Four Layer P-N-P-N Switching Devices (Uni Junction Transistor)

Lecture – 3

TDC PART – II
Paper - III (Group - A)
Chapter - 4

by:

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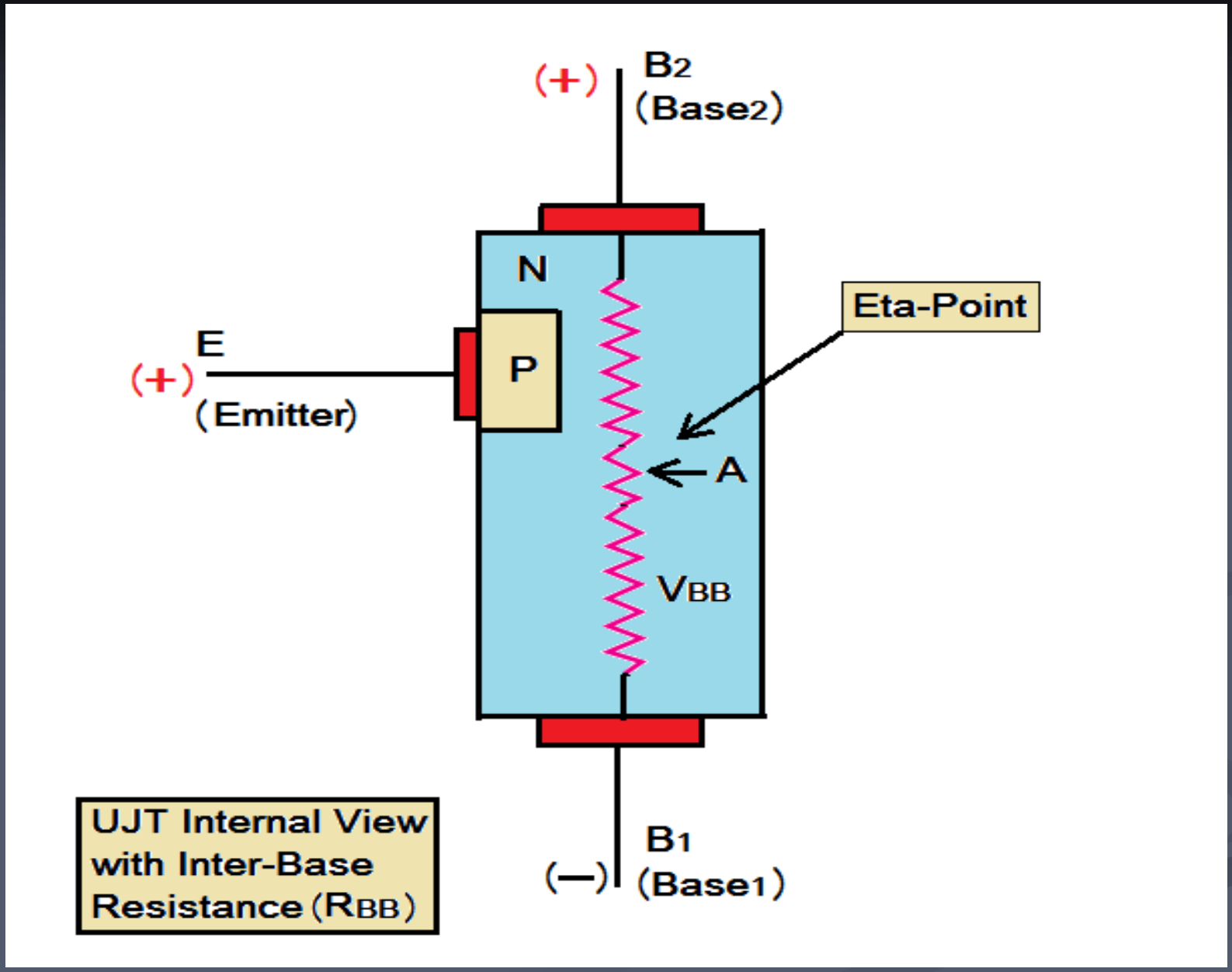
- **(Uni Junction Transistor)**
- **Lecture Content :-**
  - **UJT Parameters**
  - **(1) Inter- Base Resistance (R_{BB})**

UJT Parameters

(1) Inter Base Resistance (R_{BB})

- The **Total Resistance of the Silicon Bar** i.e., the **Resistance between Terminals B1 and B2 with Emitter (E) Terminal open** i.e. when **Emitter Current $I_E = 0$**, called as **Inter-Base Resistance (R_{BB}).**

