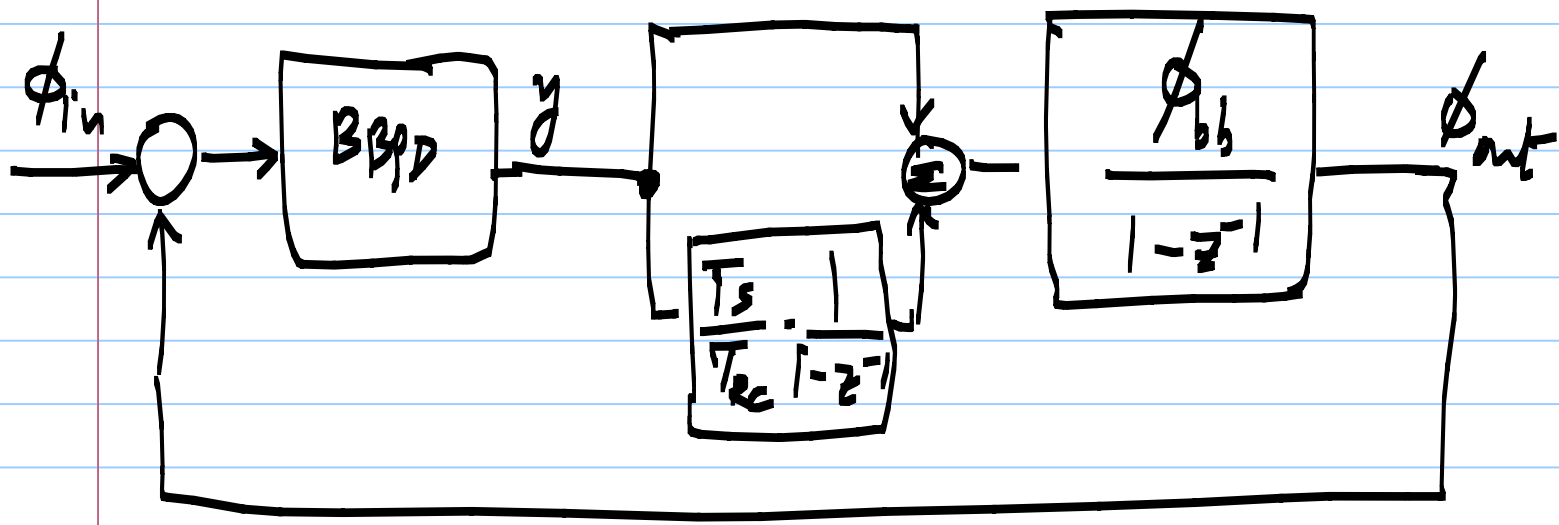
