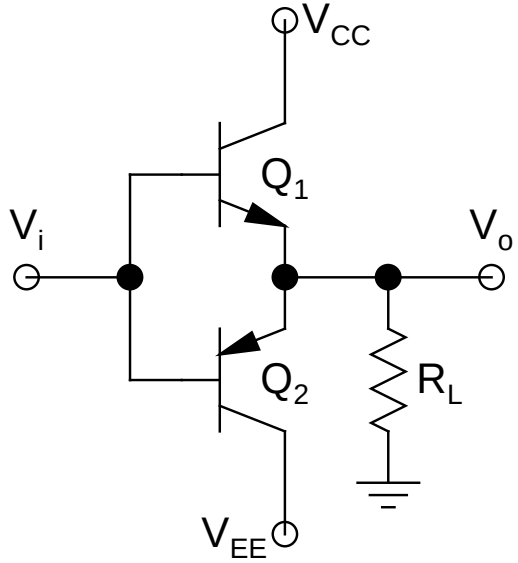
- ***Class B Push-Pull Output Stage***:

  BJT Implementation:

  - Also known as ***Comple-mentary Output Stage***
  - ***Uses dual symmetric power supplies***
  - ***Typical values used***:

    ±3 V, ±5 V, ±12 V, ±15 V
  - ***Q-point***: $V_i = V_o = 0$

    $\Rightarrow V_{be1} = V_{eb2} = 0$



Circuit Schematic

- ***Both Q_1 and Q_2 cutoff***

  $\Rightarrow$ ***Zero standby power***

- ***Note***: $V_{be1} + V_{eb2} = 0$ (***always***)

- ***As $V_i \uparrow$ beyond zero***, $V_{be1} \uparrow$ ***and*** $V_{eb2} \downarrow$

  $\Rightarrow$ ***Q_1 moves towards turning on*** and ***Q_2 is pushed deeper into cutoff***

- ***V_i has to be at least equal to V_γ for Q_1 to conduct*** - till then, ***V_o remains zero***

- ***Once V_i becomes greater than V_γ, Q_1 turns on***, ***supplies current to the load*** (R_L), and ***V_o starts to increase***

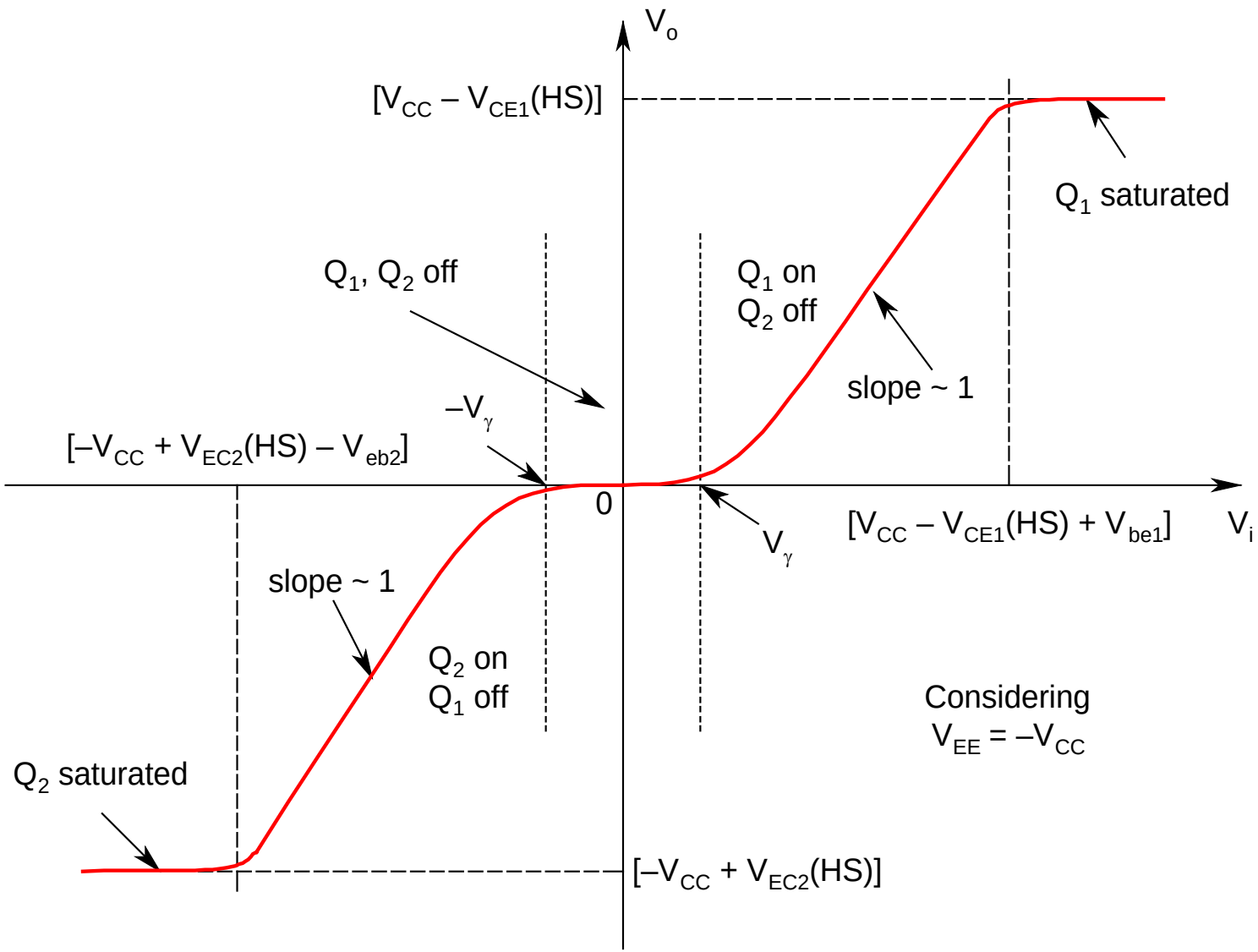
- Similarly, ***as V_i↓ below zero***, ***V_{be1}↓ and V_{eb2}↑***

