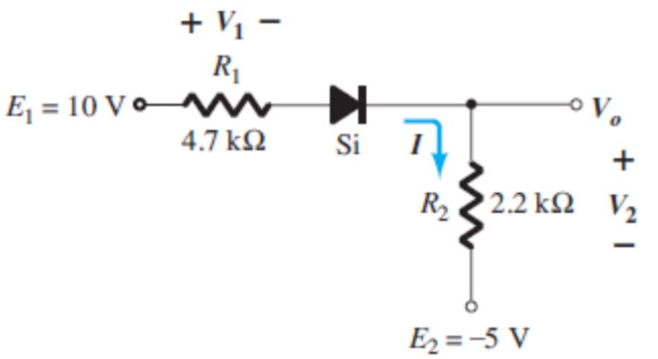
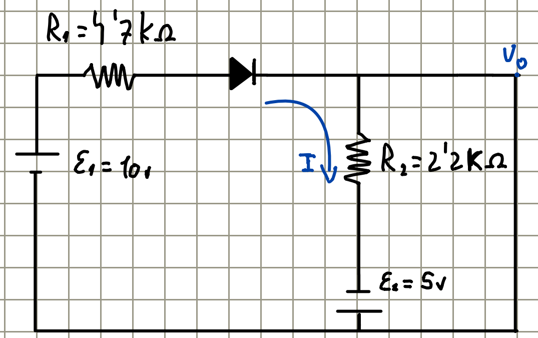
Problema 1.

Determine I, V_1, V_2 y V_o para la configuración en serie





D. ON:

$\mathcal{E}_1 = 10 = iR_1 + 0'7_v + iR_2 - 5$; $10 = i\,6900 + 0'7 - 5$ $\quad i = \frac{14'3}{6900}$; $\boxed{i = 2'07\,mA}$

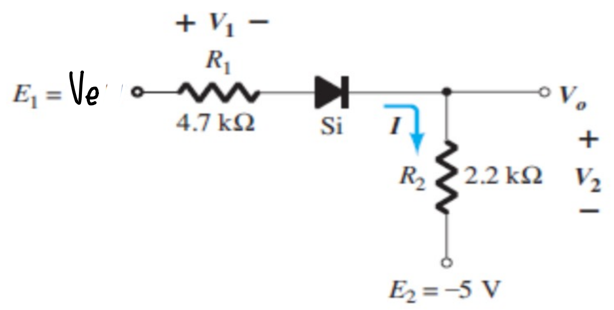
Se resta ya que va a Favor de la corriente. Con esto lo que hacemos es quitar ese voltaje que pasa en total por toda la malla ($15v \rightarrow 10v + 5v \rightarrow \mathcal{E}_1 + \mathcal{E}_2$)

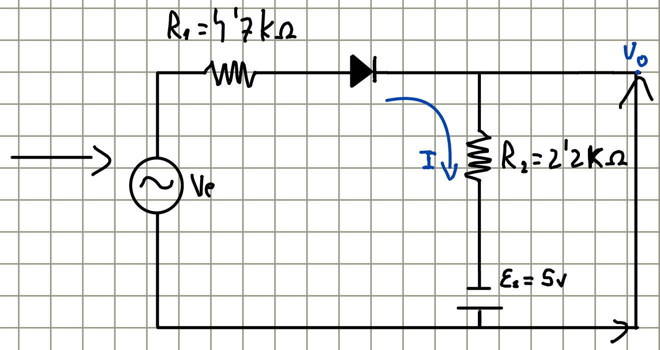
$V_1 = R_1 \cdot i$; $V_1 = 4'7 \cdot 2'07 = \boxed{9'729\ v}$ $\qquad V_2 = R_2 \cdot i$; $V_2 = 2'2 \cdot 2'07 = \boxed{4'554\ v}$

$\mathcal{E}_1 = V_1 + V_D + V_o$; $\quad V_o = 15 - 9'729 - 0'7 = \boxed{4'554_v}$

Problema 2.

Determine *I, V1, V2 y Vo* para la configuración en serie de la figura, siendo ahora $E_1 = 10 \cdot sen(\omega t)$ V.





- D P.I.

