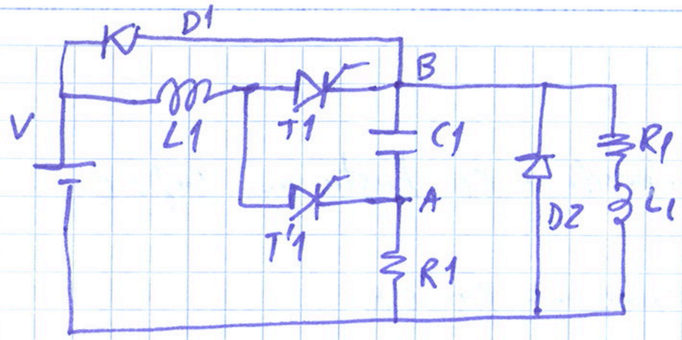
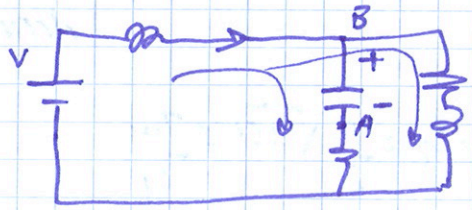
Int. estático de bloqueo forzado por Induct. en serie.



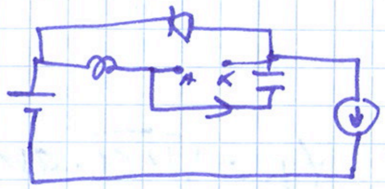
D1 → permite circul. de corriente de descarga de C1

D2 → permite extinción i_{load} sin sobretensión.

$\boxed{t = t_0^-}$
- T1 ON → int. cdo.
- $i_{L1} = I$
- $V_0 = V$
- $V_{C1} = V$ ($Z_1 = R1C1$)
- $V_A = 0$
- T2, D1, D2 → OFF



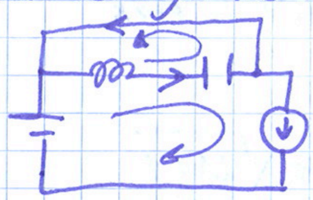
$\boxed{t = t_0}$ T'1 ON → apertura int.



$$\left.\begin{array}{l} V_A = 0 \rightarrow V \\ V_B = V \rightarrow 2V \end{array}\right\}$$

$V_{AK\_T1} = V_{\cancel{A}} - V_B = -V_C = -V$

comienza descarga resonante de C1 a través de $\begin{cases} L1 \\ D1 \\ T'1 \end{cases}$



en $\boxed{t = t_1}$ → $V_{C1} = 0 \Rightarrow V_{AK\_T1}$ = pasa por 0 $\Rightarrow t_c$

$\left.\begin{array}{l} i_{L1} \\ i_{D1} \end{array}\right\} \Rightarrow$ Máximo

$$\boxed{t_1 = t_0 = \sqrt{L_1 C_1}\ \text{arctg}\left(R\sqrt{\frac{C_1}{L_1}}\right)}$$

$V_{in}/I_{máx}$

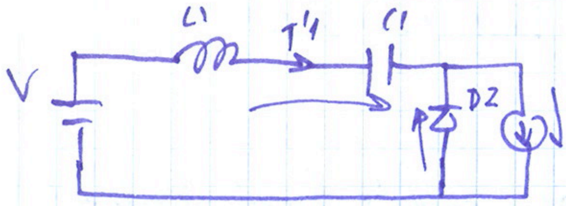
en $\boxed{t = t_2}$ → $i_{D1}(t_2) = 0$ ⟶ $\begin{cases} D1 \text{ OFF} \\ V_C = -V \rightarrow D_2 \text{ ON} \end{cases}$

