

Vanica Proiect electronica Proiect CAD

Grupul 2121.

• Circuit de detecție a nivelului de căld.

→ Căld măsură: 1650m

→ Rezistori: 5k-50k

→ $V_{CC} = 15V$

→ Semnalizare: <50, 50-100, 100-150, >150

→ Mod semnalizare: individual.

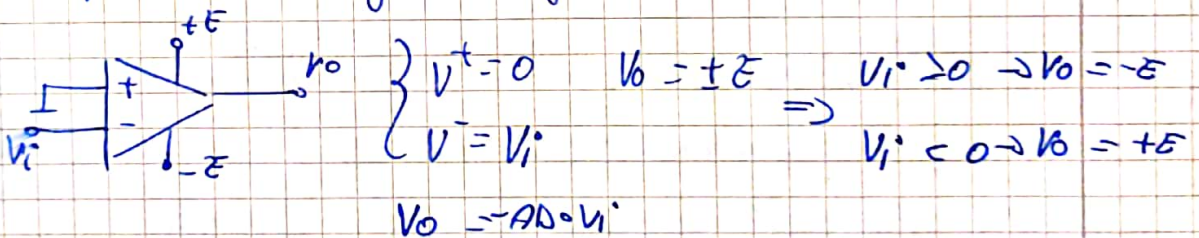
Folosim: R (rezistori); sense de temperatură;

comparator în amon găsi reactiv; LED-uri; potențiometru.

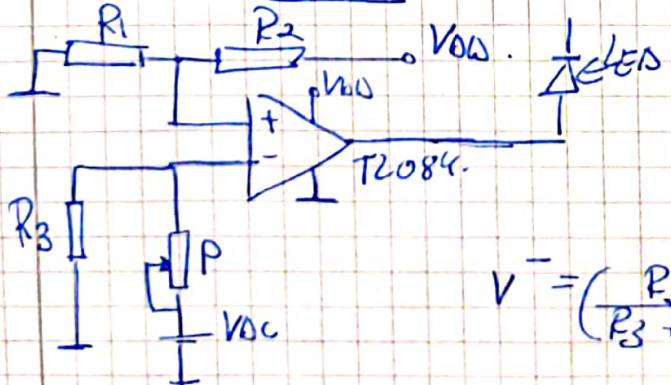
1. Calcule.

1.2 Calcule pentru rezistențe.

Comparator în amon găsi reactiv:



Proiectare circuit:



$$V^- = \left(\frac{R_3}{R_3 + P} \right) \cdot V_{DC}$$

$$V^+ = \left(\frac{R_1}{R_1 + R_2} \right) \cdot V_{DC}$$

$$V^+ = V^- \rightarrow V_{OC} \left(\frac{R_3}{R_3 + P} \right) = V_{AD} \left(\frac{R_1}{R_1 + R_2} \right)$$

$$V_{OC} = V_{AD} = \frac{15V}{15V} \rightarrow \frac{R_3}{R_3 + P} = \frac{R_1}{R_1 + R_2}$$

Alegem $R_3 = 5k$ pentru a simplifica calculul

$$\frac{5k}{5k + P} = \frac{R_1}{R_1 + R_2}$$

Alegem P pentru simplitate

$$I < 50 \Rightarrow P \approx 7k$$

$$\frac{5k}{5k + 7k} = \frac{R_1}{R_1 + R_2} \Rightarrow 0,41 \cdot R_1 + 0,42 \cdot R_2 = R_1$$

$$\Rightarrow R_2 = R_1 \frac{(1 - 0,41)}{0,41} \Rightarrow R_2 = 1,43 \cdot R_1$$

[50 - 100]

$$165 \rightarrow 50k \rightarrow x = \frac{50 \cdot 50}{165} \Rightarrow P = 15,15k$$

$$50 \rightarrow x$$

$$\frac{5k}{5k + 15,15k} = \frac{R_1}{R_1 + R_2} \Rightarrow 0,248 = \frac{R_1}{R_1 + R_2} \Rightarrow$$

$$\Rightarrow R_1 \cdot 0,248 + R_2 \cdot 0,248 = R_1 \Rightarrow$$

$$R_2 = R_1 \frac{(1 - 0,248)}{0,248} \Rightarrow R_2 = 3,03 \cdot R_1$$

[100 - 150]