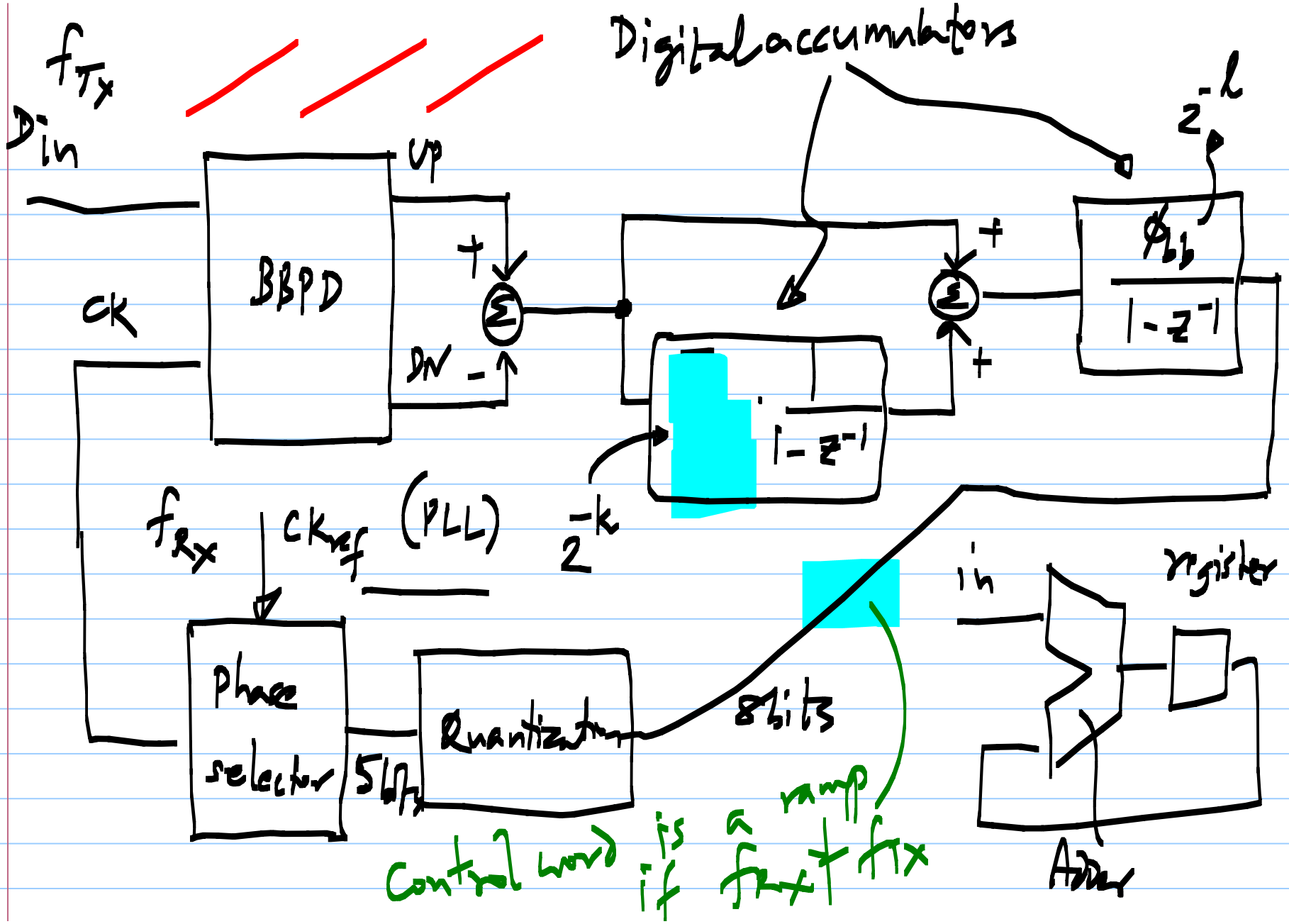
