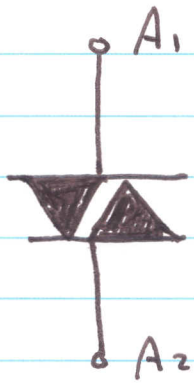
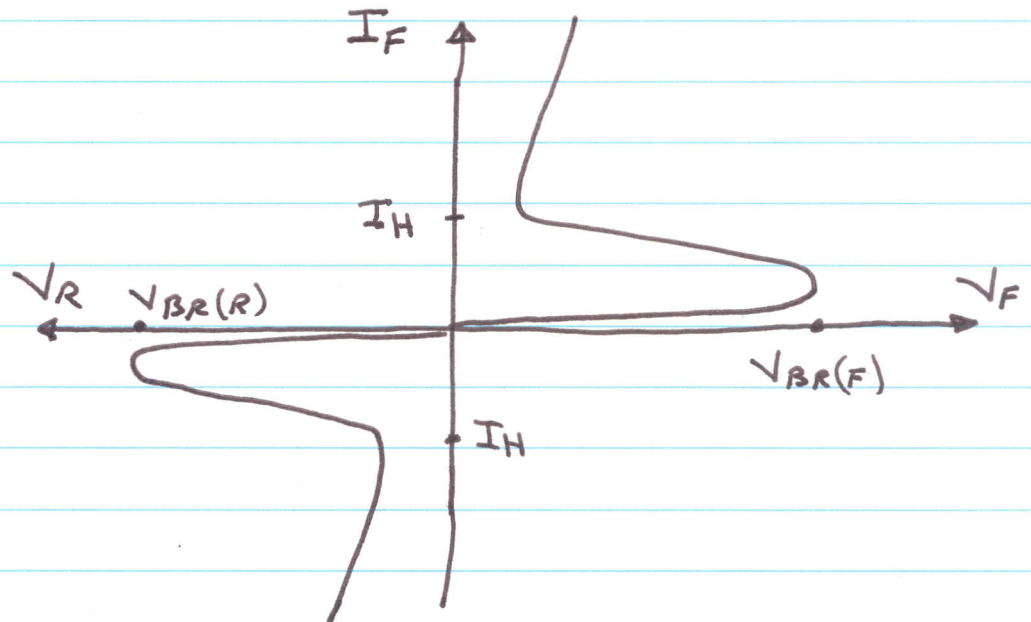