$$165 \rightarrow 50k \rightarrow x = \frac{100 \cdot 50}{165} = 30,3$$

$$100 \rightarrow x$$

$$\Rightarrow P = 30,3k$$

$$\frac{5k}{5k + 30,3k} = \frac{R_1}{R_1 + R_2} \Rightarrow 0,141 = \frac{R_1}{R_1 + R_2}$$

$$0,141 \cdot R_1 + 0,141 \cdot R_2 = R_1 \Rightarrow R_2 = R_1 \frac{(1 - 0,141)}{0,141}$$

$$\Rightarrow R_2 = 6,09 \cdot R_1$$

E150 I

$$\begin{aligned} 165 &\rightarrow 50k \\ 150 &\rightarrow X \end{aligned} \Rightarrow X = \frac{150 \cdot 50k}{165} \Rightarrow P = 45,5k$$

$$\frac{5k}{5k + 45,5k} = \frac{R_1}{R_1 + R_2} \Rightarrow 0,099 \cdot R_1 + 0,099 \cdot R_2 = R_1$$

$$\Rightarrow R_2 = R_1 \frac{(1 - 0,099)}{0,099} \Rightarrow R_2 = 9,1 \cdot R_1$$

o. Abgorn von Lötblei garantieren

I Potan mind. $[50]$: $R_1 = R_3$ (circuit maichet OR(AD))

$R_2 = R_4$ (circuit maichet OR(AD))

$$R_2 = 1,43 \cdot R_1 \Rightarrow R_1 = R_3 = 1k\Omega$$

$$R_2 = R_4 = 1,43k\Omega$$

€ E96 STANDARD

RESISTOR SERIES.

II Potan mind. $[50 - 100]$: $R_1 = R_5$ (circuit maichet OR(AD))

$R_2 = R_6$ (circuit maichet OR(AD)).

$$R_2 = 3,03 \cdot R_1 \Rightarrow R_2 = R_6 = 3,01k\Omega$$

$$R_1 = R_5 = 1k\Omega$$

€ E96

III Potan mind. $[100 - 150]$: $R_1 = R_7$ (circuit maichet OR(AD))

$R_2 = R_8$ (circuit maichet OR(AD)).

$$R_2 = 6,09 \cdot R_1 \Rightarrow R_1 = R_7 = 1k\Omega$$

$$R_2 = R_8 = 6,04k\Omega$$

€ E96.

IV Potan mind. $[150]$: $R_1 = R_9$ (circuit maichet OR(AD))

$R_2 = R_{10}$ (circuit maichet OR(AD))

$$R_2 = 9,1 \cdot R_1 \Rightarrow R_1 = R_9 = 1k\Omega$$

$$R_2 = R_{10} = 9,09k\Omega$$

€ E96.

V Pentru ultimul au fost pînă la urmă cele care
când se depășește valoarea maximă $P = 504$.

$$\frac{5k}{5k + 50k} = \frac{R_1}{R_1 + R_2} \Rightarrow 0,090 = \frac{R_1}{R_1 + R_2}$$

$$\Rightarrow 0,090 \cdot R_1 + R_2 = 0,090 \cdot R_1 + R_2 = R_1$$

$$R_2 = \frac{R_1 (1 - 0,090)}{0,090} \Rightarrow R_2 = R_1 \cdot 10,1$$

$$R_2 = R_{12} = 9,764k \in E96.$$

$$R_1 = R_{11} = 1k.$$

• Valoarea pentru V_{CC} și V_{AC} , potențiometrul

$$V_{AC} = V_{CC} = 15V$$

$$P \in [5k - 50k]$$

• Valoarea rezistorilor $R_3 = R_{13}$ (circuit proiectat corect).

$$R_3 = R_{13} = 4,99k \in E96.$$

• AO . amplificator operational \Rightarrow comparator în ambele direcții

$$T2084 (U1A; U1B; U1C; U1D; U2A) \in$$

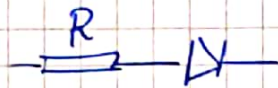
$$\in T2084; T2084A; T2084B.$$

T2084 Datasheet - ST Microelectronics.