$V_D \geq V_{AC}$; $V_{AC} < 0'7$; $V_{AC} = V_e + \mathcal{E}_2$; $V_e + 5 \leq 0'7$; Ocurrirá cuando: $\boxed{V_e = -4'3\ V}$

$i = 0A$ $\quad V_1 = 0V$ $\quad V_2 = 0V$ $\quad V_o = 5V$

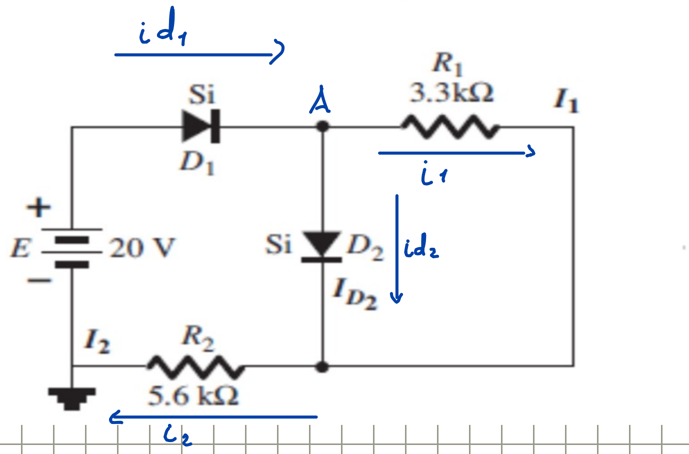
- D ON:

$V_e > -4'3$; $V_e = R_1 i + V_D + R_2 i + \mathcal{E}_2$; $V_e = 6900 i - 5$; $i = \dfrac{10 \cdot sen(wt) - 5}{6900}$

$V_1 = 4700 \cdot \dfrac{10 \cdot sen(wt) - 5}{6900}$ $\quad V_2 = 2200 \cdot \dfrac{10 \cdot sen(wt) - 5}{6900}$

Problema 3.

Determine las corrientes I_1, I_2 e I_{D_2} para la red de la figura :



Como $\varepsilon > D_1 + D_2$; $20 > 1'4$, los diodos están en polarización directa

- D_1 ON , D_2 ON

Malla 1: $\varepsilon = V_{D_1} + V_{D_2} + R_2 \cdot i_2$; $20 = 0'7 + 0'7 + 5600 \cdot i_2$

Malla 2: $\varepsilon = V_{D_1} + R_1 i_1 + R_2 \cdot i_2$; $20 = 0'7 + 3300\, i_1 + 5600 \cdot i_2$

$\rightarrow 18'6 = 5600 \cdot i_2$; $\boxed{i_2 = 3'32\,mA}$

Son $= \longrightarrow 3300 i_1 = 0'7$; $\boxed{i_1 = 0'21\,mA}$

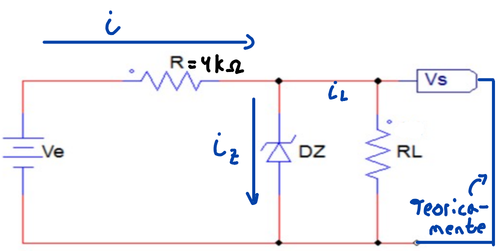
Nudo A: $i_{d_1} = i_{d_2} + i_1$

Nudo B: $i_{d_2} + i_1 = i_2$

$\rightarrow i_2 = i_{d_1}$; $\boxed{i_{d_1} = 3'32\,mA}$

$i_{d_2} = 3'32 - 0'21$; $\boxed{i_{d_2} = 3'11}$

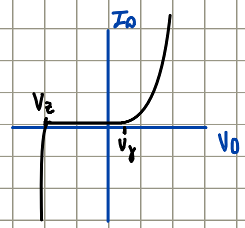
Problema 5.



En el circuito de la figura, calcular entre qué valores puede variar $\mathbf{R_L}$ para que **Vs** esté estabilizada en 6V.