↓

$\underline{V_{carga} = 0}$

$i_{D1}(t_2) = i_{T'1}(t_2) - I_0 = 0$

↳ $t_2 = \sqrt{L_1 C_1}\ \text{arcsen}\left(\frac{2R\sqrt{L_1 C_1}}{R^2 C_1 + L_1}\right)$



i_{L1} sigue cargando más negativamente a C1 hasta que $i_{T_1'} = 0$

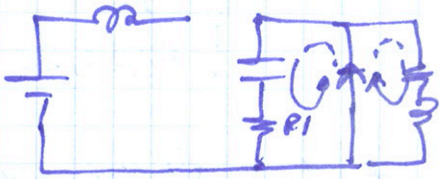
en $\boxed{t = t_3}$ – $i_{T_1'} = 0$ — T'1 bloqueo – D2 ON

$$V_{carga} = \begin{cases} 0 & \text{si } J_{DC} \\ \text{decrece a 0 con } \tau = LR & \text{si es carga } RL \end{cases}$$

$$t_3 - t_2 = \frac{\pi}{2}\sqrt{L1C1} = \frac{T_{res}}{4}$$

$\boxed{t > t_3}$ — T'1 bloqueado.

C1 se descarga por R1, D2



DISEÑO : – $t_b = \sqrt{L1C1} \cdot \operatorname{arctg}\left\{ \frac{V_{in}}{I_{o\,max}} \cdot \sqrt{\frac{C1}{L1}} \right\}$

