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

Lecture – 5

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

by:

Dr. Niraj Kumar,

Assistant Professor (Guest Faculty)

Department of Electronics

L.S. College, BRA Bihar University, Muzaffarpur.

Four Layer P-N-P-N Switching Devices (Uni Junction Transistor) Lecture – 5

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- (Uni Junction Transistor)
- Lecture Content :-
  - UJT Parameters
  - (2) Intrinsic Stand-off Ratio (η) by 2nd Method
  - (2) Intrinsic Stand-off Ratio (η) by 3rd Method

UJT Parameters

(2) Intrinsic Stand off Ratio (η) by 2nd Method

- **Figure (13)** Shown below, a battery **V_{BB}** connected across Base **B_2** and **B_1** of equivalent circuit of **UJT.** Here **emitter** point **E** acts as a **Voltage Divider Tap** on the **fixed resistance R_{BB}**. It is obvious that part of **V_{BB}** is dropped over **R_{B2}** and part on **R_{B1}**. Let the voltage drop across **R_{B1}** is **V_{RB1}**, then the magnitude of **V_{RB1} (**with **$I_E = 0$)** is equal to **V_A**.

- **$V_{RB1} = V_A = V_{BB} (R_{B1} / R_{B1} + R_{B2})$**
  where, $I_E = 0$ ..... (1)

- **Where, $R_{BB} = R_{B1} + R_{B2}$**

- (**R_{BB} Inter Base Resistance** when no voltage is applied to the Emitter (E)).

- From equation (1), we have,

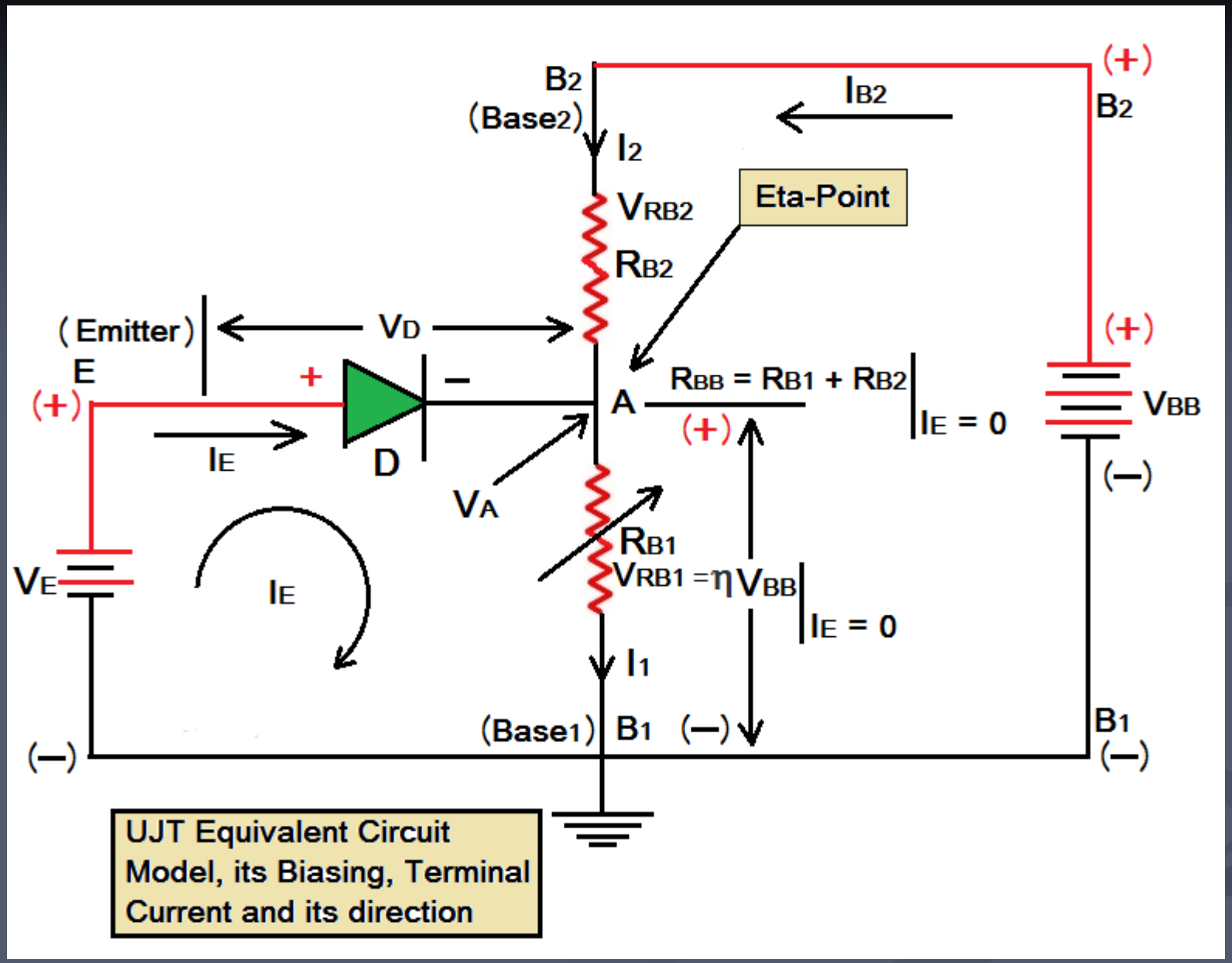
- $V_A / V_{BB} = R_{B1} / R_{B1} + R_{B2}$
  ..... (2)

- The ratio V_A / V_{BB} is called the **Intrinsic-Stand off Ratio** and is represented by η .