Datos:

- Ve=10±1 V
- Izmin=20μA
- Izmax=140mA
- Vz=6V



$V_{ac} \leq -V_Z$ (Para que actúe)

D.Z → Pol. Zener ($V_Z = 6V$) ; Por definición, $V_S = i_L \cdot R_L = V_Z$; $\boxed{V_S = 6V}$

$$\left.\begin{array}{l} V_e = iR + V_Z \\ V_e = iR + i_L \cdot R_L \\ i = i_Z + i_L \end{array}\right\}$$

• Para $V_e = 9$; ⟶ $9 = i\,4000 + 6$; $i = \frac{3}{4000}$; $\boxed{i = 0'75\,mA}$

a) i_z min ⟶ $0'75 = 0'02 + i_L$; $\boxed{i_L = 0'73\,mA}$

$6 = 0'73 \cdot R_L$; $\boxed{R_L = 8219\,\Omega}$

a) i_z min ⟶ $0'75 = 140 + i_L$; $\boxed{i_L = -139'25\,mA}$ ✗

• Para $V_e = 9$; ⟶ $11 = i\,4000 + 6$; $i = \frac{5}{4000}$; $\boxed{i = 1'25\,mA}$

a) i_z min ⟶ $1'25 = 0'02 + i_L$; $\boxed{i_L = 1'23\,mA}$

$6 = 1'23 \cdot R_L$; $\boxed{R_L = 4878\,\Omega}$

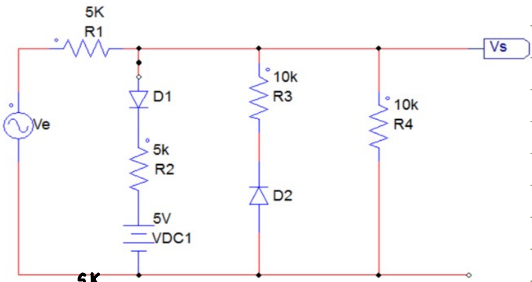
a) i_z min ⟶ $1'25 = 140 + i_L$; $\boxed{i_L = -139'25\,mA}$ ✗

Problema 7.

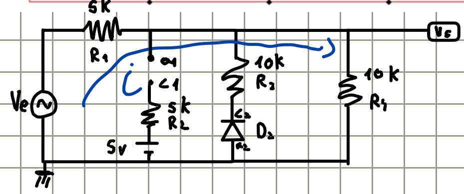
a) Hallar la curva de transferencia del circuito de la figura (Vs/Ve).

b) Dibujar la salida correspondiente a una entrada con forma de onda triangular, simétrica, de 20Vpp y 10Hz de frecuencia.

(Considerar los diodos ideales Vɣ=0)



A. D_1 P.L ⟶



D_2 P.L ⟶ $V_{A_2} = 0$

$V_{C_2} = V_e - iR_1 \to V_e = iR_1 + iR_4$

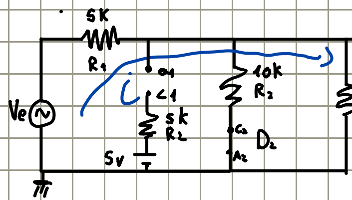
$V_e = i \cdot 5000 + i \cdot 10000 = 15000i$; $\boxed{i = \frac{V_e}{15000}}$ ⟶ $\boxed{V_c = iR_4} = \frac{V_e}{15000} \cdot 10000 = \boxed{\frac{2}{3} V_e}$

Dedución mallas

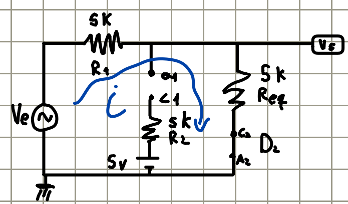
$V_{AC_2} = \boxed{-\frac{2}{3} V_e}$

• D_2 ON ⟶ $V_e \leq 0$; • D_2 OFF ⟶ $V_e > 0$

A.1) D_1 P.L y D_2 ON ($V_e < 0_V$)



R_3 y R_4 paralelas ⟹



$V_{a_1} = R_{eq}\, i = V_e - iR_1$

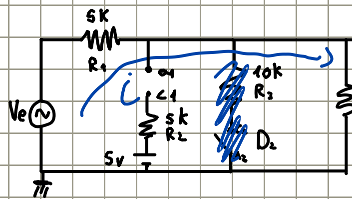
$V_{c_1} = 5_V$

$V_e = 5000i + 5000i$; $i = \frac{V_e}{10000}$; $V_{a_1} = \frac{5000}{10000} V_e = \frac{1}{2} V_e$ $\boxed{V_{ac_1} = \frac{1}{2} V_e - 5}$

