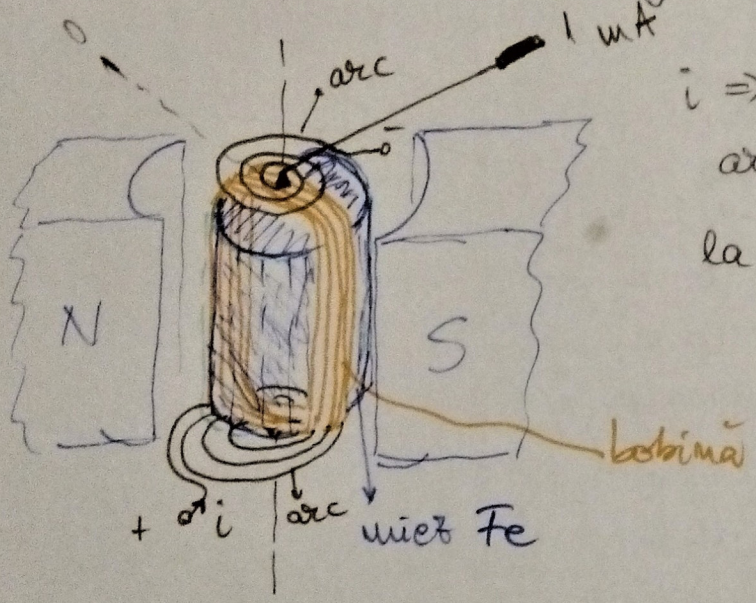
CURS 10 SIS

Măsurarea mărimilor electrice cu AO:

.) Voltmetru analogic DC:

Indicator D'Arsonval: (galvanometru).



$i \Rightarrow \vec{B} \Rightarrow \vec{F}_{mag}$

arc $\Rightarrow \vec{F}_{el}$

la echilibru

$F_{mag} = F_{el}$.

(sau $\mathcal{F}_{mag} = \mathcal{F}_{el}$).

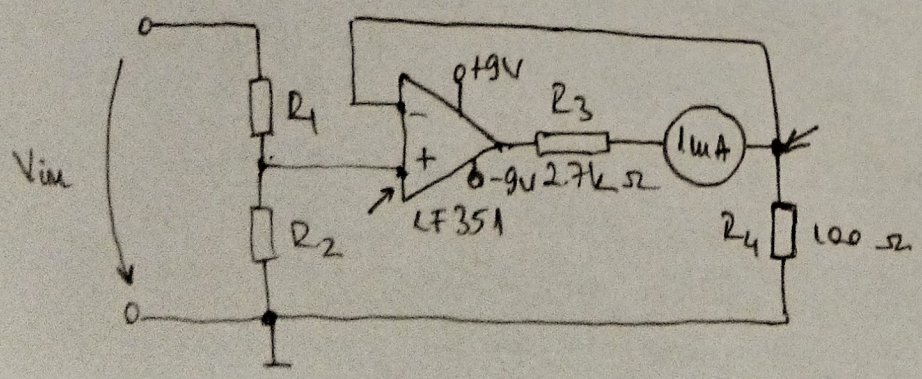
→ ampermetru.

$R \simeq 100\,\Omega \rightarrow K\,\Omega$

FSD: Full-Scale Deflection. → 1 mA.

LF351 → JFET op-amp.

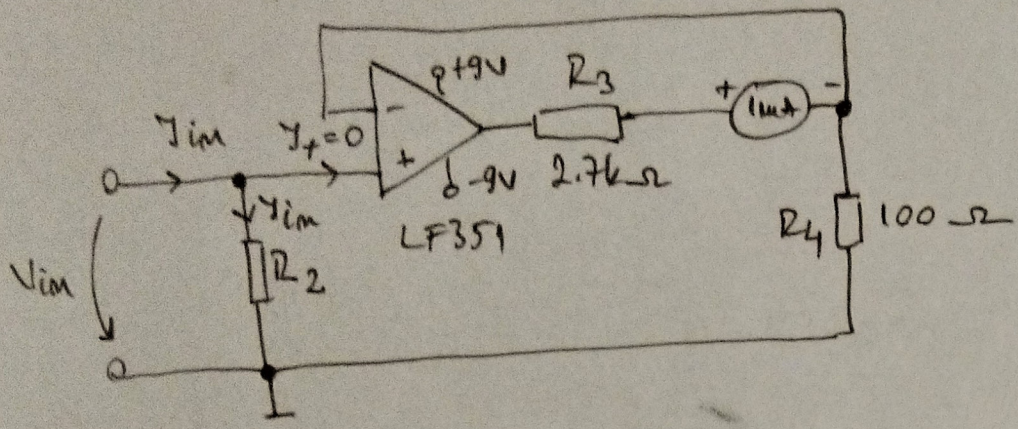
Zin mare



max deflection of 1mA.