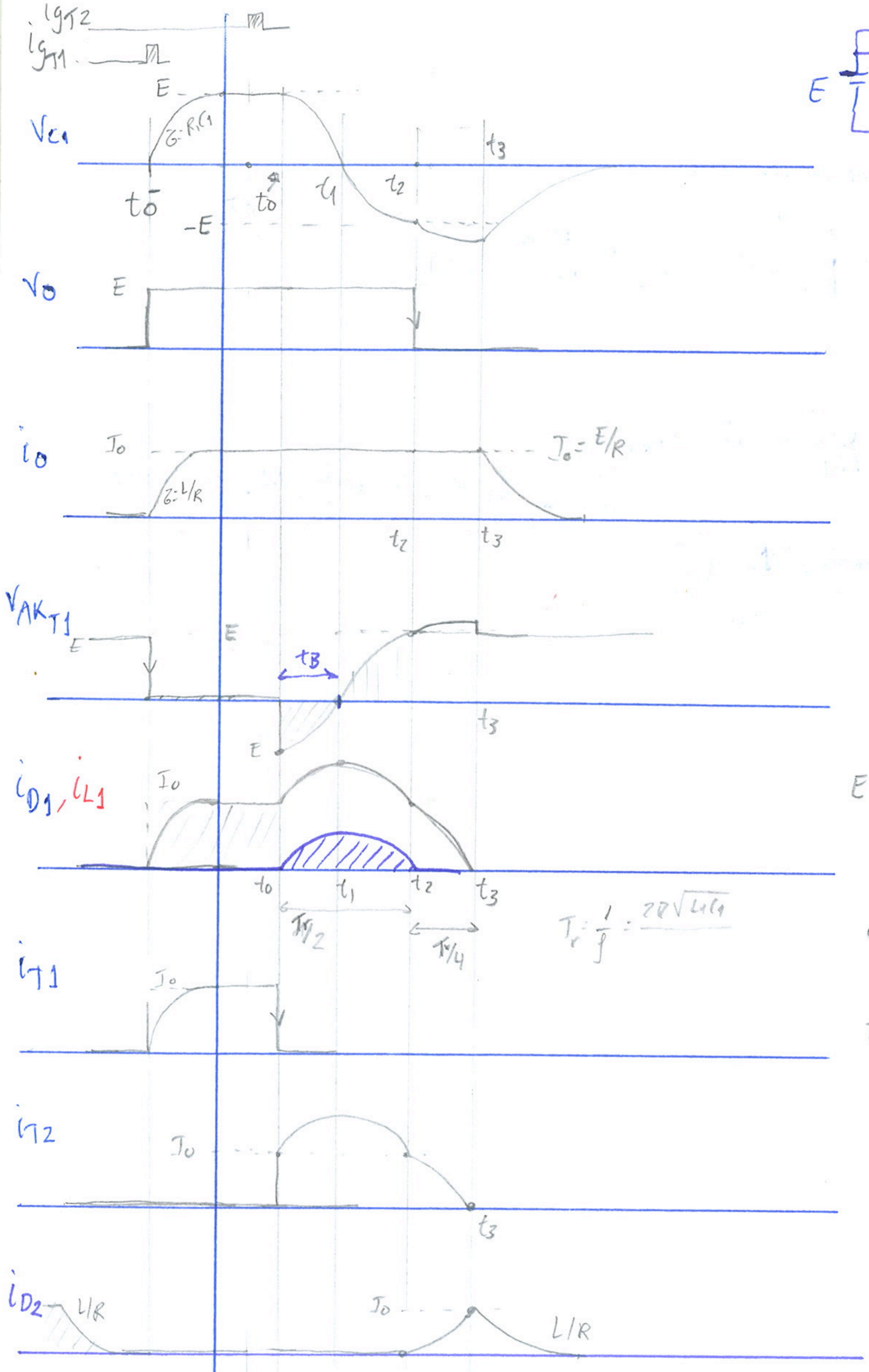
→ Menor energía resid. posible

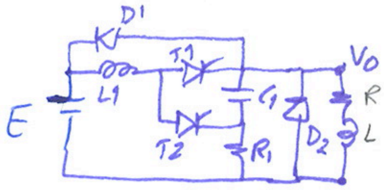
$$i_{L1\,max} = V_{in}\sqrt{\frac{C1}{L1}} \simeq 1{,}5\, I_{o\,max}$$

$$\Downarrow$$

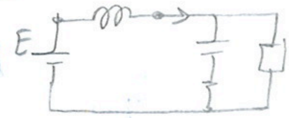
$$t_q = \sqrt{L1C1} \cdot \operatorname{arctg}(1{,}5) \approx \sqrt{L1C1}$$

$$\hookrightarrow \begin{cases} C1 = 1{,}5 \cdot t_q \dfrac{I_{o\,max}}{V_{in}} \\ L1 = 0{,}66 \dfrac{t_q \cdot V_{in}}{I_{o\,max}} \end{cases}$$

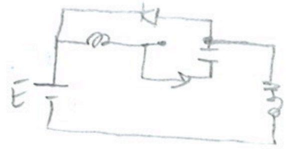




$t_0^- < t < t_0$ $\quad t_0^- \to T1\ ON$



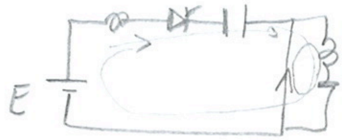
$t = t_0 \to T2\ ON$



en $t = t_2 \to D1\ OFF$

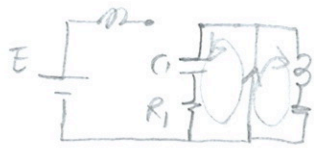
$V_{C1} = -E$

$E = V_0(t) - V_c(t) \to D_2\ ON$



cuando $i_{D2} = I_0 \to T2\ OFF$

en $t_3 \to T2\ OFF$



$$t_B \to \quad \left. V_{AKT1}(t_1) = -V_{C1}(t_1) = 0 \right\} \to t_1 = t_B = \sqrt{L_1 C_1} \cdot \operatorname{arctg}\left[\underset{\downarrow\ \frac{E}{I_{max}}}{R} \cdot \sqrt{\frac{C_1}{L_1}}\right]$$

→ se limita la energía reactiva

$$i_{T_2}\Big|_{res.} = \boxed{E \cdot \sqrt{\frac{C_1}{L_1}}}\, sen\left(\frac{t}{\sqrt{L_1 C_1}}\right) + \frac{E}{R_0} \cos\left(\frac{t}{\sqrt{L_1 C_1}}\right)$$

