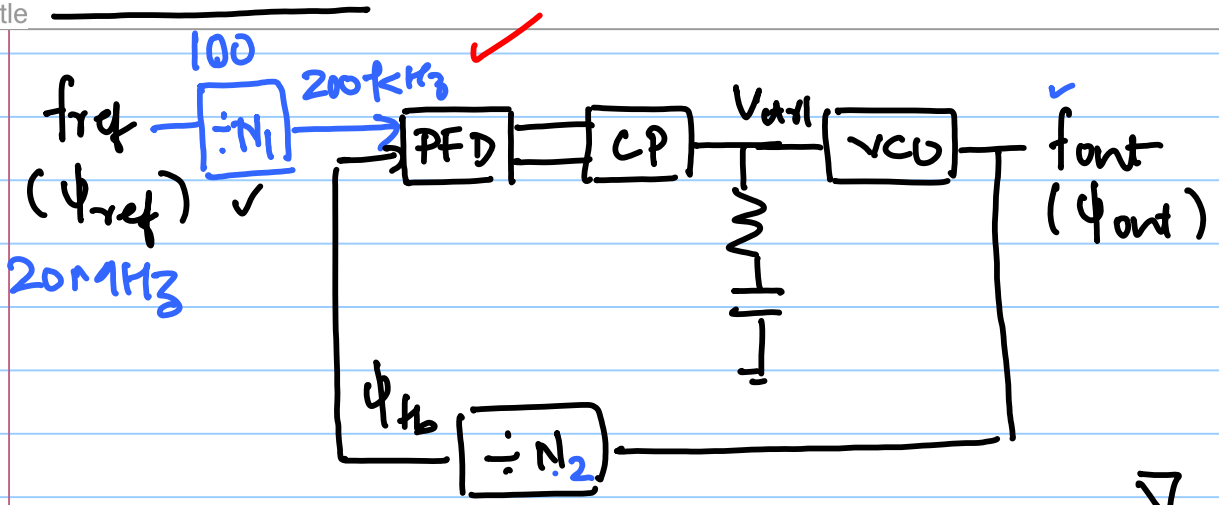
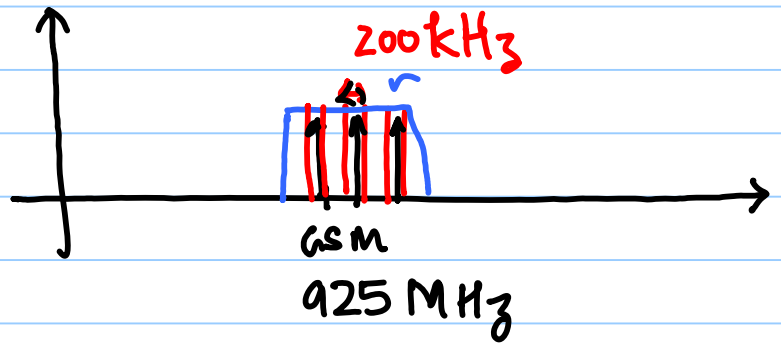
Lecture #44

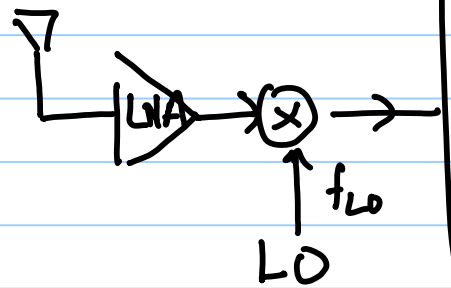
Note Title 10-12-2020



$$f_{out} = N f_{ref}$$

$$\frac{d(\phi_{in} - \phi_{fb})}{dt} = 0$$





$f_{out} = 920.2\ kHz.$

$f_{ref} = 20\ MHz$

$N_{div} = \frac{920.2}{20}$

$= 46.01$

$$f_{LO} = 925\ MHz \pm k \times 200\ kHz.$$

$$N = \frac{925\ MHz}{200\ kHz} = 4.625 \times 10^{3}$$

$$\frac{f_{ref}}{N_1} = \frac{f_{out}}{N_2} \Rightarrow f_{out} = \frac{N_2}{N_1} f_{ref}$$

Leap Year:

365 days	6 hrs	Year #1	⇒ 365 days	6 hrs ✓
365 days	6 hrs	Year #2	2× 365 days.	12 hrs ✓
365 days	6 hrs	Year #3	3× 365 days	18 hrs
365 days	6 hrs	Year #4.	4× 366 days.	~~24 hrs~~ 0 hrs.

