Multivibrator** cannot generate square waves of its own like an **Astable Multivibrator**. **It produces a single output pulse of a desired duration for every input trigger pulse.** Only **external pulse will cause** it to generate the **square wave.**

⇨ The **basic Transistor Version Mono-Stable Multivibrator** circuit diagram is **shown below in Figure (1).** For instance, suppose at any particular instant, **Transistor Q1** is **CONDUCTING (ON)** and **Transistor Q2** is at **CUT-OFF. It is First Initial Stable State.** If left to itself, the **Mono-Stable Multivibrator** will stay in this position forever.

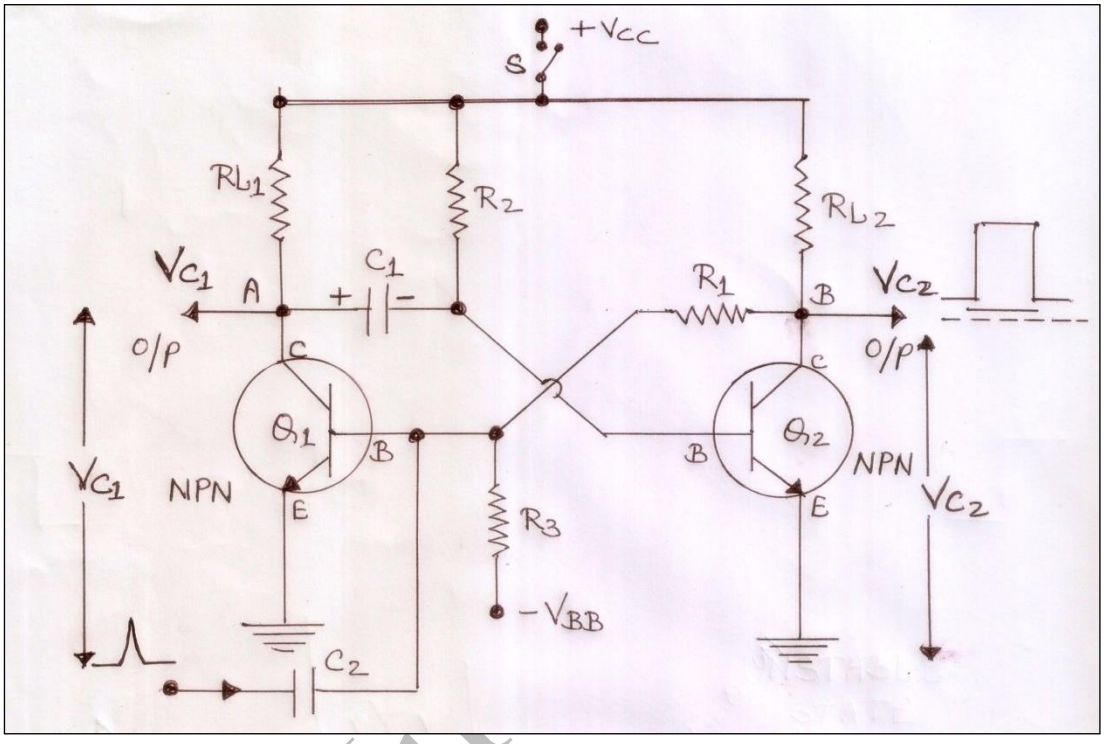

Fig. (1) Shown the Circuit Diagram of a Transistor Mono-Stable Multivibrator.