• D1 ON ⟶ $\frac{1}{2} V_e - 5 \geq 0$; $V_e \geq 10_V$ • D1 OFF ⟶ $V_e < 10_V$

✓ A.1) es para D.2 ON ($V_e \leq 0_V$). Por tanto, D_1 OFF ($V_e < 10_V$)

A.2) D.1 PL y D. OFF ($V_e > 0_V$)



$V_{a_1} = iR_4 = V_e - i \cdot R_1$

$V_{c_1} = 5_V$

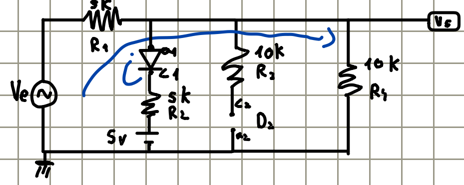
$V_{ae_1} = \frac{2}{3} V_e - 5_V$

$V_e = i\,5000 + i\,10000 = i \cdot 15000$; $i = \frac{V_e}{15000}$; $V_{a_1} = \frac{V_e}{15000} \cdot 10000 = \frac{2}{3} V_e$

• D1 ON ⟶ $\frac{2}{3} V_e - 5 \geq 0$; $V_e \geq 7'5_V$ • D1 OFF ⟶ $V_e < 7'5_V$

✓ A.2) es para D.2 OFF ($V_e > 0_V$). Por tanto, D_1 ON ($V_e \geq 7'5_V$)

B. D_2 P.L $\longrightarrow$



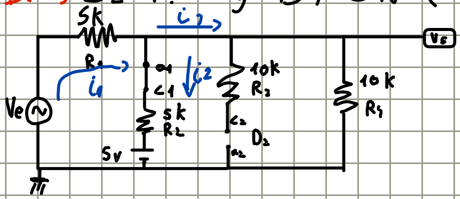
D_1 P.L $\quad V_{a1} = i \cdot R_4 = V_e - i R_1$

$V_{c1} = 5v$

$V_e = i\,5000 + i\,10000 \,; \quad i = \frac{V_e}{15000} \longrightarrow V_{a1} = \frac{10\,000}{15\,000} V_e = \frac{2}{3} V_e \,; \quad V_{ac1} = \frac{2}{3} V_e - 5v$

- D_1 ON $\longrightarrow V_e \geq 7'5$ $\qquad$ D_1 OFF $\longrightarrow V_e \leq 7'5$

B.1) D_2 P.L y D_1 ON ($V_e \geq 7'5$)

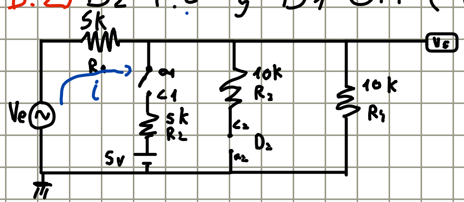


$$\left.\begin{array}{l} V_e = R_1 i_1 + R_4 i_3 \\ V_e = R_1 i_1 + R_2 i_2 + 5 \\ i_1 = i_2 + i_3 \end{array}\right\} \longrightarrow R_2 i_2 + 5 = R_4 i_3 \,; \quad i_3 = \frac{R_2 i_2 + 5}{R_4}$$

$$i_1 = i_2 + \frac{R_2 i_2 + 5}{R_4}$$

- D_2 ON $\longrightarrow V_e \leq -7'5v$
- D_2 OFF $\longrightarrow V_e \geq -7'5v$

B.2) D_2 P.L y D_1 OFF ($V_e < 7'5$)



$V_{a2} = 2/3\, V_e$

$V_{c2} = 0$

$\longrightarrow V_{ac2} = -2/3\, V_e$

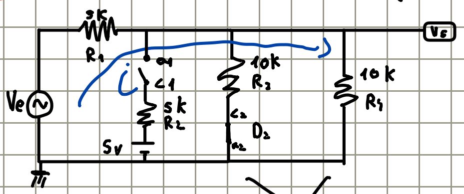
- D_2 ON $\longrightarrow V_e \leq 0v$
- D_2 OFF $\longrightarrow V_e \geq 0v$

I	II	III
D_1 OFF, D_2 ON	D_1 OFF, D_2 OFF	D_1 ON, D_2 OFF

V_e: 0, 7'5

b)

I D_1 OFF – D_2 ON ($V_e < 0$)