The Diac

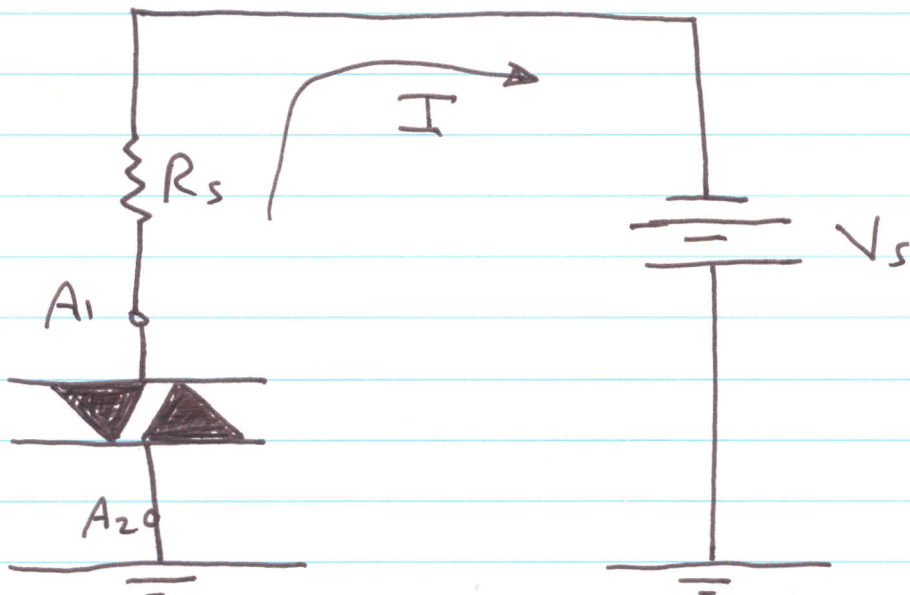
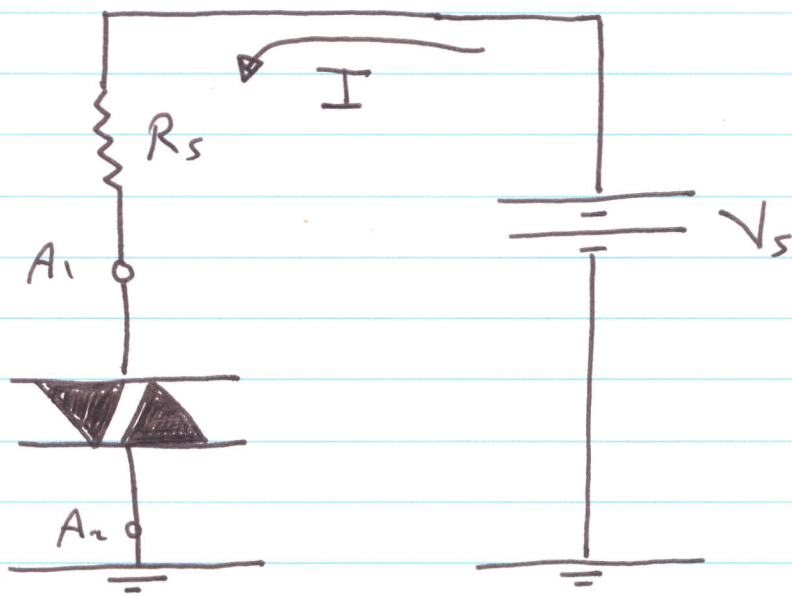


Circuit Symbol

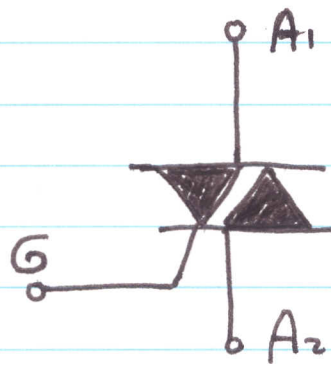


Characteristic Curve

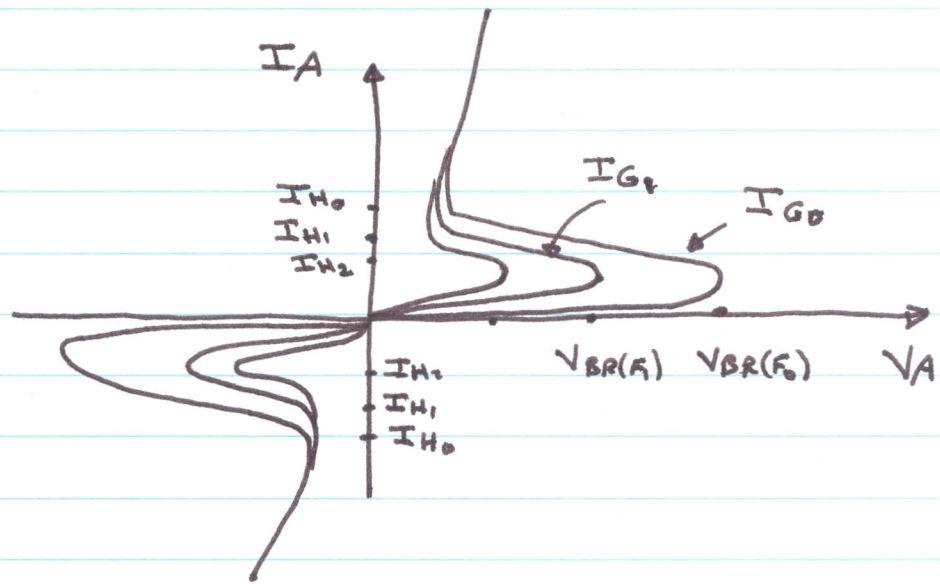
- It is a two terminal device
- It can conduct current in either direction when properly activated
- Conduction occurs when the breakover voltage is reached with either polarity
- The device turns off when the current drops below the holding value (I_H)
- The device functions like two parallel Shockley diodes turned in opposite direction