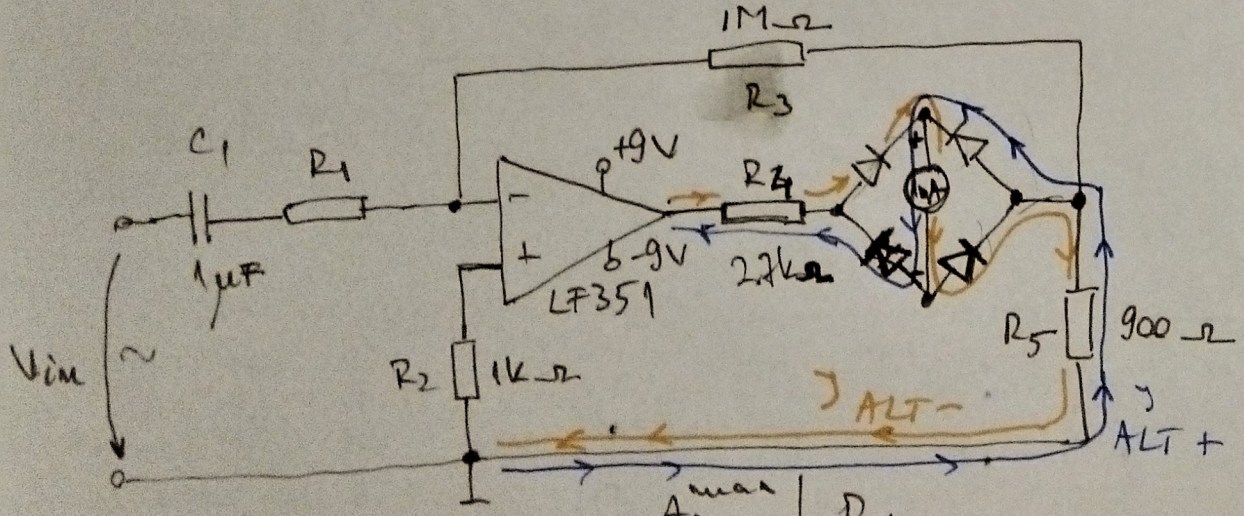
V_{in}^{max}	R_1	R_2
1000 V	10MΩ	1kΩ
100 V	10MΩ	10kΩ
10 V	10MΩ	100kΩ
1 V	900kΩ	100kΩ
0.1 V	0	100kΩ

a) Ampermetru DC:



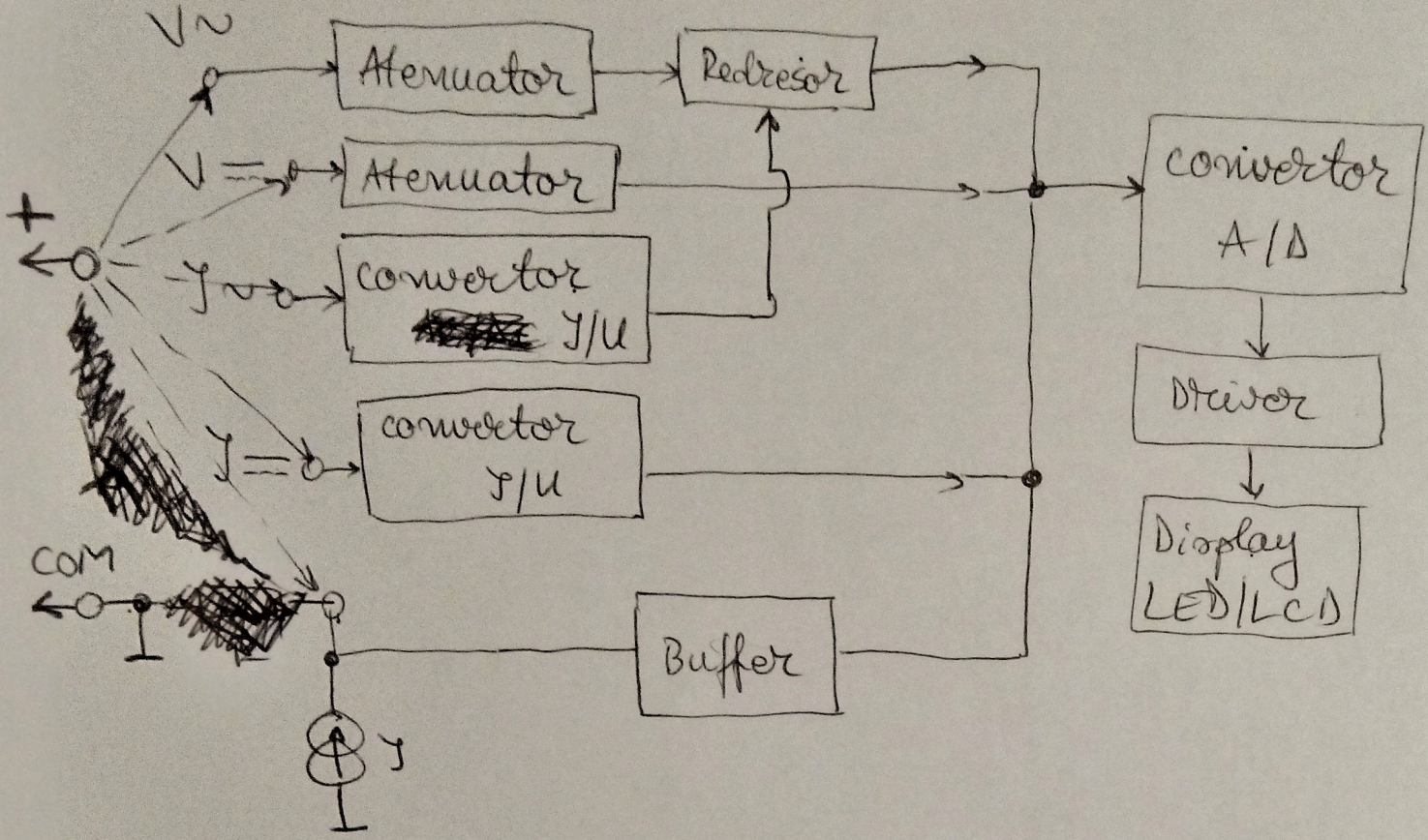
I_{max}	R_2
1A	0.1Ω
100mA	1Ω
10mA	10Ω
1mA	100Ω
100μA	1kΩ
10μA	10kΩ
1μA	100kΩ

b) Milivoltmetru AC:

