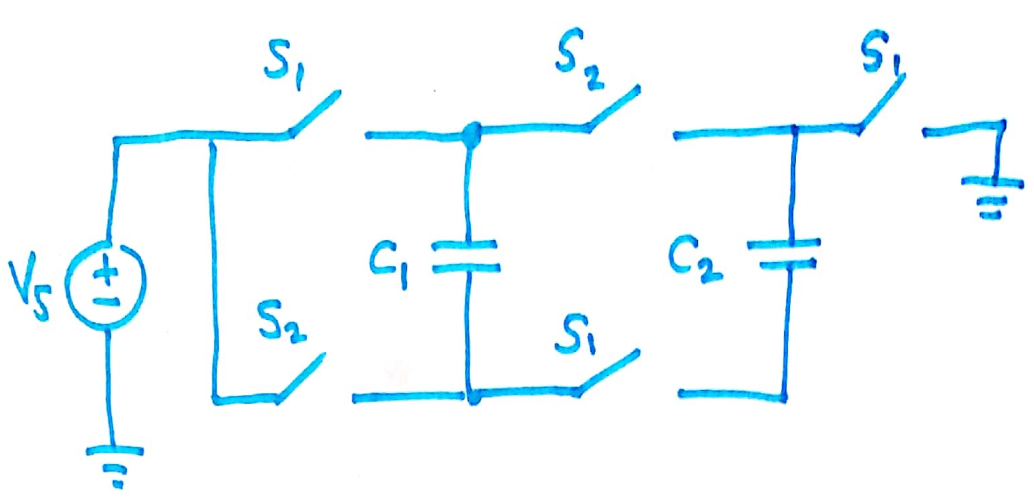
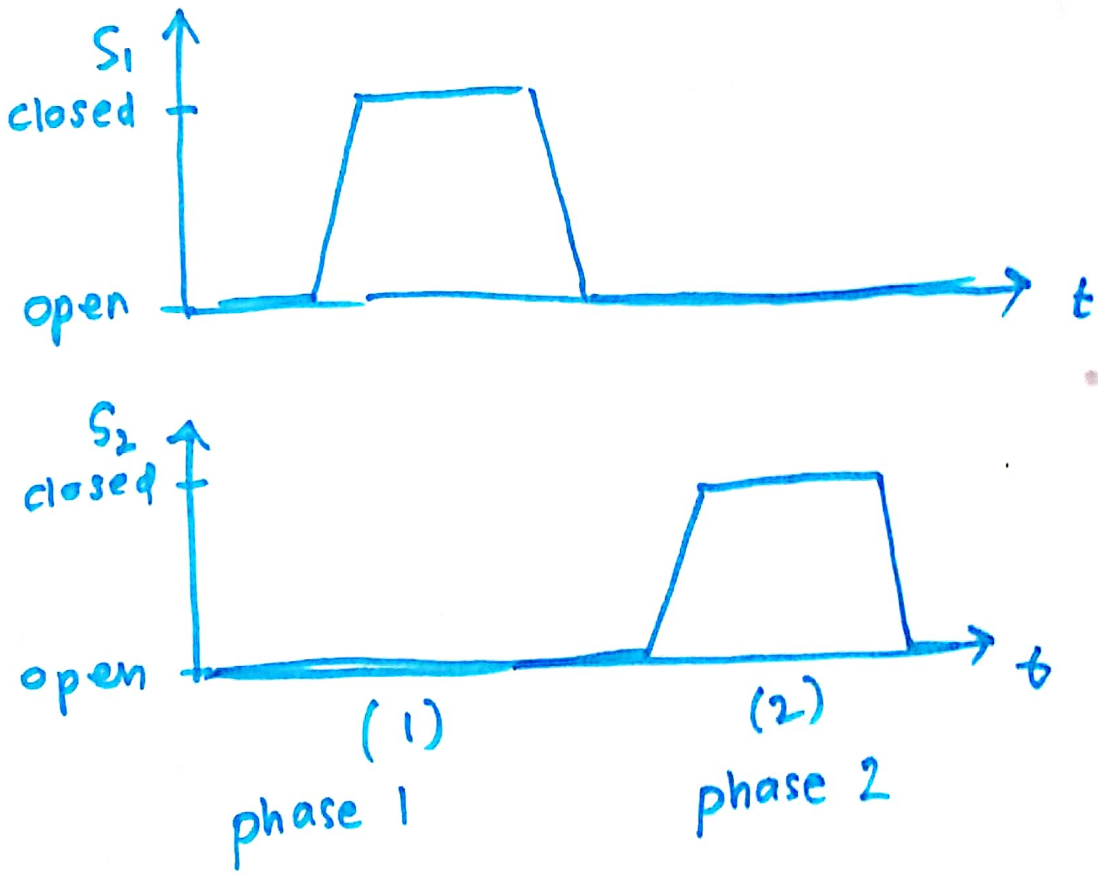
10