The Triac



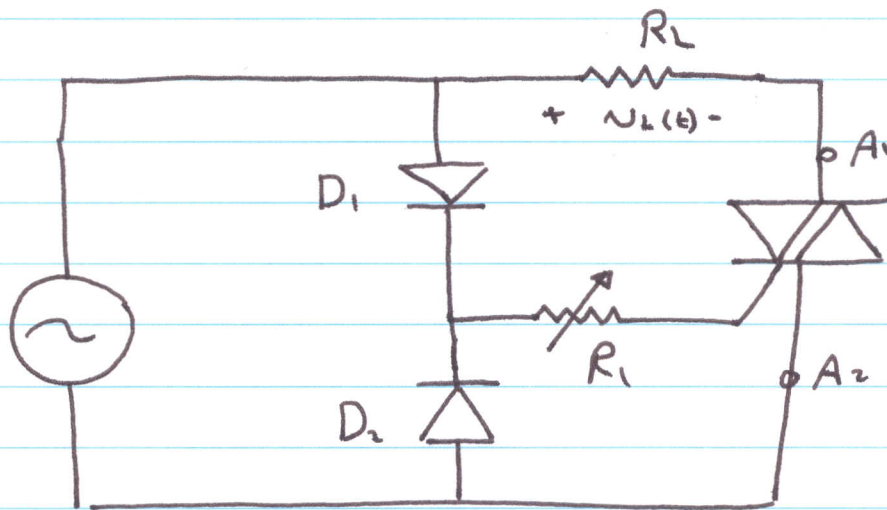
Circuit +
Symbol



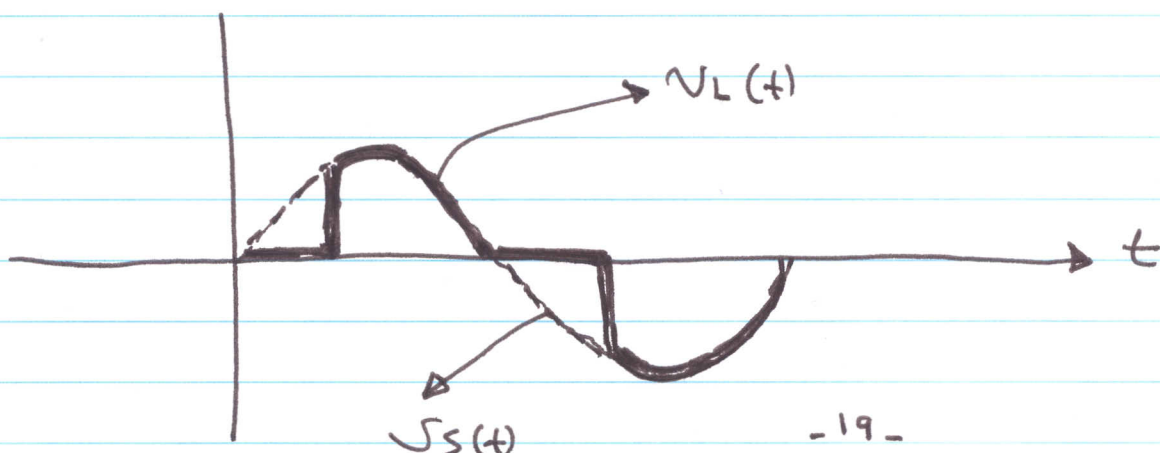
characteristic Curves

- A triac is like a diac with a gate
- The triac functions like two SCR connected in parallel and in opposite direction with a common gate terminal.
- The triac can conduct current in either direction when it is triggered on, depending on the polarity of the voltage across its A_1 and A_2 terminals.
- The triac turns off when the current drops below the holding value (I_H).