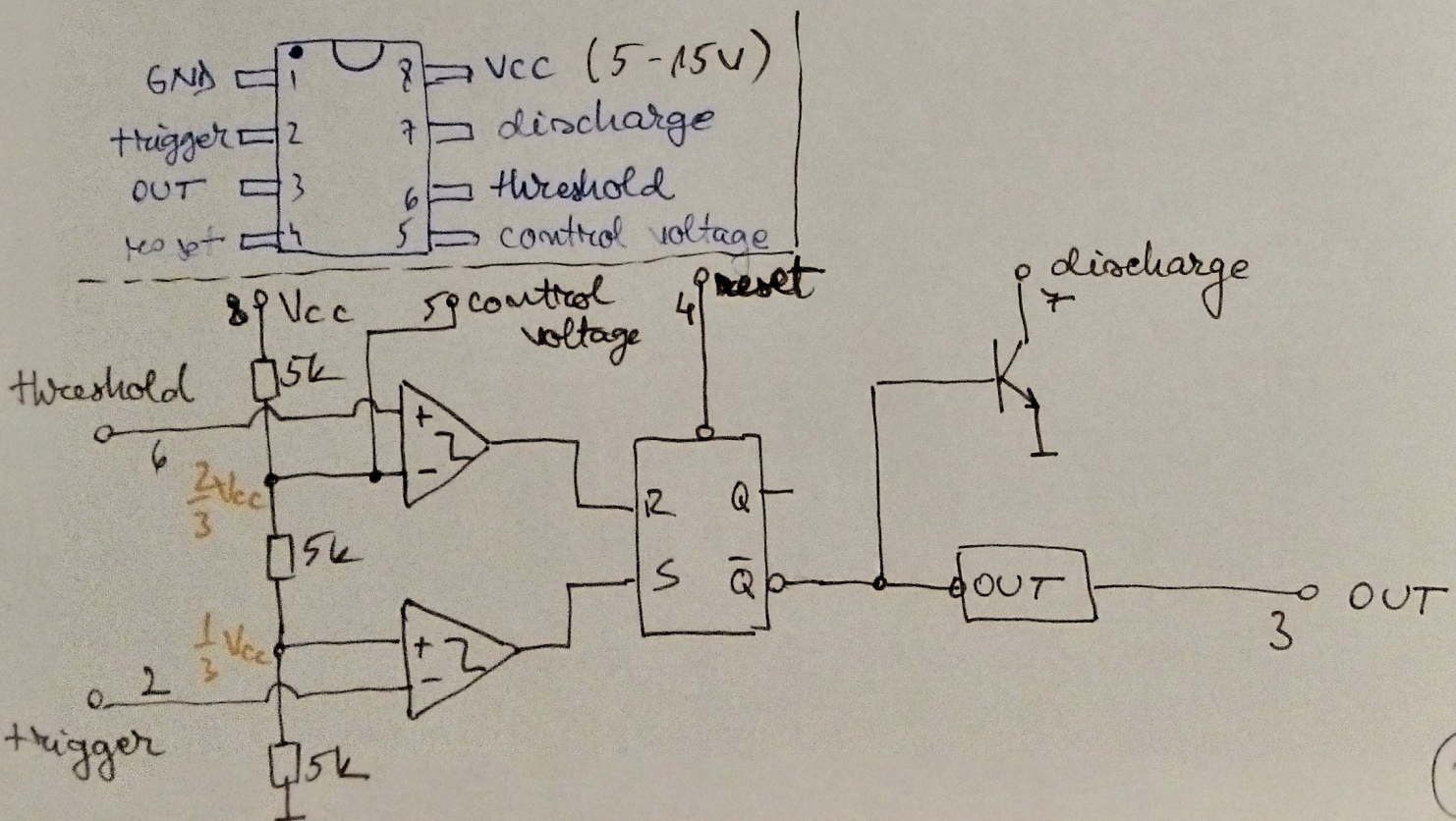


A_{im}^{max}	R_1
1V	1MΩ
100mV	100kΩ
10mV	10kΩ