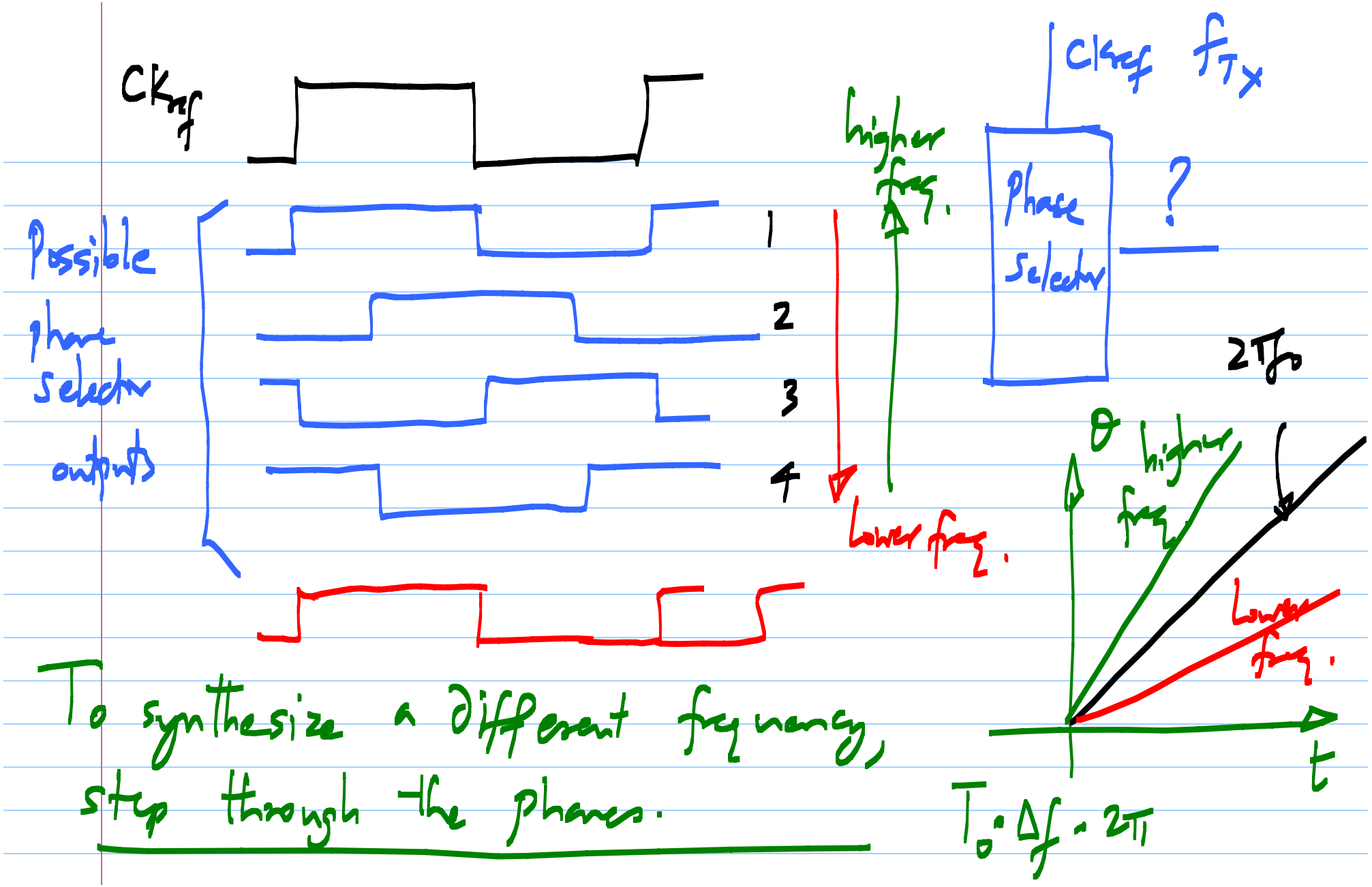
EE322