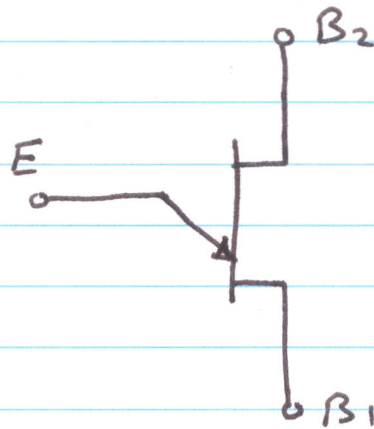
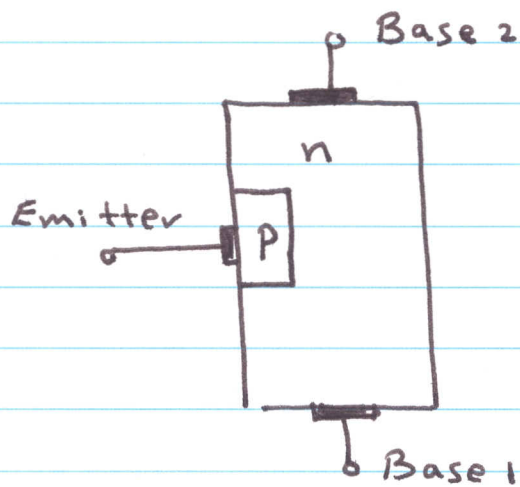
Triac Application



- Diode D_1 Conducts during the positive half-cycle
- The value of R_1 sets the point on the positive half cycle at which the triac triggers
- Diode D_2 Conducts during the negative half cycle
- The value of R_1 sets the trigger point