$$\boxed{E \cdot \sqrt{\frac{C_1}{L_1}} = 1.5\ I_{o\,Máx}}$$

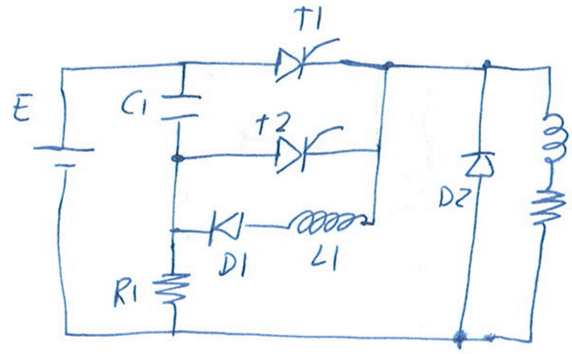
$$t_q = \sqrt{L_1 C_1} \cdot arctg\left(\frac{E}{I_{o\,Máx}} \sqrt{\frac{C_1}{L_1}}\right)$$

$$\rightarrow \boxed{t_q = \sqrt{L_1 C_1} \cdot arctg\,(1{,}5) \simeq \sqrt{L_1 C_1}}$$

$$C_1 = 1{,}5 \cdot t_q \frac{I_{o\,Máx}}{E}$$

$$L_1 = 0{,}66\ \frac{t_q \cdot E}{I_{o\,Máx}}$$

* Troceador de Oscilación



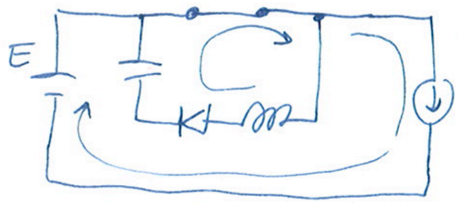
$t < t_0 \rightarrow \left.\begin{matrix} T1 \\ T2 \end{matrix}\right\} OFF$

$I_{D2} = I_0$

$V_{C1} = E$

en $t = t_0 \rightarrow$ T1 ON — i_{C1} descarga por L1 D1 — circt. resonante unidirec.

D2 OFF



$V_{carga} = E$

$$\left.\begin{matrix} i_c(t) = \dfrac{E}{L_1 \omega} sen(\omega t) \\ V_c(t) = E \cos(\omega t) \end{matrix}\right\} \omega = \frac{1}{\sqrt{L_1 C_1}}$$

t_1

$V_c(t_1) = 0$

$$i_{D1}(t_1) = max = \frac{E\sqrt{L_1 C_1}}{L_1} = E\sqrt{\frac{C_1}{L_1}} \quad — \quad \left[t_1 = \frac{T}{4}\right] = \frac{\pi}{2}\sqrt{L_1 C_1}$$

t_2

$$\left.\begin{matrix} i_{D1}(t_2) = 0 \\ V_c(t_2) = -E \end{matrix}\right\}$$

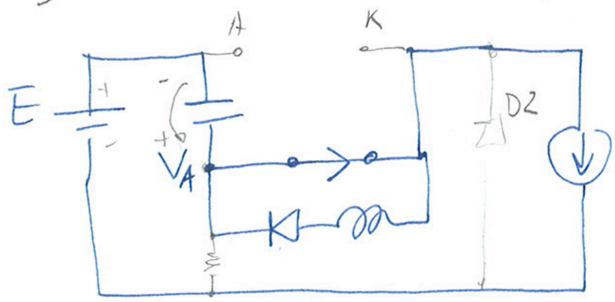
$$V_{AK\,T2} = -V_c(t) \left\{\begin{matrix} V_{AK-T2}(t_0) = -E \\ V_{AK-T2}(t_1) = 0 \\ V_{AK-T2}(t_2) = E \end{matrix}\right.$$

$\Rightarrow$ * puede ser cebado para comienzo del instante de apertura.

en $\boxed{t = t_3}$ → apertura del regulador

T2 ON.

$t_3 \rightarrow T2\ ON$



$V_c(t_2) = -E \longrightarrow V_A = 2E$

en $t_3 \rightarrow V_{ak\,T1}(t_3) = E - V_A = -E$

$\downarrow$

bloqueo de T1

$$\begin{cases} V_{carga} = V_A = 2E \rightarrow \text{salto tensión.} \\ V_{ak\,D2} = 0 - 2E \longrightarrow \text{invers. polariz.} \end{cases}$$