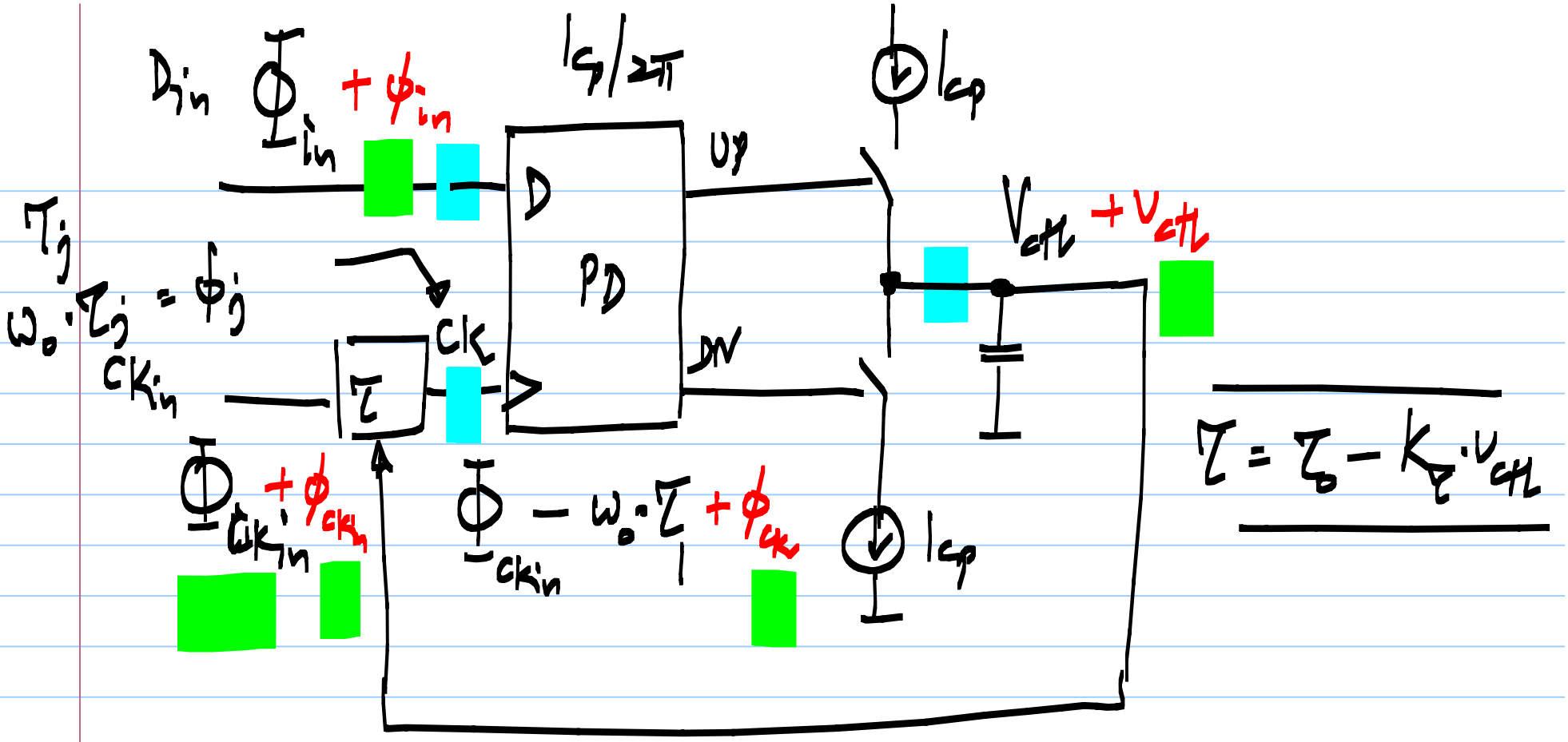
±1, 0

28/2/2018




Digital accumulators
f_{Tx}
D_{in}
BBPD
CK
UP
DN
+
+
+
z^{-l}
ϕ_{bb}
$1-z^{-1}$
$1-z^{-1}$
2^{-k}
f_{Rx}
CK_{ref}
(PLL)
Phase selector
5bits
Quantization
8bits
in
register
Adder
control word is $\hat{f}_{Rx} + f_{TX}$
ramp


CK_{ref}
Possible phase selector outputs
1
2
3
4
higher freq.
Lower freq.
CK_{ref} f_{TX}
Phase Selector
?
$2\pi f_0$
θ
higher freq.
Lower freq.
t
$T_0 \cdot \Delta f = 2\pi$
To synthesize a different frequency, step through the phases.