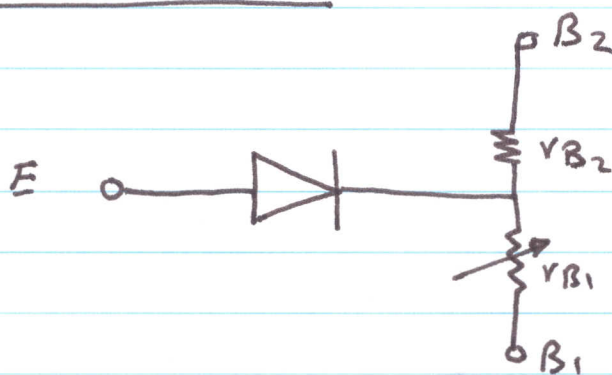


The Unijunction Transistor : UJT



- UJT is a three terminal device ; E, B₁, and B₂
- UJT has one pn junction

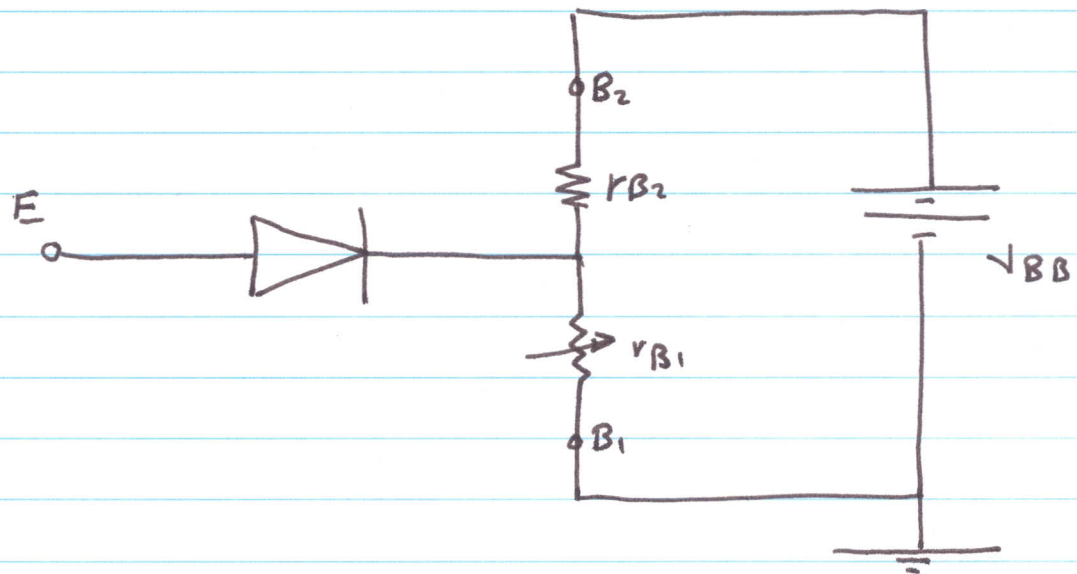
Equivalent Circuit



r_{B1} , r_{B2} are the dynamic resistance

$$r_{BB} = r_{B1} + r_{B2} \quad \text{interbase resistance}$$

r_{B1} varies inversely with emitter current



To find the UJT

$$V_{EB1} \geq V_D + \frac{r_{B1}}{r_{B1} + r_{B2}} V_{BB} = V_p$$

$$V_{EB1} \geq V_D + \frac{r_{B1}}{r_{BB}} V_{BB} = V_p$$

$$V_{EB1} \geq V_D + \eta V_{BB} = V_p$$

$$\eta = \frac{r_{B1}}{r_{BB}} \equiv \text{standoff ratio}$$

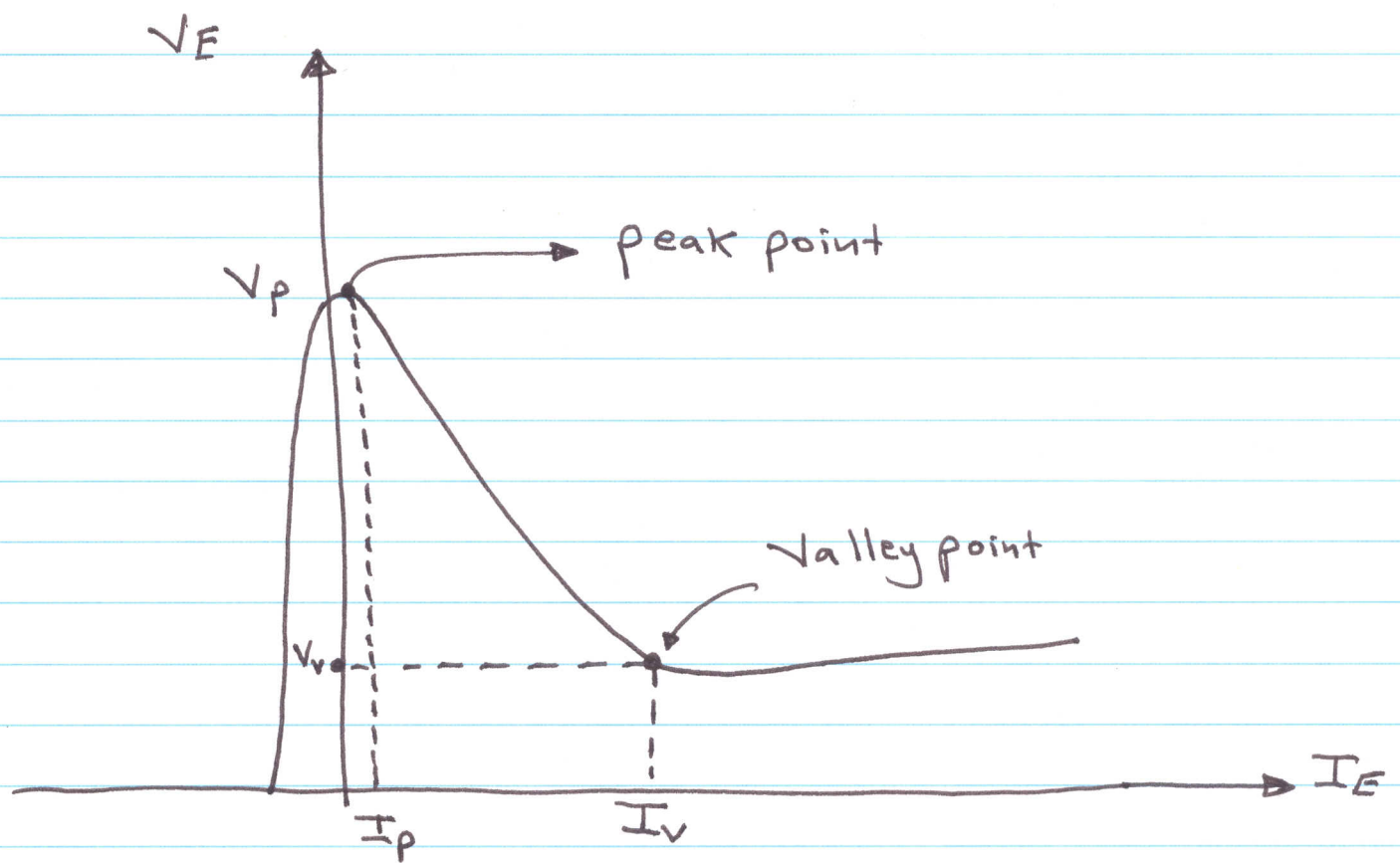
$V_p \equiv$ peak point voltage

As long as the applied emitter voltage V_{EB1} is less than V_p ; there is no emitter current because the pn junction is not

forward biased

- When V_{EB} reaches V_p , the pn junction becomes forward biased and I_E begins.
- Holes are injected into the n-type bar from the p-type emitter