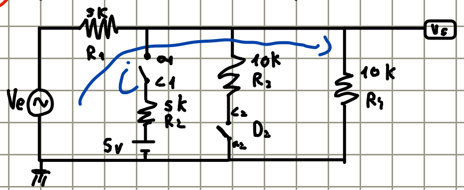


Paralelas ; $R_{eq} = 5k$

$V_s = i\,R_{eq}$; $\boxed{V_s = \frac{1}{2} V_e}$

$V_e = i\,R_1 + i\,R_{eq}$; $i = \frac{V_e}{10000}$

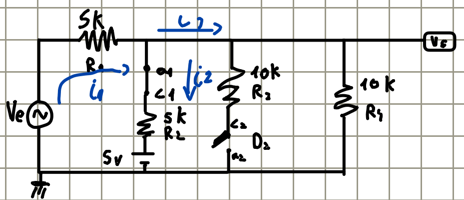
II D_1 OFF – D_2 OFF ($V_e < 7'5$ y $V_e > 0$)



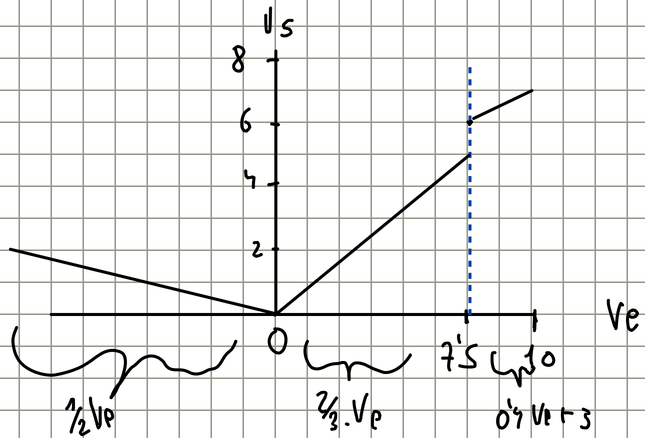
$V_s = i\,R_4$; $\boxed{V_s = \frac{2}{3} V_e}$

$V_e = i\,5000 + i\,10000$; $i = V_e / 15000$

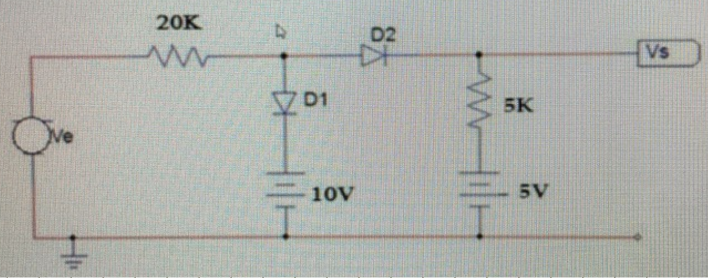
III D_1 ON – D_2 OFF ($V_e > 7'5$)



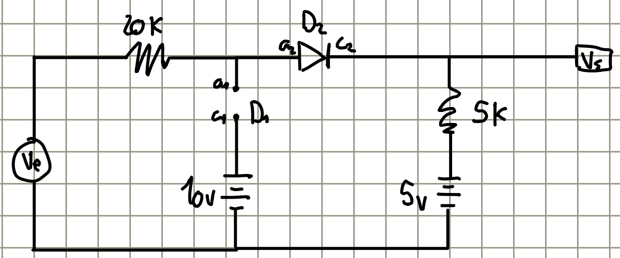
$\boxed{V_s = 0'4\,V_e + 3}$



PROBLEMA 2. (50%) Obtener la característica de transferencia (Vs/Ve) del circuito de la figura considerando los diodos ideales (Vγ=0) y siendo Ve una tensión senoidal de amplitud 45V.