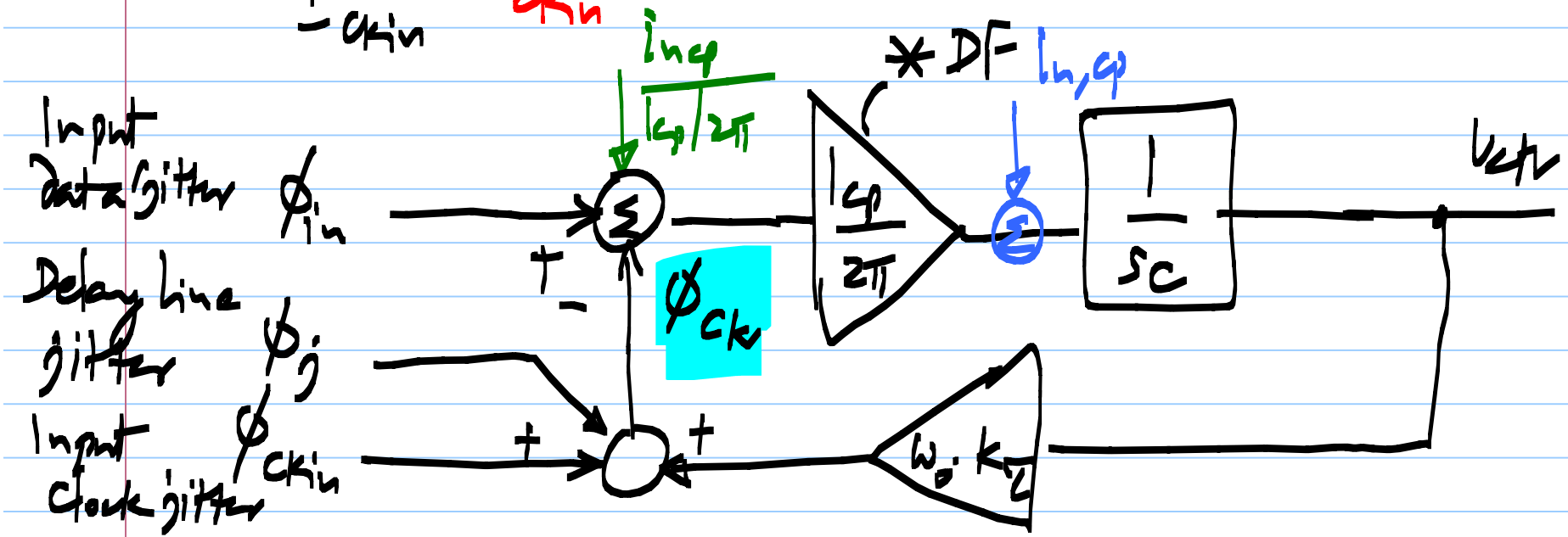
@ op. point: $\Phi_{CK_{in}} - \omega_0 \tau_1 = \Phi_{in}$ (CK aligned to D_{in})

D_{in}: $\Phi_{in} + \phi_{in}$

@ op. pt: $\Phi_{in} = \Phi_{ckin} - \omega_0 (\tau_0 - K_\tau \cdot V_{ctl})$

CK_{in}: $\Phi_{ckin} + \phi_{ckin}$ $\quad \omega_0 (\tau_0 - K_\tau \cdot V_{ctl} - K_\tau \cdot v_{ctl})$