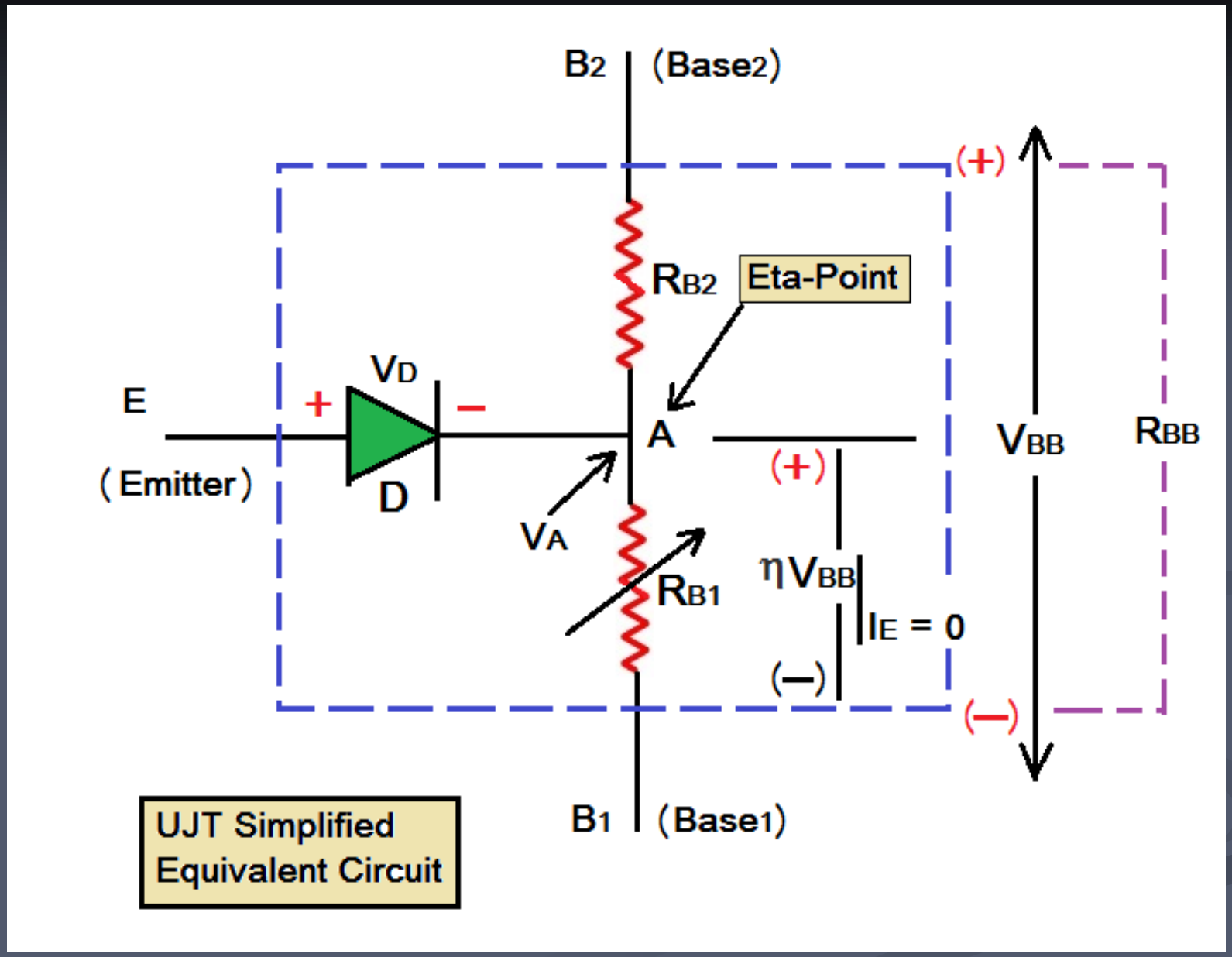
- It is the **Resistance** between **(Base2) B_2** and **(Base1) B_1** *i.e.* it is the **Total Resistance of the Silicon Bar from one end to the other** with **Emitter (E) Terminal open** i.e. When **Emitter Current $I_E = 0$. Inter Base Resistance (R_{BB})** shown in below **Figure (9).** In simple words, it is the **Resistance of the N-type Bar** when measured **Lengthwise.**



- **Fig (9)** Shown UJT internal view with Inter-Base Resistance (R_{BB}).

- If **R_{B1}** is the **Resistance** of the **Bar from Emitter (E)** to **Base1 (B_1)** and **R_{B2}** is the **Resistance of the Bar** from **Emitter (E) to Base2 (B_2).** From the **Simplified Equivalent Circuit of UJT** shown in below **Figure (10),** it is seen that **UJT Inter-Base Resistance (R_{BB})** can be expressed as,

- $$R_{BB} = R_{B2} + R_{B1}$$



- **Fig (10)** Shown UJT Simplified Equivalent Circuit Diagram with Voltage Divider.

- Where **R_{B2}** is the **Resistance of Silicon Bar between B_2** and the **point at which Emitter Junction Lies** and **R_{B1}** is the **Resistance of Silicon Bar** between **B_1 and Emitter Junction.** The **Resistance R_{B1}** is **variable** because its value depends upon the **Biasing Voltage (V_{BB}) across P-N Junction.**

- It should also be noted that **Point A also called "Eta-Point"** is such that **$R_{B1} > R_{B2}$**. Usually, **$R_{B1} = 60\%$** of **R_{BB}**. The Resistance **R_{B1}** has been shown in above **Figure (10)** act as a **Variable Resistor** because its **value** depends upon the **Bias Voltage (V_{BB}) across P-N Junction and varies inversely** as **Emitter Current I_E.** The typical range of **Inter Base Resistance $R_{BB} = R_{B1} + R_{B2}$** is from **4KΩ** to **10KΩ** .

to be continued .....