⇨ However, if an **external trigger pulse** is applied to the circuit in such a way that **Transistor Q1 is CUT-OFF** and **Transistor Q2 is turned CONDUCTING (ON). It is second state which is known as Quasi-Stable State.** Again, if left to itself, the circuit will **stay in the new position (Quasi-Stable State). It remains in this position** for a **time period determined by RC circuit component. After this period of time, the circuit will automatically switch back to the Initial Stable State and remains there until another input triggers pulse is applied.**

⇨ **This process is repeated** upon the **application of each trigger pulse.** Since the **Mono-Stable Multivibrator produces a single output pulse for each input trigger pulse,** it is generally called One-Shot multivibrator. Thus a **Mono-Stable Multivibrator** cannot generate square waves of its own like an **Astable Multivibrator**. **It produces a single output pulse of a desired duration for every input trigger pulse.**

⇨ The **Mono-Stable Multivibrator** actually **takes series of input triggers** and converts them to **Uniform Square Pulses,** as shown below in **Figure (2).** All of the **square output pulses** are of the **same amplitude and time duration**.

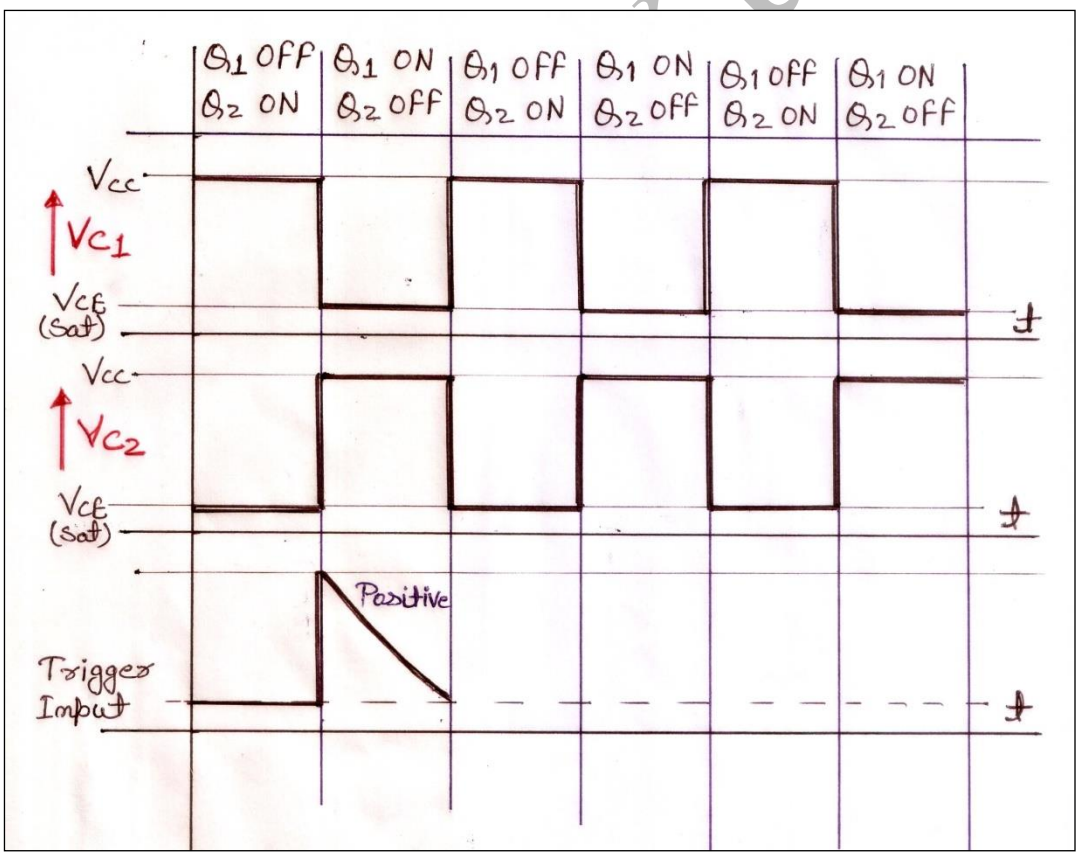

Fig. (2) Shown MMV Output Square Wave Forms at the both Transistor Q1 and Q2 Output Terminal Voltage **VC1** and **VC2** along with Positive Input Trigger Pulse.

⇨ Detailed **of the Transistor Mono-Stable Multivibrator Circuit Diagram** is discussed in next **Lecture – 12.**

to be continued .....

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