t_3^+

$\rightarrow C_1$ se descarga por T2 — de forma lineal I_0

$$V_C(t) = V_C(t_2) + \frac{1}{C}\int i\,dt = -E + \frac{I_0 \cdot t}{C_1}$$

$$V_C(t_c) = 0 \longrightarrow \boxed{t_c = \frac{E C_1}{I_0}}$$

instante a partir del cual $V_{ak_{T1}} > 0$

$\downarrow$

$$\left[C_1 \geq \frac{t_{off} \cdot I}{E} \right] \quad (t_c > t_q)$$

en $t_4 \rightarrow V_C(t_4) = E \longrightarrow V_{ak\,T1} = V_c = E$

$\downarrow$

$V_{AK\,D2} = 0 \longrightarrow V_{carga} = 0 \quad t_4^+ — D2\ ON$

$\downarrow$

* corte de T2 por falta de corriente.

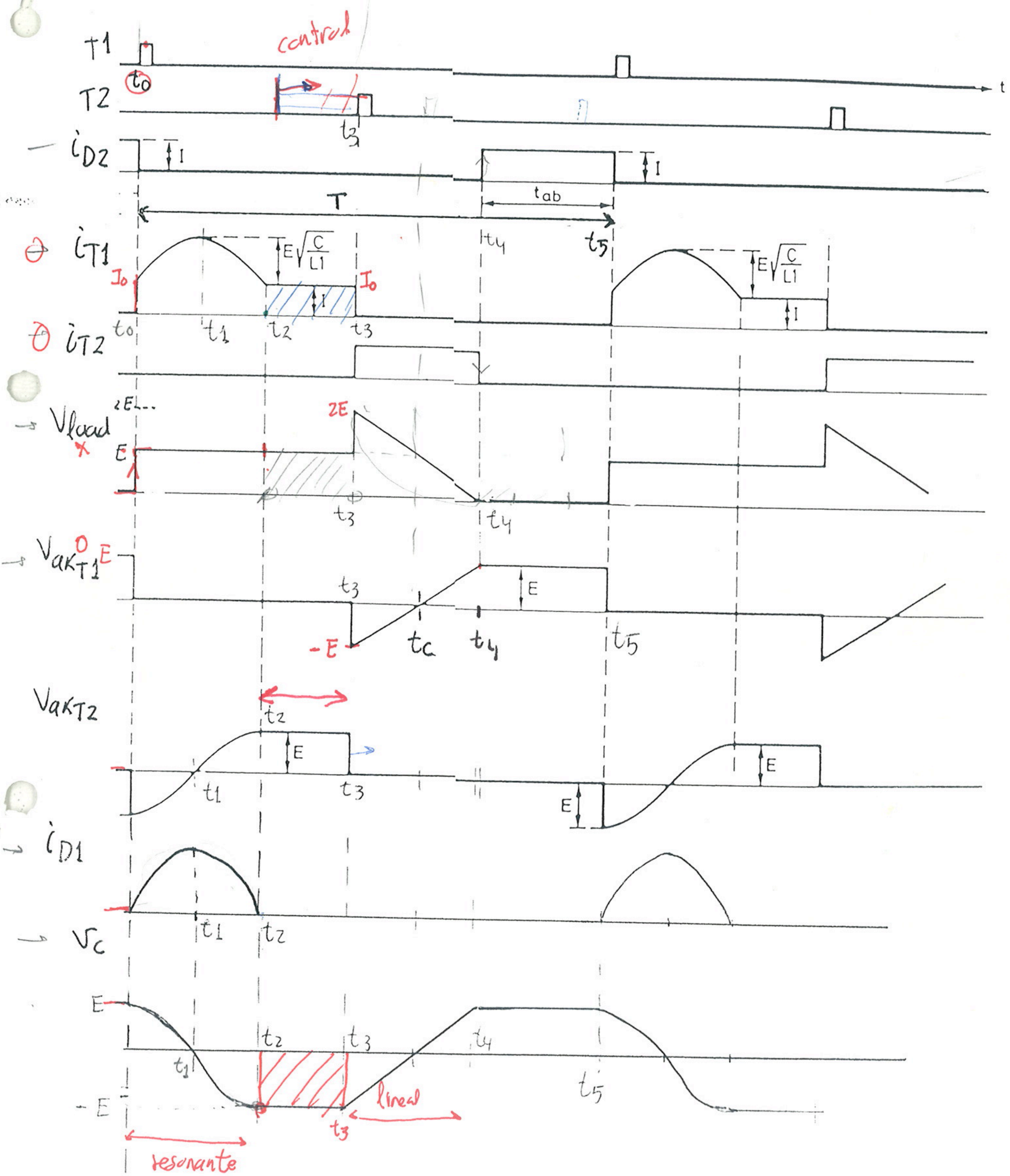
$V_C(t_4) = E$

$$\hookrightarrow E = -E + \frac{I\,t_4}{C_1} \longrightarrow \left| t_4 = \frac{2E \cdot C_1}{I_0} \right|$$

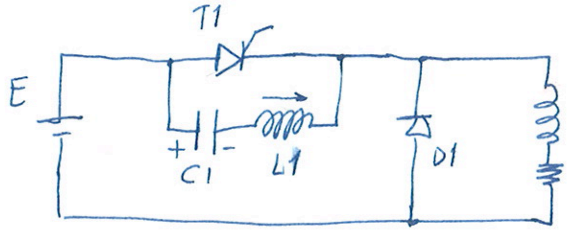
$V_{ak\,T2}(t_4^+) = 0 \rightarrow I_{T2} = 0$

$i_{D2} = I_0 \longrightarrow$ hasta la nueva conduc. de T1 en t_5 nuevo periodo de funcionamiento.

Troceador de Oscilación.



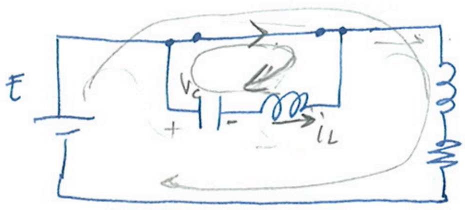