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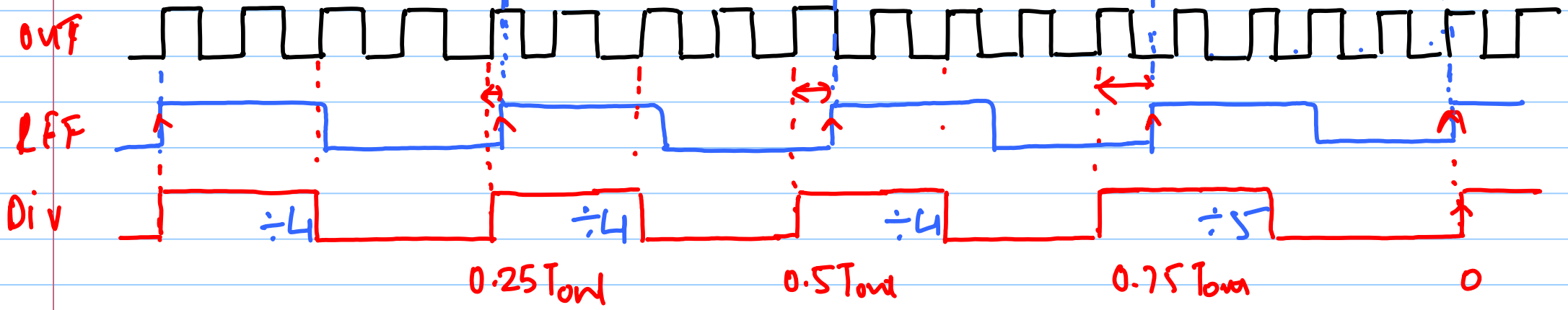
✓ $f_{out} = 4.25\, f_{ref} \Rightarrow T_{ref} = 4.25\, T_{out}$.

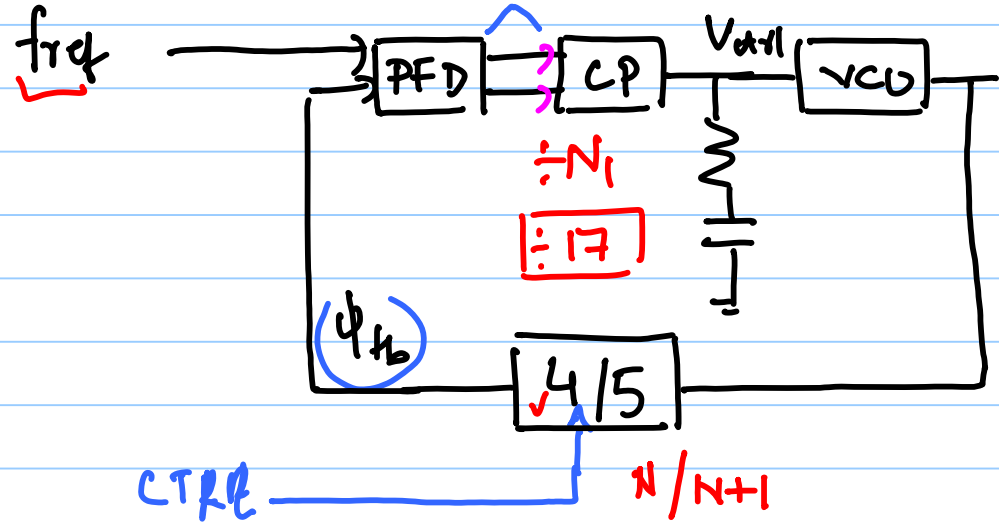
1 T_{ref} ⟶ 4.25 T_{out} periods. ⟶ 4 T_{out}. + 0.25 T_{out}