  $\Rightarrow$ ***Q_2 moves towards turning on*** and ***Q_1 is pushed deeper into cutoff***

- Again, ***V_i has to be at least equal to $-V_\gamma$ for Q_2 to conduct*** - till then, ***V_o remains zero***

- ***Once V_i becomes less than $-V_\gamma$, Q_2 turns on***, ***pulls current away from the load*** (R_L), and ***V_o starts to decrease*** (***remains negative***)

- Thus, the name ***Push-Pull***
  - ***Each transistor remains on for little less than half a cycle***

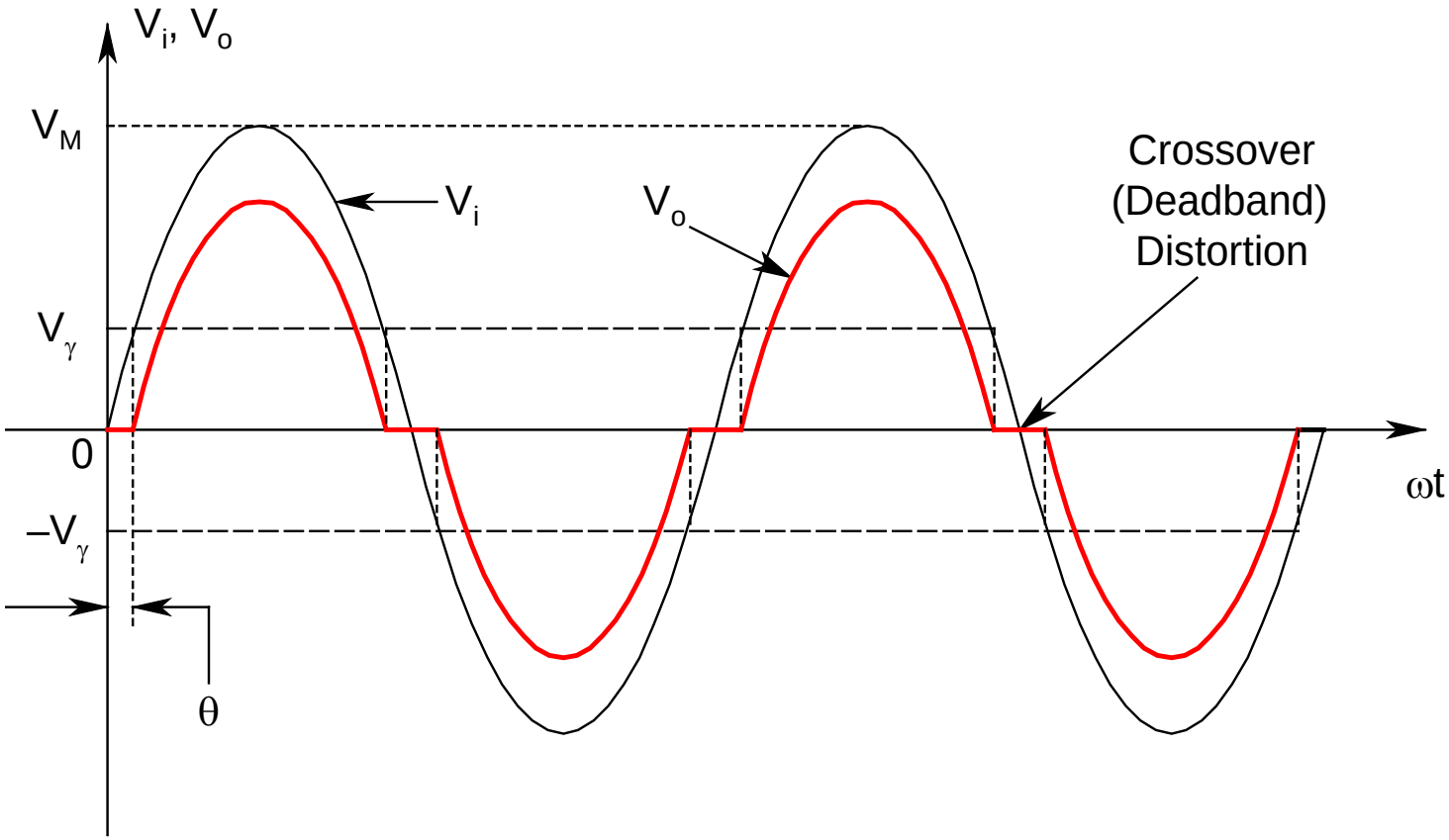


The Voltage Transfer Characteristic (VTC)

- Note the ***deadband*** (***$V_o = 0$***) ***between*** $\pm V_\gamma$
- Consider ***positive*** V_i:
  - ***For*** $V_i > V_\gamma$, V_o ***follows*** V_i with a ***slope of almost unity*** and ***without any phase shift*** (***CC stage***)
  - ***As*** $V_o \uparrow$, $V_{ce1} \downarrow$, and Q_1 ***starts to move towards saturation***

    $\Rightarrow$ ***Positive*** $V_{o,max} = V_{CC} - V_{CE1}(HS)$
  - However, for this to happen, V_i ***has to be greater than*** V_{CC} (since there is an ***extra drop of*** V_{be1})

    $\Rightarrow$ ***This point can never be reached***
- ***The characteristic for negative*** V_i ***can be similarly understood***



Crossover Distortion