* Regulador de frecuencia variable. Bloqueo por cirt. resonante →
(Autoconmutado)



- → t_{on} → establecido por LC
- → variación P_o con la frecuencia ↓ t_{off} variable
- simple
-

$\boxed{t<t_0}$ → T1 OFF, D1 ON — $V_{load}=0$ $\Big\}$ $V_{AK-T1}=E$; $V_{C_1}=E$, $i_{D_1}=I_o$

$\boxed{t=t_0}$ → ↑ T1 ON comienza descarga resonante. de C_1



$\boxed{D1\ OFF}$; $V_{load}=E$

$$V_{L_1}+V_{C_1}=0 \rightarrow V_{C_1}=-L\frac{di_c}{dt}$$

$$i_L=-i_c=-C\frac{dV_c}{dt}$$

$\boxed{\underline{i_{T_1}(t)+i_{L_1}(t)=I_o}}$

$$i_{L_1}(t)=\frac{E}{L_1\omega}\cdot \operatorname{sen}\omega(t-t_0)$$

$$V_{C_1}(t)=-E\cos\{\omega(t-t_0)$$

$$W_1=\frac{1}{\sqrt{L_1C_1}}$$

en $t=\frac{t_0+t_1}{2}$ → $V_C=0$, i_{L_1} máx

$\boxed{t_0<t<t_1}$ semiciclo resonante de descarga de C_1 desde E a $-E$

$$\boxed{t_1-t_0}=\frac{2\pi\sqrt{L_1C_1}}{2}=\pi\sqrt{L_1C_1}=\frac{\pi}{\omega_1}$$

$\boxed{t_1<t<t_2}$ C_1 se descarga pero en sent. opuesto.