I) D1 PL



$\boxed{D_2\ PL}$

$V_{a2} = V_e$

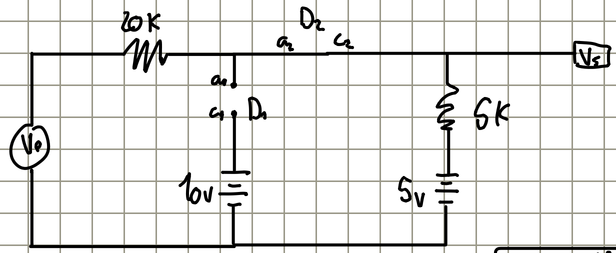
$V_{c2} = 5_V$

$V_{a2c2} = V_e - 5_V$

• D2 ON: $V_e \geq 5_V$

• D2 OFF: $V_e < 5_V$

Ia) D1 PL y D2 ON ($V_e \geq 5_V$)



$V_{a1} = V_e - i\,20k = i\,5k + 5 = \frac{V_e-5}{25k}\cdot 5k + 5 = \boxed{\frac{V_e+20}{5}}$

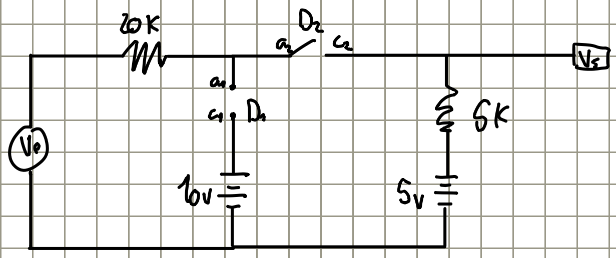
$V_{c1} = 10_V$

$\boxed{V_{ac1} = \frac{V_e-30}{5}}$

$V_e = i\,20k + i\,5k + 5$; $\boxed{i = \frac{V_e-5}{25k}}$

D1 ON: $V_e \geq 30_V$ D1 OFF: $V_e < 30_V$

Ia) D1 PL y D2 OFF ($V_e < 5_V$)



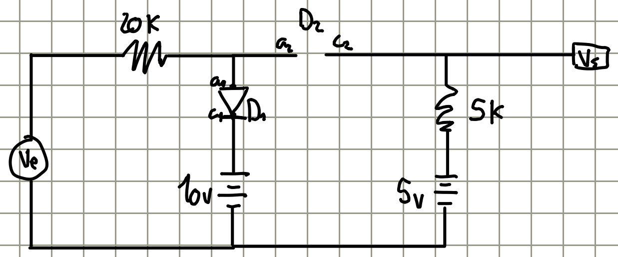
$V_{a1} = V_e$

$V_{c1} = 10_V$

$V_{a1} = V_e - 10$

D1 ON: $V_e \geq 10_V$ D1 OFF: $V_e < 10_V$

I) D2 PL



$\boxed{D_1 \; PL}$

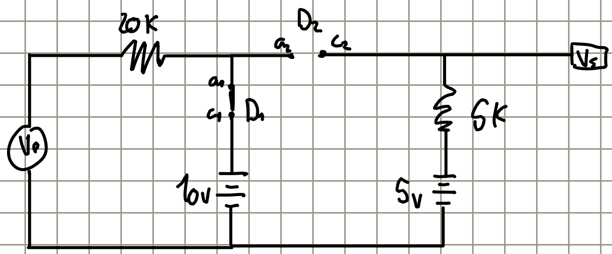
$V_{a1} = V_e$

$V_{c1} = 10_v$

$V_{ac_2} = V_e - 10_v$

- D_1 ON: $V_e \geq 10_v$
- D_1 OFF: $V_e < 10_v$

Ia) D2 PL y D1 ON ($V_e \geq 10_v$)



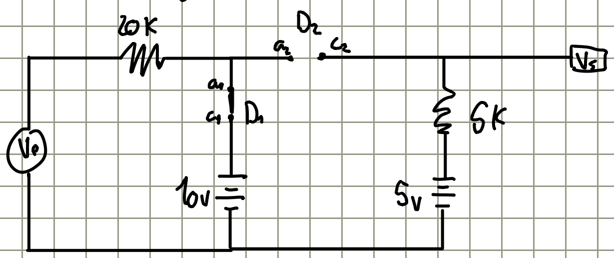
$V_{a2} = V_e - i\,20k = 10_v$

$V_{c2} = 5v$

$\boxed{V_{ac_2} = 10 - 5 = 5}$

D_2 ON Siempre

Ia) D2 PL y D1 ON ($V_e < 10_v$)



$V_{a2} = V_e$

$V_{c2} = 5v$

$\boxed{V_{ac_2} = V_e - 5}$

D_2 ON: $V_e \geq 5$ $\quad$ D_2 OFF: $V_e < 5$

D_1 OFF	D_1 OFF	D_1 ON
D_2 OFF	D_2 ON	D_2 ON