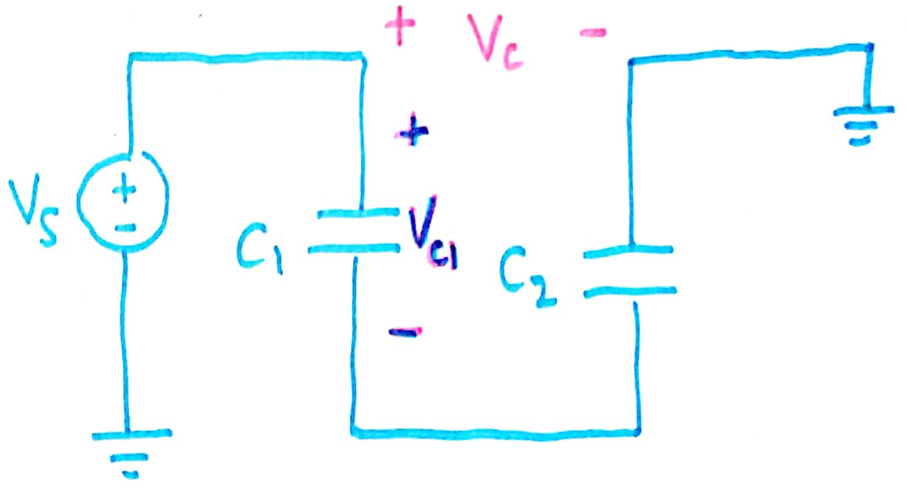


S_1
S_2
S_1
V_S
C_1
C_2
S_2
S_1

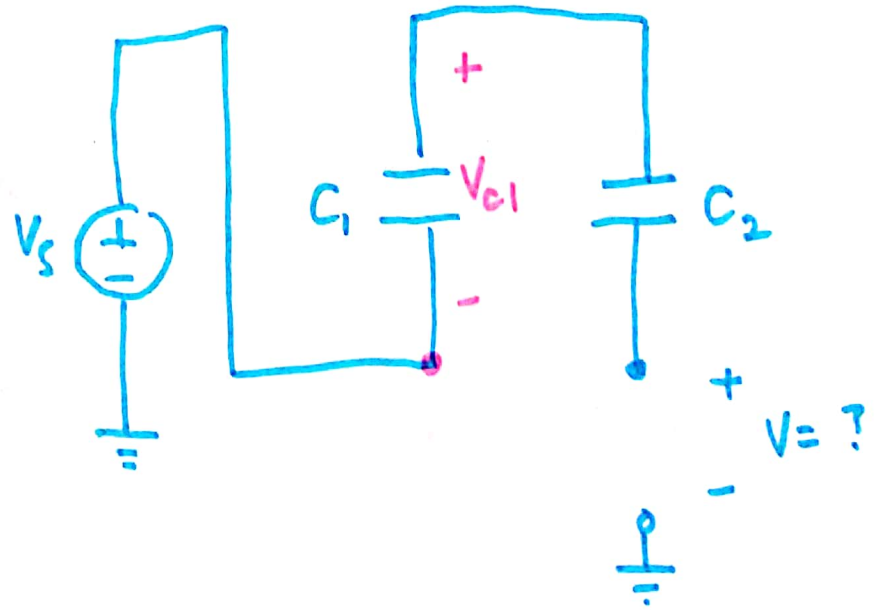


S_1
closed
open
t
S_2
closed
open
t
(1)
(2)
phase 1
phase 2

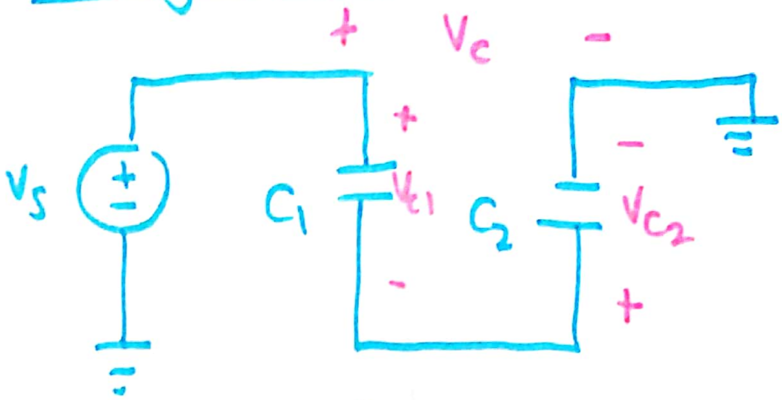
Phase 1

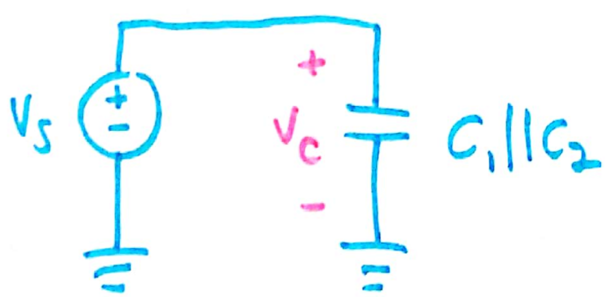


Phase 2