2 T_{ref} ⟶ 8.50 T_{out} periods ⟶ 8 T_{out} + 0.5 T_{out}.

3 T_{ref} ⟶ 12.75 T_{out} periods. ⟶ 12 T_{out} + 0.75 T_{out}

4 T_{ref} ⟶ 17 T_{out} periods. 17 T_{out} + 0 T_{out}.

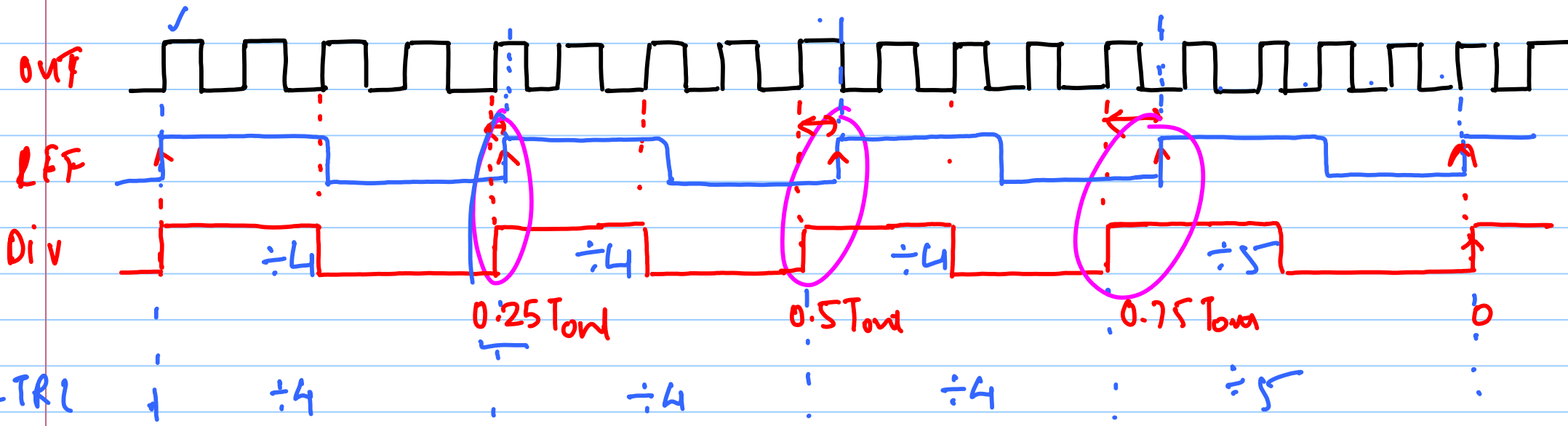


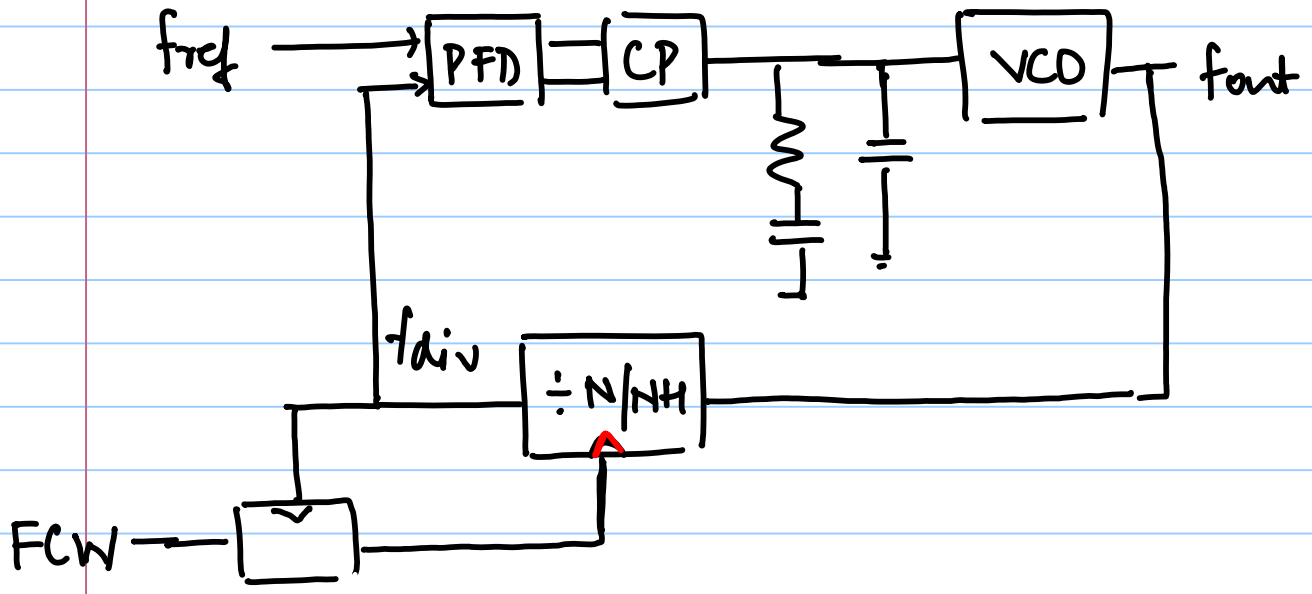


$f_{out} = 4.25\, f_{req} \cdot \frac{\div 4}{\div N_2} + f_{out2}$

$f_{out} = 17\, f_{req}$

$f_{out2} = \frac{f_{out}}{4} = \frac{17}{4} f_{req} = 4.25\, f_{req}$





$$T_{ref} = (N+\alpha)\,T_{out} \quad ; \quad 0<\alpha<1$$

$$f_{out} = (N+\alpha)\,f_{ref}.$$

$$\left(122 + \frac{17}{164}\right) T_{out} = T_{ref}$$

$$122 \times 164\, T_{out} + 17\, T_{out} = 164\, T_{ref}$$

$$(147+17) \times 122\, T_{out} + 17\, T_{out} = 164\, T_{ref}.$$

Ex: $f_{ref} = 19.68\ MHz.$

$f_{out} = 2.403\ GHz.$

$= 122.10365 \times 19.68\,M$

$= \left(122 + \frac{17}{164}\right) \times 19.68\,M.$

$492\, T_{ref} = 492 \times 122\, T_{out}$

$+ \quad 51\, T_{out}$

$= (441+51)\, 122\, T_{out}$

$+ 51\, T_{out}$

$= 441 \times 122\, T_{out}$

$+ 51 \times 123\, T_{out}$

$147 \times 122\ T_{out} + 17 \times 123\ T_{out} = 164\ T_{ref}$.