Stabilizator serie cu reactie , configuratie Darlington

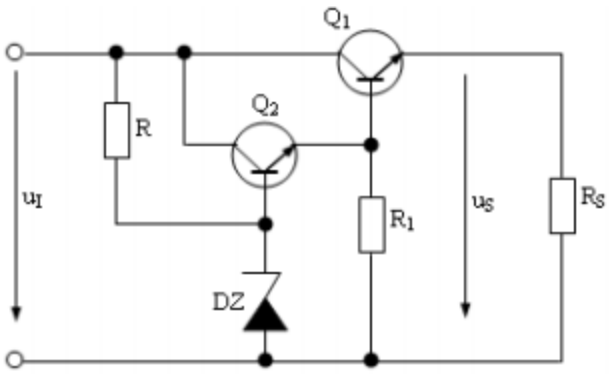
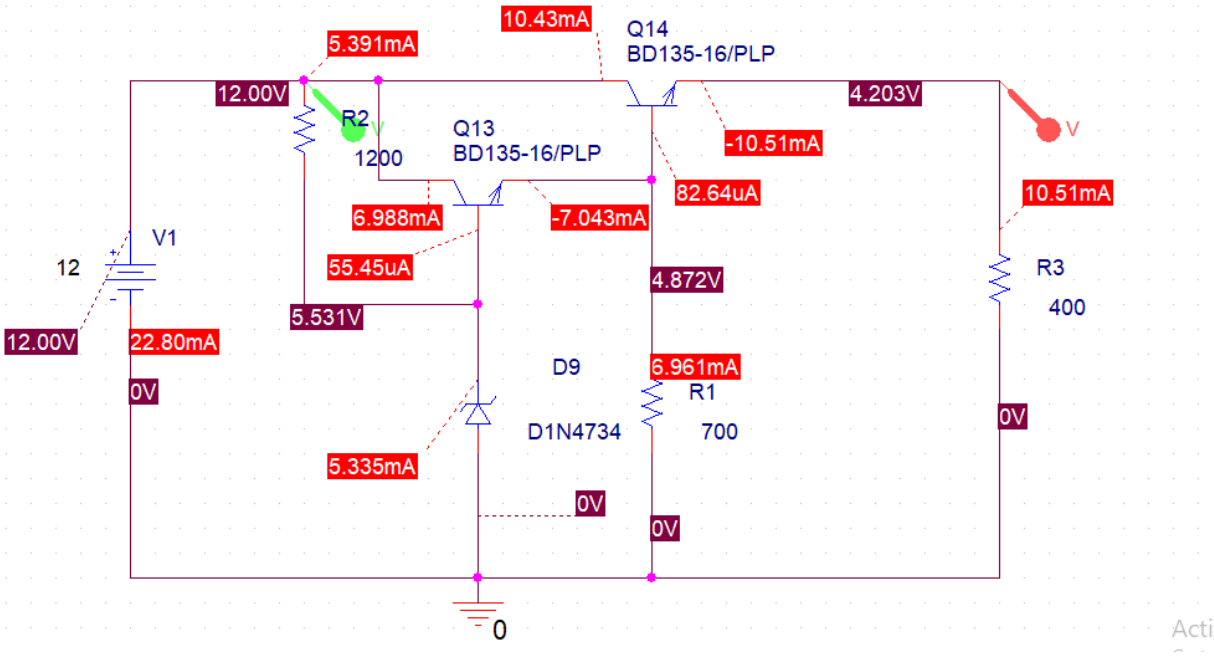
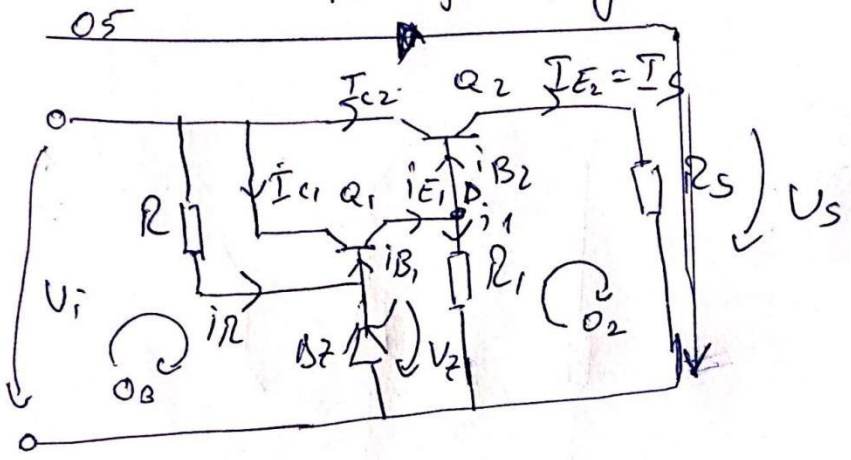