During Phase 1



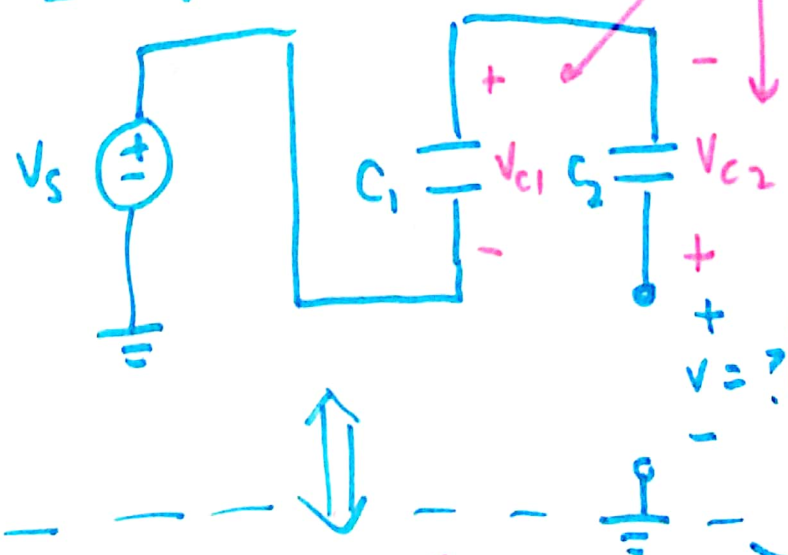


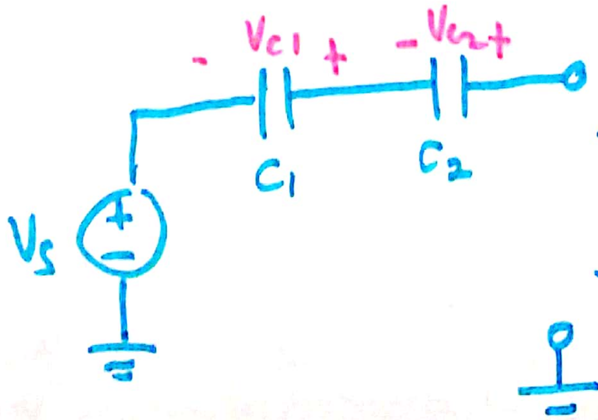
$V_c = V_s$

$V_c = V_{c1} + V_{c2}$

During phase 2

While S_1 switches open and S_2 switches close, there are no currents so these voltages stay the same in valve and polarity