WWW.ALPHASHEET.COM

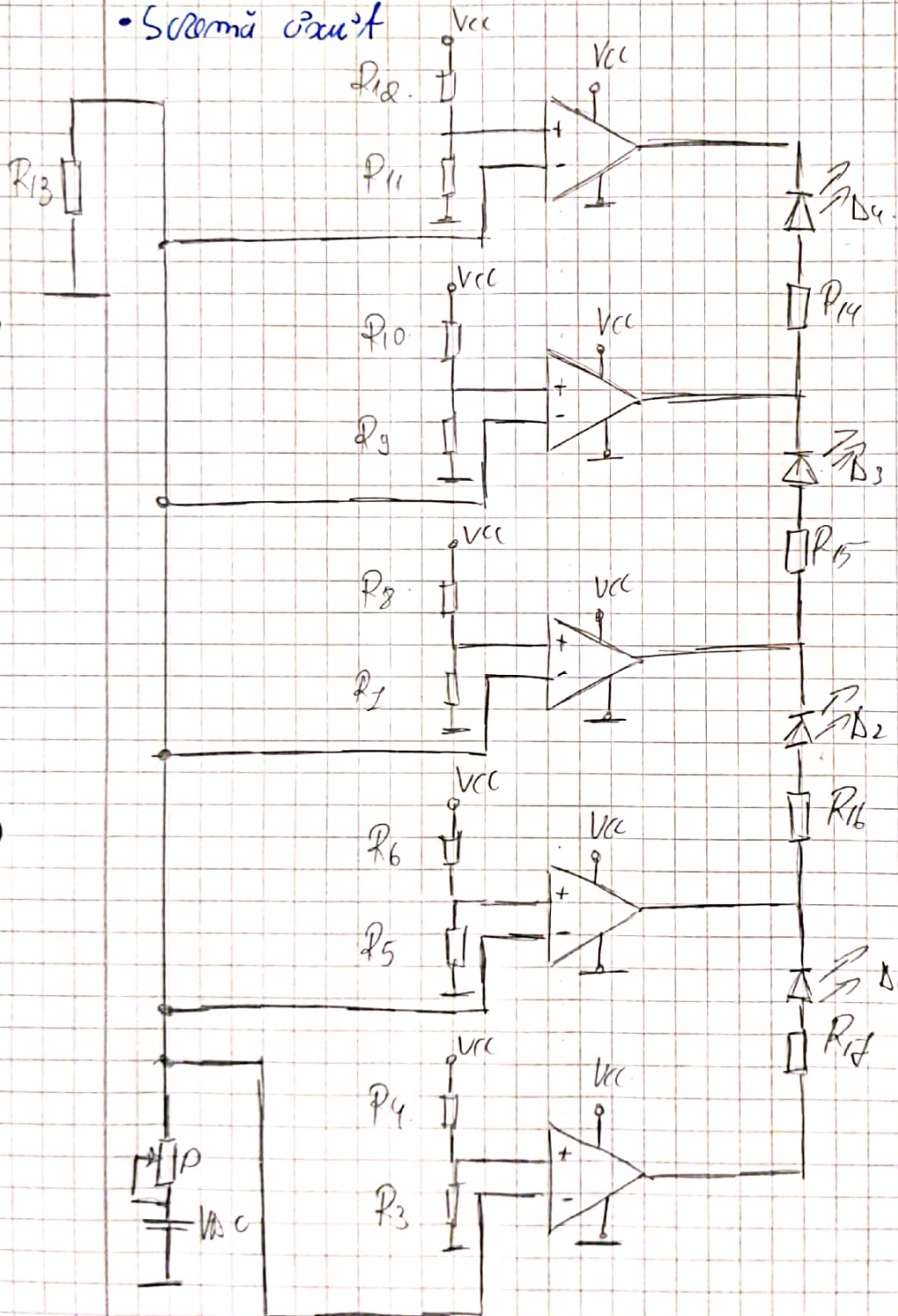
Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage.	± 18	V
V_i	Input Voltage.	± 15	V
V_{id}	Differential Input Voltage.	± 30	V
Plot.	Power dissipation.	680	mV.

• R led.



$$V = I \cdot R \rightarrow R = \frac{V}{I} = \frac{V_0}{I_{led}} = 300 \Omega.$$

• Sistemă de iluminat



Ciurcuit de detectie a nivelului de lichid

Vanca Rafael Marian Grupa 2121

Nivel Masura: 165cm - Rsensor:
5k-50k - VCC = 15v -
Semnalizari : <50, 50-100,
100-150 , >150- Mod semnalizare
: individual