Fig. 9.14 Schema stabilizatorului serie cu reacţie, fără amplificator de eroare cu montaj Darlington



Stabilizator serie cu reactie
Montaj Darlington



$U_1 = 12V$

$U_S = 5V$

$\beta_1 = \beta_2 = 100$

$R = 1{,}2\ K\Omega$

$R_1 = 700\ \Omega$

$R_S = 400\ \Omega$

$K\Pi(O_1): V_{CC} - I_R \cdot R - V_{BE\Delta} - I_E R_S = 0$

$I_E = I_S = \beta_2 I_{B2} + I_{B2} = (\beta_1 + 1) I_{B2} \approx I_{B2} \cdot \beta_2$

$I_E = \beta_2 (I_{E1} - I_{R1}) = \beta_2 (\beta_1 I_{B1} - I_{R1})$

$KI(\Delta): I_{E1} = I_{B2} + I_{R1} \Rightarrow I_{B2} = I_{E1} - I_{R1}$

$I_{E1} = I_{B1} + I_{C1} = (\beta_1 + 1) I_{B1} \approx \beta_1 I_{B1}$

$I_E = \beta_2 I_{B2} = \beta_2 (\beta_1 I_{B1} - I_{R1})$

$I_E = I_S = 10,5\ mA$

$U_S = U_Z - 1,4 = 5,6 - 1,4 = 4,2V$

$I_S = \frac{U_S}{R_S} = \frac{4,2}{400} = 10,5\ mA$

$I_E = \beta_2 \beta_1 I_{B1} - \beta_2 I_{R1} = \beta_D I_{B1} - \beta_2 I_{R1}$

$\beta_D = 100 \cdot 100 = 10.000$

$10,5\ mA = 10.000 \cdot I_{B1} - 100 \cdot 7mA$

KII(O2): $U_{BE} + U_S - R_1 I_{R1} \Rightarrow I_{R1} = \frac{U_{BE} + U_S}{R_1}$

$= \frac{4,2 + 0,7}{400} = 7\ mA \Rightarrow U_{R1} = 700 \cdot 0,007 = 4,9V \approx 5V$

$I_{B1} = \frac{10,5\ mA + 100 \cdot 7\ mA}{10.000} = 71,5\mu A$

KII(O3): $V_i - R I_R - U_Z = 0 \Rightarrow I_R = \frac{V_i - U_Z}{R}$

$= \frac{12 - 5,6}{1200} = 5,3\ mA$

$U_R = 6,4V$

KII(O4): $-V_i + V_{CE1} + R_1 I_{R1} = 0$

$V_{CE1} = V_i - V_{R1} = 12 - 5 = 7V$

KII(O5): $V_{CE2} = V_i - U_S = 12 - 4,2 = 7.8V$

Conclusions:

- When input voltage Ui rises => output voltage Us tend to increase
- The value of the output voltage depends on the zenner diode: $Us = Uz - 1.4$
- Has a much greater current gain because of the Darlington configuration
- Uz is always constant