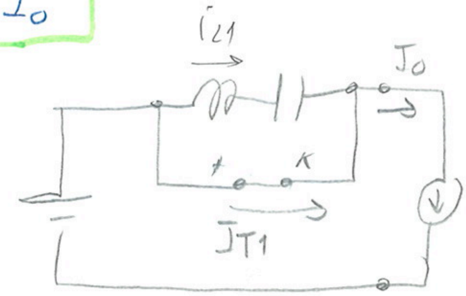
V_{C_1} se hace menos negativo.

i_{C_1} va de 0 hasta I_o senoid.

i_{T1} va de I_o hasta 0

$$t_2-t_1=\frac{1}{\omega}\operatorname{arcsen}\left[\frac{I_o\cdot L_1\cdot\omega_1}{E}\right]$$

en $t = t_2 \rightarrow$ $\boxed{T1\ OFF}$ pues $\boxed{i_{L1}(t_2) = I_0}$



$i_{T1} = I_0 - i_{L1} = 0$

$V_{AK-T1} = -E + \epsilon = V_C$

$V_{load} = 2E - \epsilon$

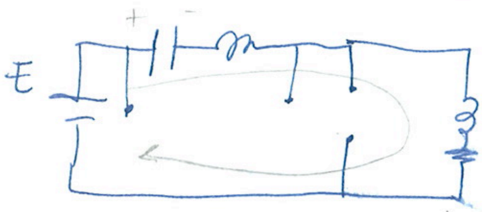
$V_{load} = E - V_C = E - (-E+\epsilon)$

$t_2 - t_1 = \frac{1}{\omega} \text{arcsen}\left[\frac{I_0 L_1 \omega}{E}\right]$

coincide con el tiempo de bloqueo. ←

$\boxed{t_2 < t < t_3}$

~~Des~~carga $\boxed{\text{lineal de } C1}$



V_{C1} de $V_{res.}$ hasta 0

$V_{AK-T1} = V_C$

$\left[V_{load} = E - V_C\right] \rightarrow E < V_{load} < 2E$

$t_3 - t_2 = |V_c(t_2)| \cdot \frac{C_1}{I_0} \equiv t_{bloqueo}$ ←

$i_c = C \frac{dV}{dt}$

$t_3 \rightarrow$ final bloqueo $\rightarrow V_{AK-T1} = V_c = 0$

$i_{L1} = I_0$; $I_{D1} = I_{T1} = 0$

$V_{load} = E - V_c = E$

$V_{AK-D1} = -V_{load} = -E$ — D1 OFF

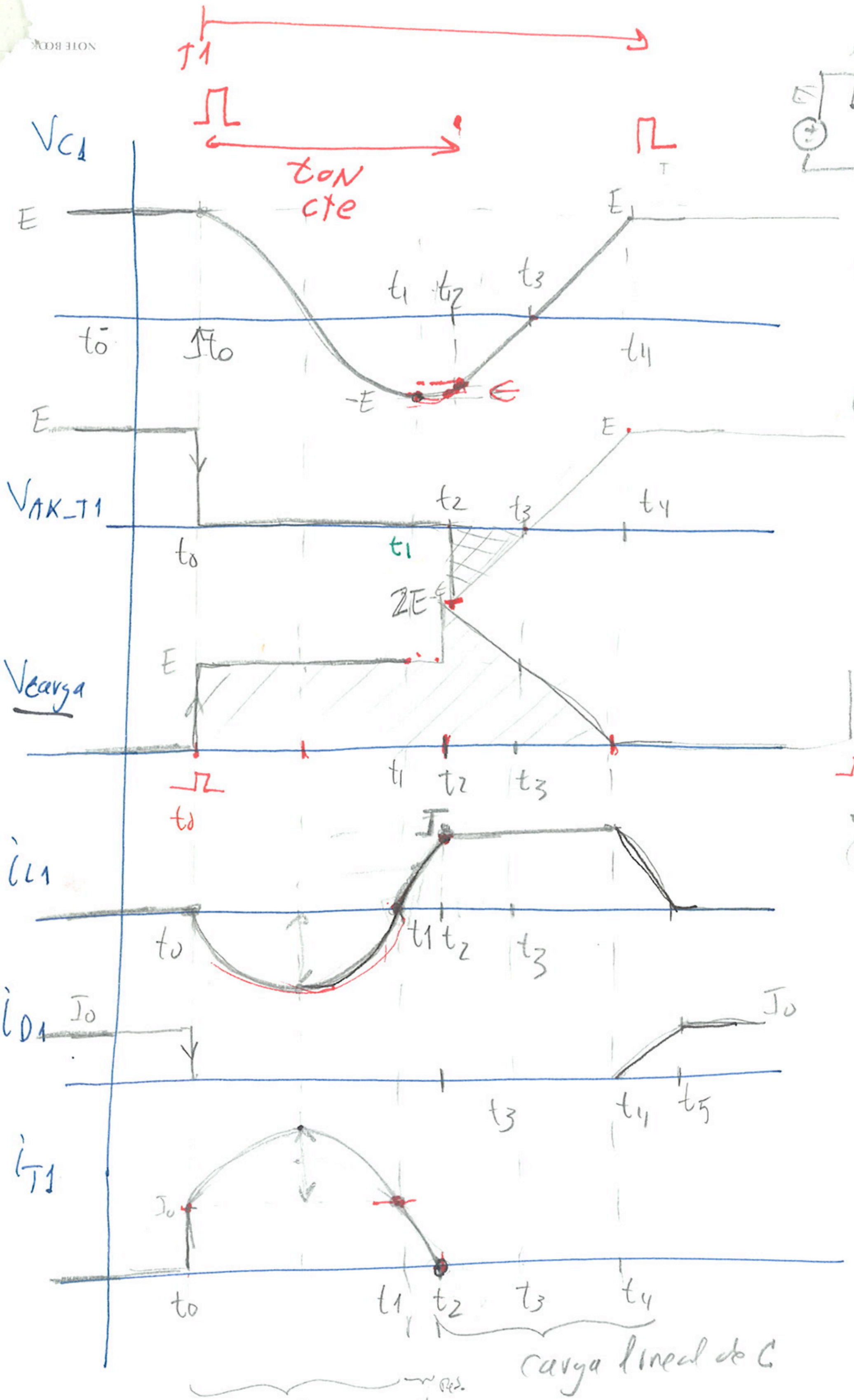
$\boxed{t_3 < t < t_4}$ $\boxed{\text{Carga lineal de } C1}$