CK: $\Phi_{ckin} + \phi_{ckin} - \overbrace{\omega_0 \cdot \tau}$

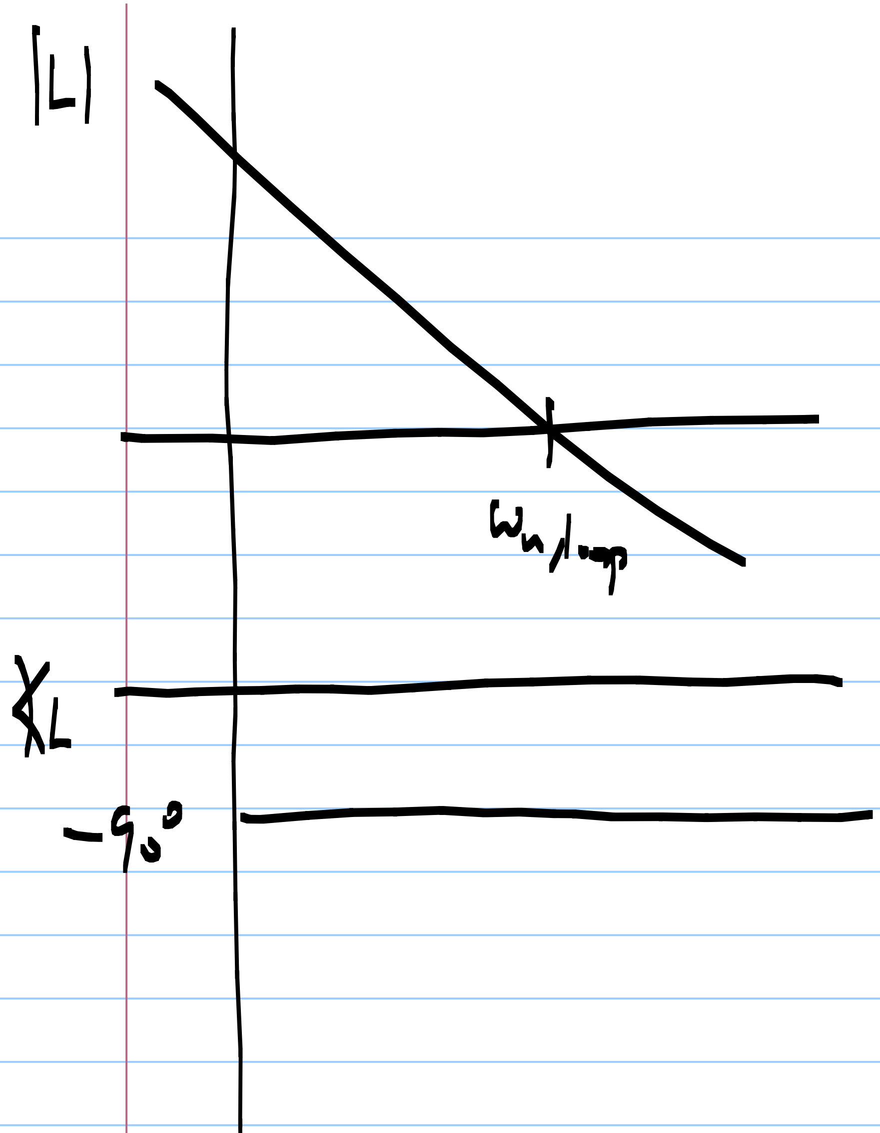


JTRAN: $\frac{\phi_{ck}}{\phi_{in}} = \frac{L}{1+L} = \frac{1}{1 + s/\omega_{n,loop}}$ $\omega_{n,loop} = \frac{I_{cp}}{2\pi} \frac{\omega_0 K_z}{sC}$

JGEN: $\begin{cases} \frac{\phi_{ck}}{\phi_{ckin}}, = \frac{\phi_{ck}}{\phi_j} = \\ \frac{\phi_{ck}}{i_{cp}} = \frac{2\pi}{I_{cp}} \frac{\phi_{ck}}{\phi_{in}} = \end{cases}$

JTOL: $|\phi_{in} - \phi_{ck}| < \phi_0$ $JTOL = \frac{\phi_0}{\left|1 - \frac{\phi_{ck}}{\phi_{in}}\right|} =$

$|\phi_{in}| \left|1 - \frac{\phi_{ck}}{\phi_{in}}\right| < \phi_0$ (phase)



$$L(s) = \frac{I_{cp}}{2\pi} \cdot \omega_o K_{T} \cdot \frac{1}{sC}$$

$$\omega_{u/loop} = \frac{I_{cp}}{2\pi} \frac{\omega_o K_{T}}{C}$$