- r_{B1} decreases
- After turn on, the UJT operates in a negative resistance region up to a certain value of I_E .
- After the peak point ($V_E = V_p$ and $I_E = I_p$) V_E decreases as I_E continues to increase, thus producing the negative resistance characteristic.
- Beyond the valley point ($V_E = V_v$ and $I_E = I_v$) , the device is in saturation

UJT Characteristic Curve

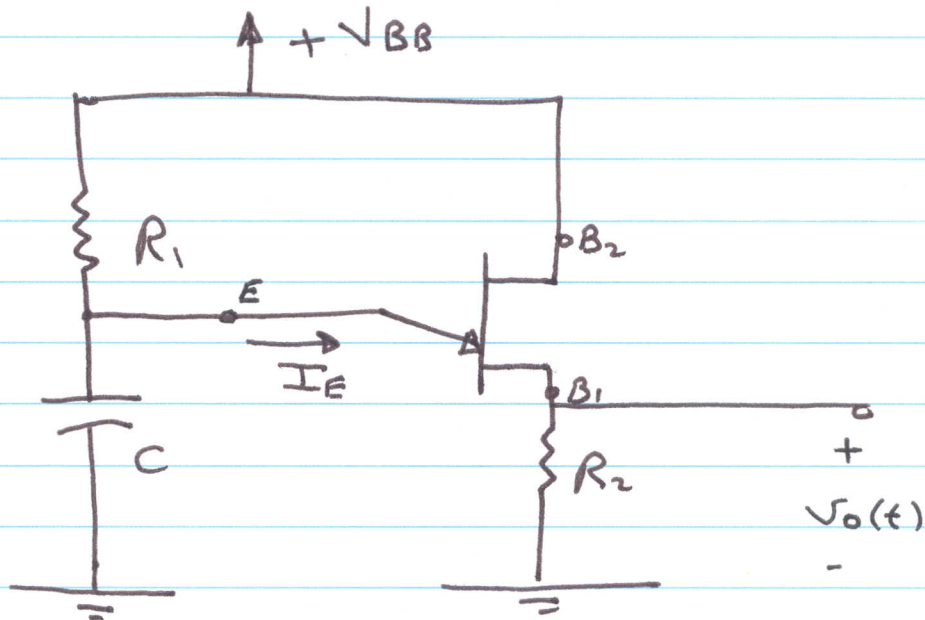


$V_v \equiv$ Valley Voltage

$I_v \equiv$ Valley Current

A UJT Application

Relaxation Oscillator



- When the dc power supply is applied, the Capacitor C charges through R_1 until it reaches V_p
- At this point, the pn junction becomes forward biased and I_E conducts, and V_{B_1} decreases
- The Capacitor then quickly discharges through R_2 and V_{B_1}
- When the Capacitor voltage decreases to the Valley Voltage, the UJT turns OFF

- The Capacitor begins to charge again and the cycle is repeated.