1mV	1kΩ

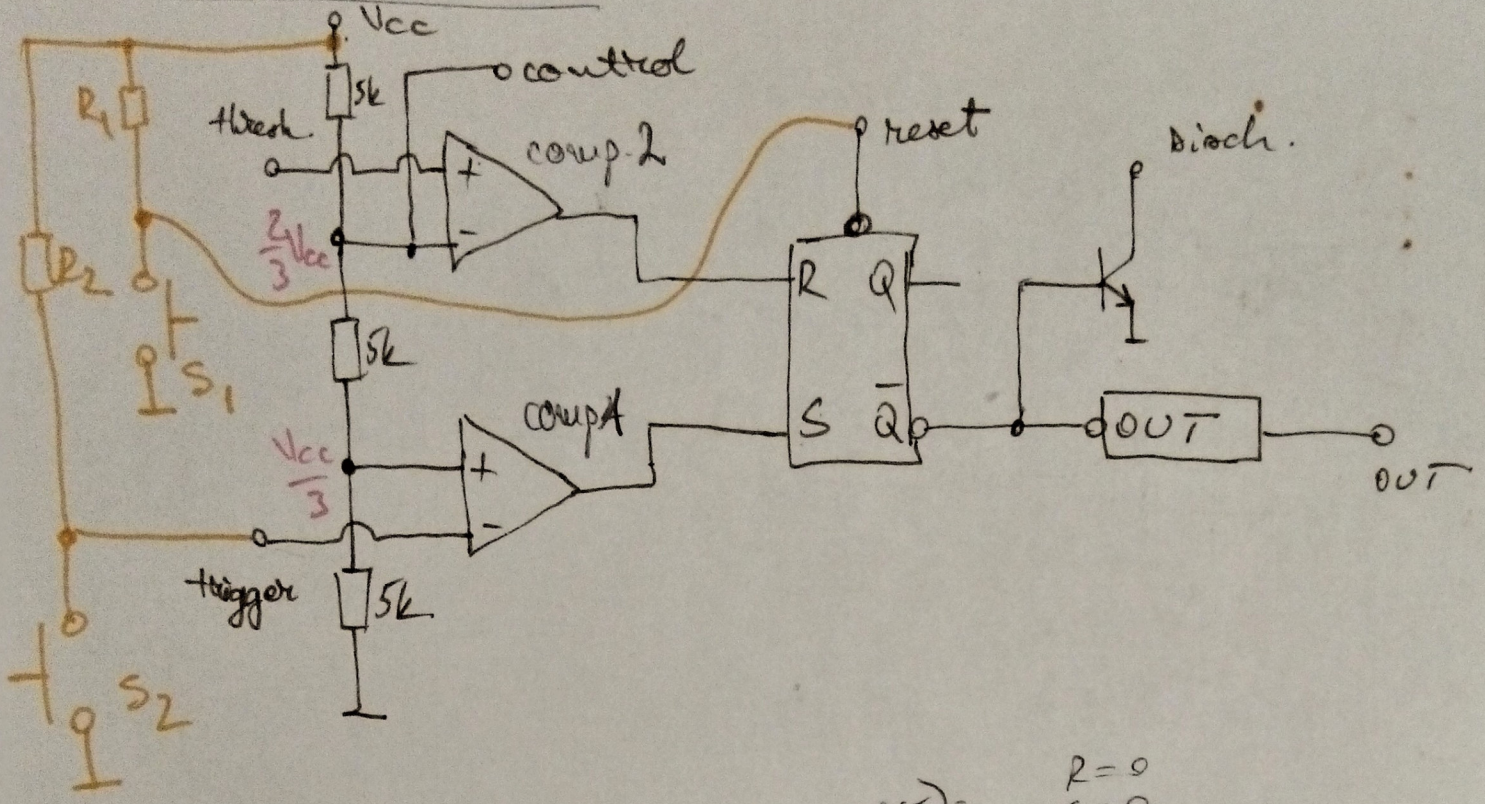
c) Multimetru digital - schemă bloc:



Circuitul integrat 555

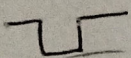


) Modul bistabil:

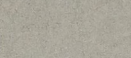


S_1, S_2 off $\Rightarrow$ reset = 1 (inactiv) $\Rightarrow$ R = 0, S = 0.

comp2 = 0, comp1 = 0 $\Rightarrow$ Q = 0, $\bar{Q}$ = 1 $\Rightarrow$ OUT 0.

S_1 off, S_2 on,  $\Rightarrow$ reset = 1, comp2 = 0, comp1 = 1 $\Rightarrow$ R = 0, S = 1 $\Rightarrow$ Q = 1, $\bar{Q}$ = 0 $\Rightarrow$

$\Rightarrow$ OUT = 1.

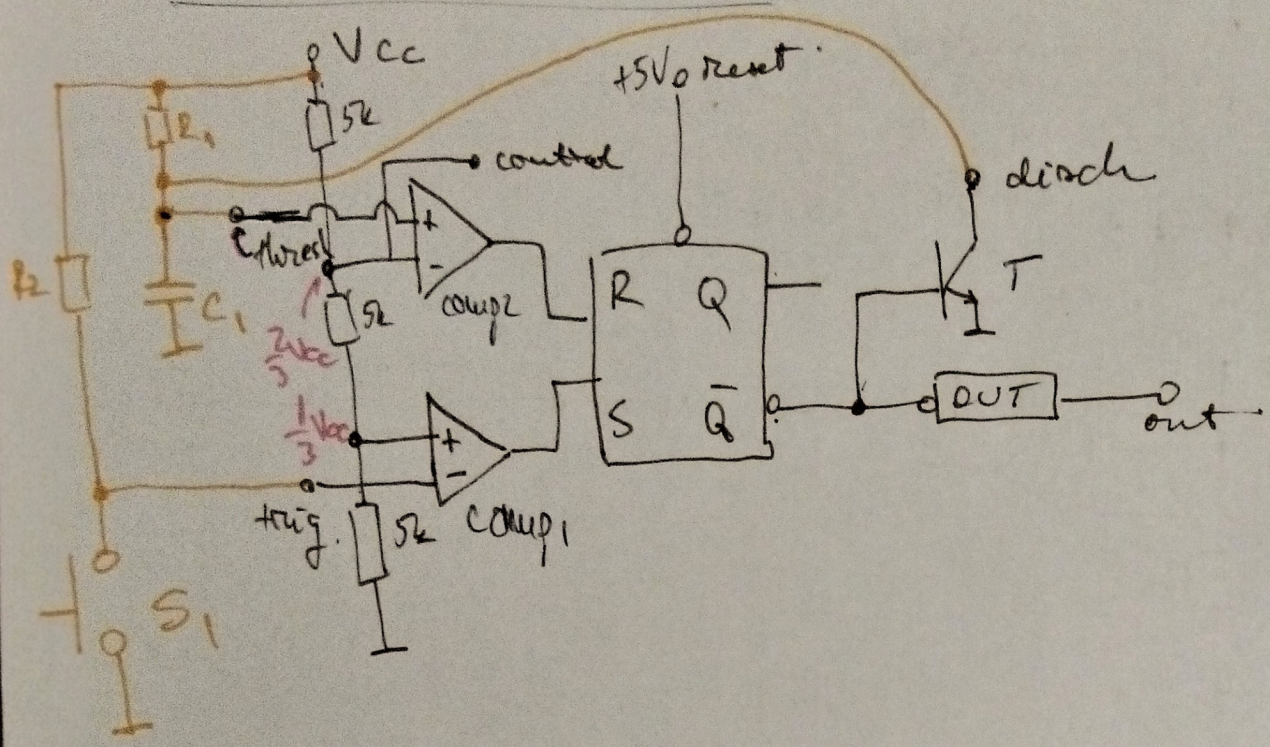

S_1 on, S_2 off $\Rightarrow$ reset = 0, comp1 = 0 $\Rightarrow$ R = 0, S = 0 $\Rightarrow$ Q = 0, $\bar{Q}$ = 1 $\Rightarrow$

$\Rightarrow$ OUT = 0.

S_1 on, S_2 on $\Rightarrow$ OUT = 0

(reset $\Rightarrow$ ignorarea S, R).

a) Modul monostabil:



S_1 off $\Rightarrow$ comp1 out = 0, comp2 out = 0 $\Rightarrow$ S = 0, R = 0 $\Rightarrow$ Q = 0, $\bar{Q}$ = 1 $\Rightarrow$ OUT = 0

$\Rightarrow$ baza T 0 $\Rightarrow$ T conducție $\Rightarrow$ thresh. pin scurtcirc. la 0V.

S_1 on $\Rightarrow$ comp 2 out = 1 $\Rightarrow$ S = 1 $\Rightarrow$ $\bar{Q}$ = 0 $\Rightarrow$ OUT = 1

$\Rightarrow$ T blocat $\Rightarrow$

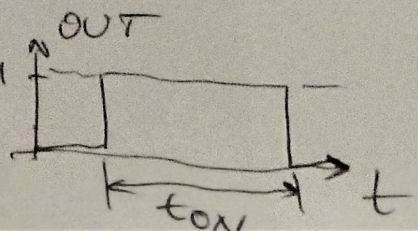
$\Rightarrow$ C_1 se incarcă prin C_1 până la $\frac{2}{3}$ Vcc = V_{cap}.