- Hence ,

- $\eta = R_{B1} / R_{B1} + R_{B2} = R_{B1} / R_{BB}$
  where, $I_E = 0$ ..... (3)

- The **Intrinsic Stand-off Ratio (η)** is the property of the **UJT** and is always **less than unity(0.4 to 0.85). Voltage** across R_{B1} is,



- **Fig (13)** Shown Typical UJT Equivalent Circuit Diagram.

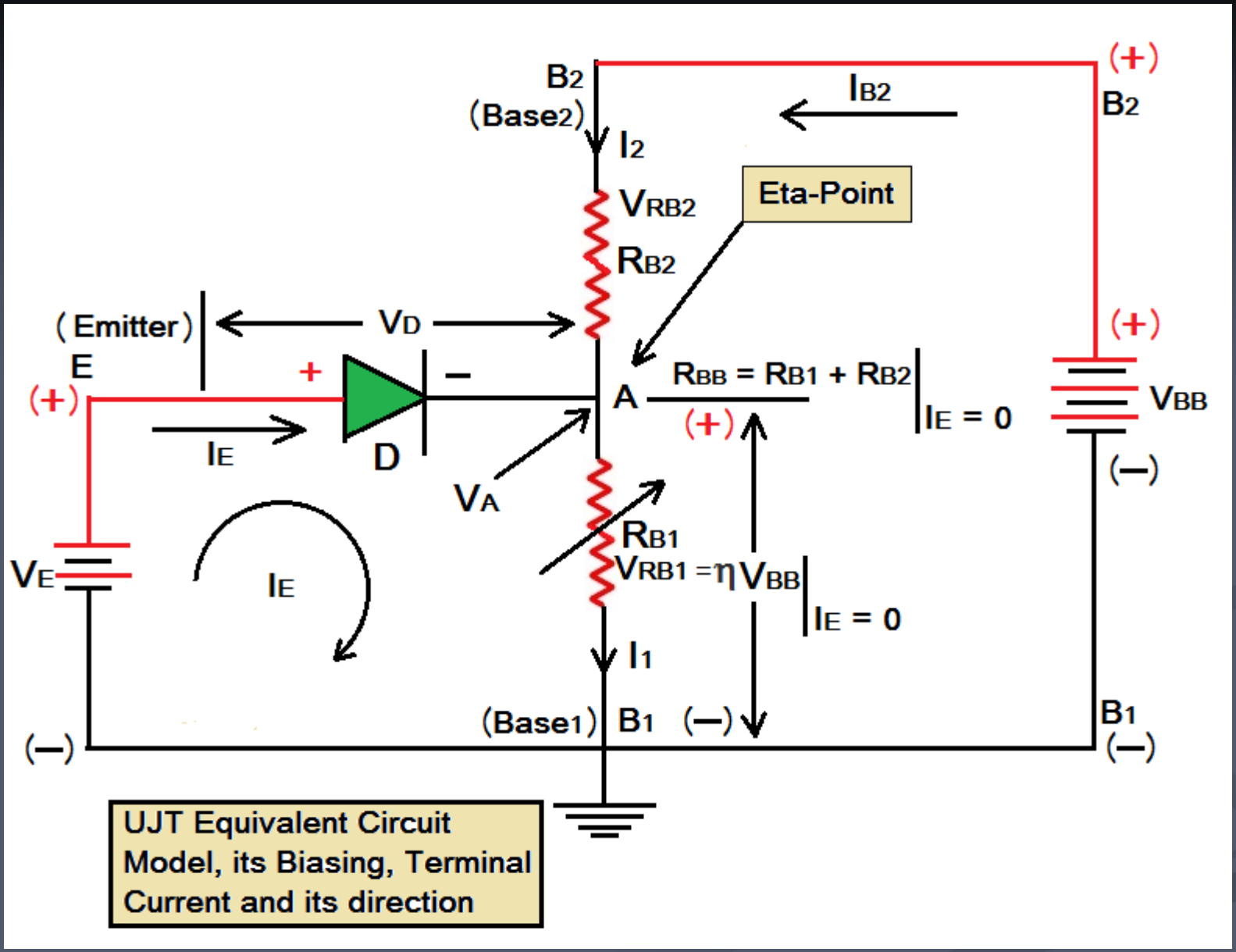
- $V_{RB1} = V_A = (R_{B1} / R_{BB}) V_{BB}$
  where, $I_E = 0$ ..... (4)

- $V_{RB1} = V_A = \eta V_{BB}$
  where, $I_E = 0$ ..... (5)

- **The voltage ηV_{BB}** appearing across **R_{B1} Reverse-Biases** the diode and hence the **Emitter Current $I_E = 0$**

(2) Intrinsic Stand off Ratio (η) by 3rd Method

- **Intrinsic Stand-off Ratio (η)** can be describe as,
- When **Inter Base Voltage (VBB)** is applied across the **Two Base** terminals **B1** and **B2** **shown in below Figure (14),** the potential of **Point A** with respect to **B1** is given by
- $V_{AB1} = (V_{BB} / R_{B1} + R_{B2}) R_{B1}$
- $V_{BA1} = (R_{B1} / R_{B1} + R_{B2}) V_{BB}$



- **Fig (14)** Shown Typical UJT Equivalent Circuit Diagram.

- $V_{AB1} = \eta V_{BB}$
- Where, $\eta = R_{B1} / R_{B1} + R_{B2}$
- η (nita) is called the **Intrinsic Stand off Ratio (η)**.
- The **Intrinsic Stand off Ratio** is the property of the **UJT** and is always **Less then Unity**. The typical value of η are **.51 to .82.**

to be continued .....