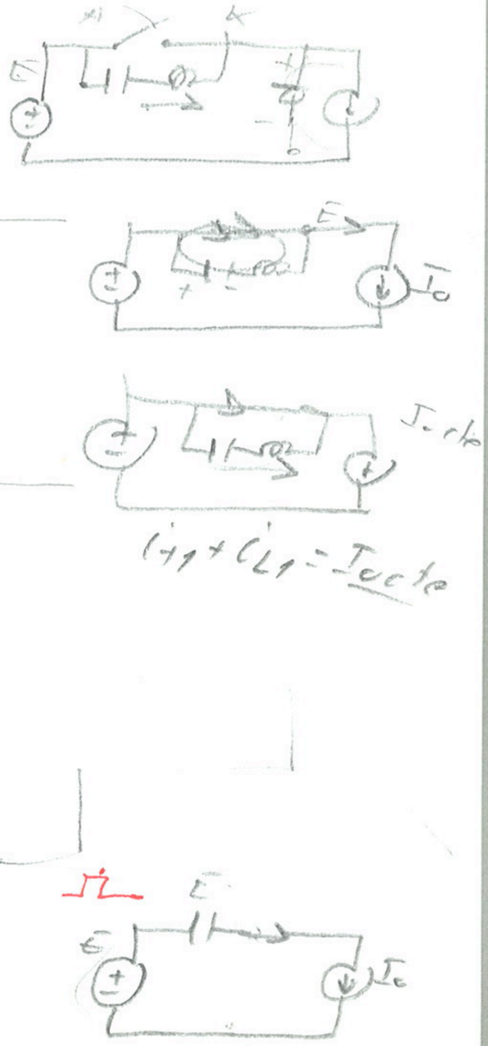
$\left[t_4 - t_3 = \frac{C_1}{I_0} \cdot E\right]$

V_C va desde 0 E

en $t_4 \rightarrow V_c = E \Rightarrow V_{AK-D1} = V_{load} = V_c - E = 0$

D1 ON#





semiciclo resonante

C1 se descarga de E a -E

$(\pi\sqrt{L_1 C_1})$

$$t_b = \frac{|V_C(t_2)|}{I_o} \cdot C_1$$