La $\frac{2}{3}$ Vcc = V_{cap}. $\Rightarrow$

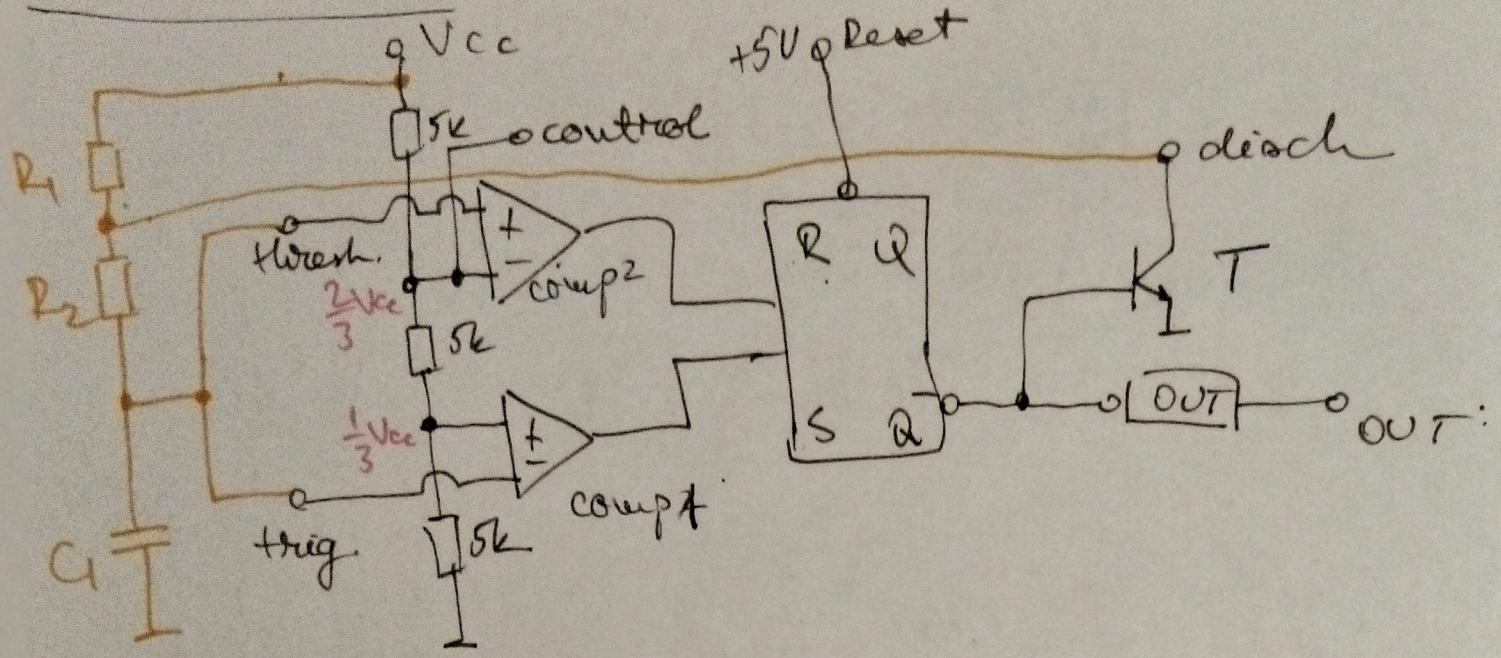
$\Rightarrow$ comp2 out = 1 $\Rightarrow$ R = 1 $\Rightarrow$ $\bar{Q}$ = 1 $\Rightarrow$ OUT = 0

$\Rightarrow$ T conducție $\Rightarrow$ C se descarcă prin T.

$t_{ON} = 1.1 \times C_1 \times R_1$



) Modul astabil : (oscilator / multivibrator)



out = 1

) La t=0 comp1 = 1 ⇒ S=1 } ⇒ $\bar{Q}$ = 0 ⇒ out = 1
comp2 = 0 R=0. }

⇓
T blocat

(*)) C_1 se incarcă prin R_1 și R_2

) Dacă $V_{cap} = \frac{1}{3}V_{cc}$ ⇒ comp1 = 0, dar
⇓
S=0 ⇒ $\bar{Q}$ = 0.

out = 1

) Dacă $V_{cap} = \frac{2}{3}V_{cc}$ ⇒ comp2 = 1 } ⇒ R=1 } ⇒
comp1 = 0 } S=0 }

⇒ $\bar{Q}$ = 1 ⇒ out = 0

⇓ T conductie. ⇒

⇒ C_1 se descarcă prin R_2 până la $V_{cap} = \frac{1}{3}V_{cc}$

$V_{cap} < \frac{2}{3}V_{cc}$ ⇒ comp2 = 0 } SR "no change"
comp1 = 0 }

La $V_{cap} = \frac{1}{3}V_{cc}$ ⇒ comp1 = 1 ⇒ S = 1 ⇒ $\bar{Q}$ = 0 ⇒
⇒ T blocat → go to (*)

$T_H = 0.693 \times (R_1 + R_2) \times C_1$ → timp "high"

$T_L = 0.693 \times R_2 \times C_1$ → timp "low"

Perioada unui ciclu

$$T = T_H + T_L = 0.693 \times (R_1 + 2R_2) \times C_1 .$$

$$f = \frac{1}{T} = \frac{1}{0.693} \cdot \frac{1}{(R_1 + 2R_2) C_1} = 1.44 \cdot \frac{1}{(R_1 + 2R_2) C_1}$$

T_H, T_L pot fi modificate dacă R_1 și R_2 se înlocuiesc cu rezistențe variabile (potențiometre) → (implicit T, f).