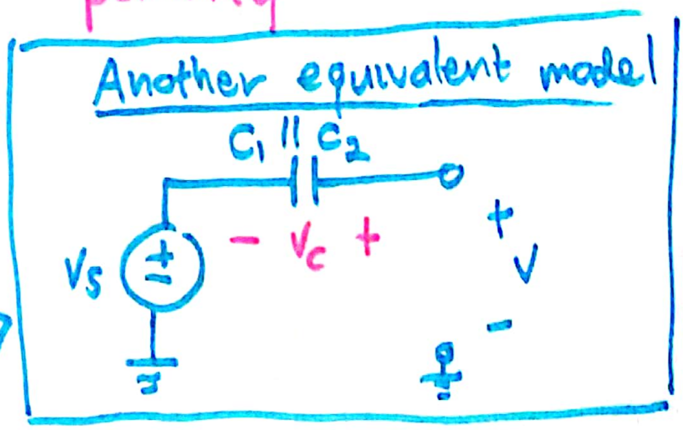




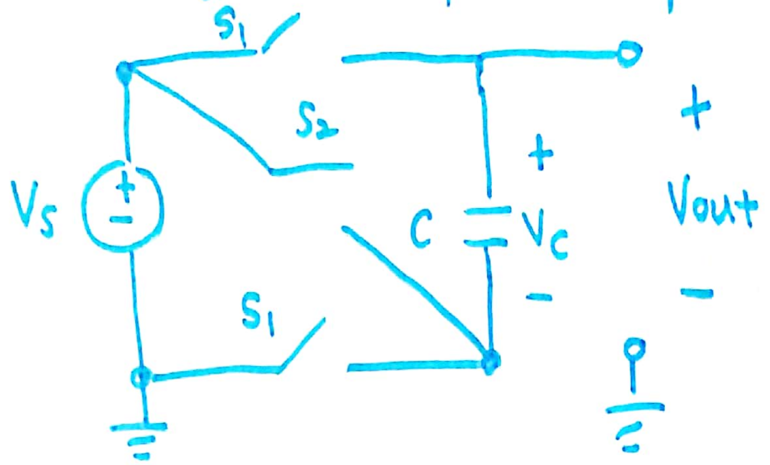
$V = V_s + V_{c1} + V_{c2}$

$= V_s + V_c$

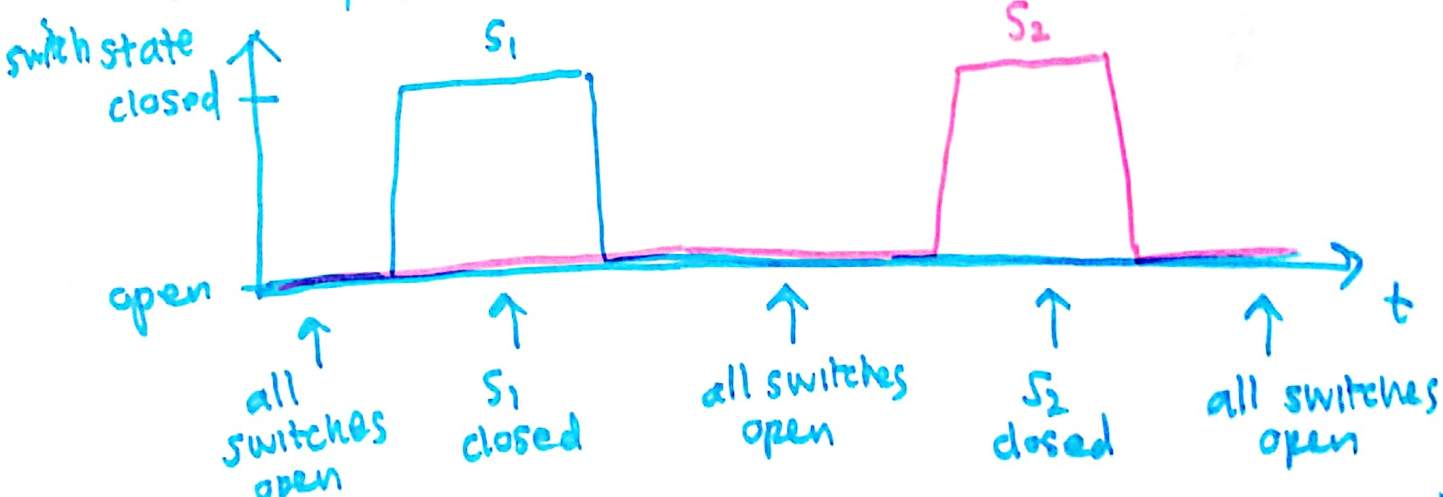
$= 2V_s$ Doubled voltage!



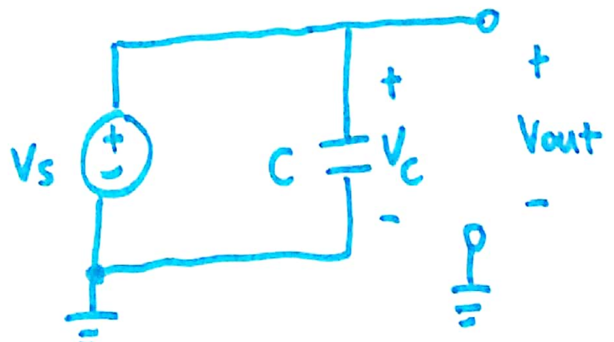
A much simpler implementation shown in lecture (and updated documents notes) uses only one capacitor



Initially, $V_c = 0V$



<u>During phase 1 (S_1 closed)</u>

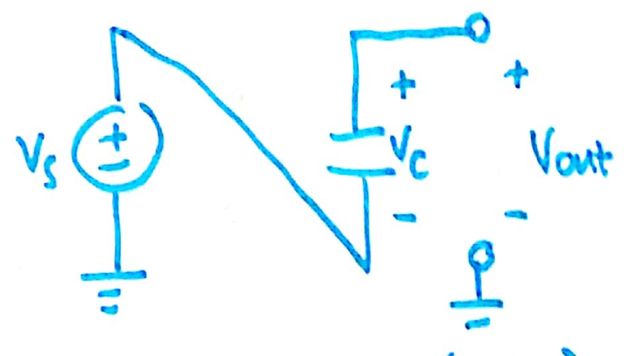


$V_c = V_s$ (capacitor charged)

$V_{out} = V_c = V_s$

(~~Oput~~ Output measured over same nodes)

<u>During phase 2 (S_2 closed)</u>



$V_{out} = V_s + V_c$ (KVL)

In phase 1, $V_c = V_s$. This doesn't change when S_1 opens and S_2 closes.

$\Rightarrow V_{out} = V_s + V_s = 2V_s$