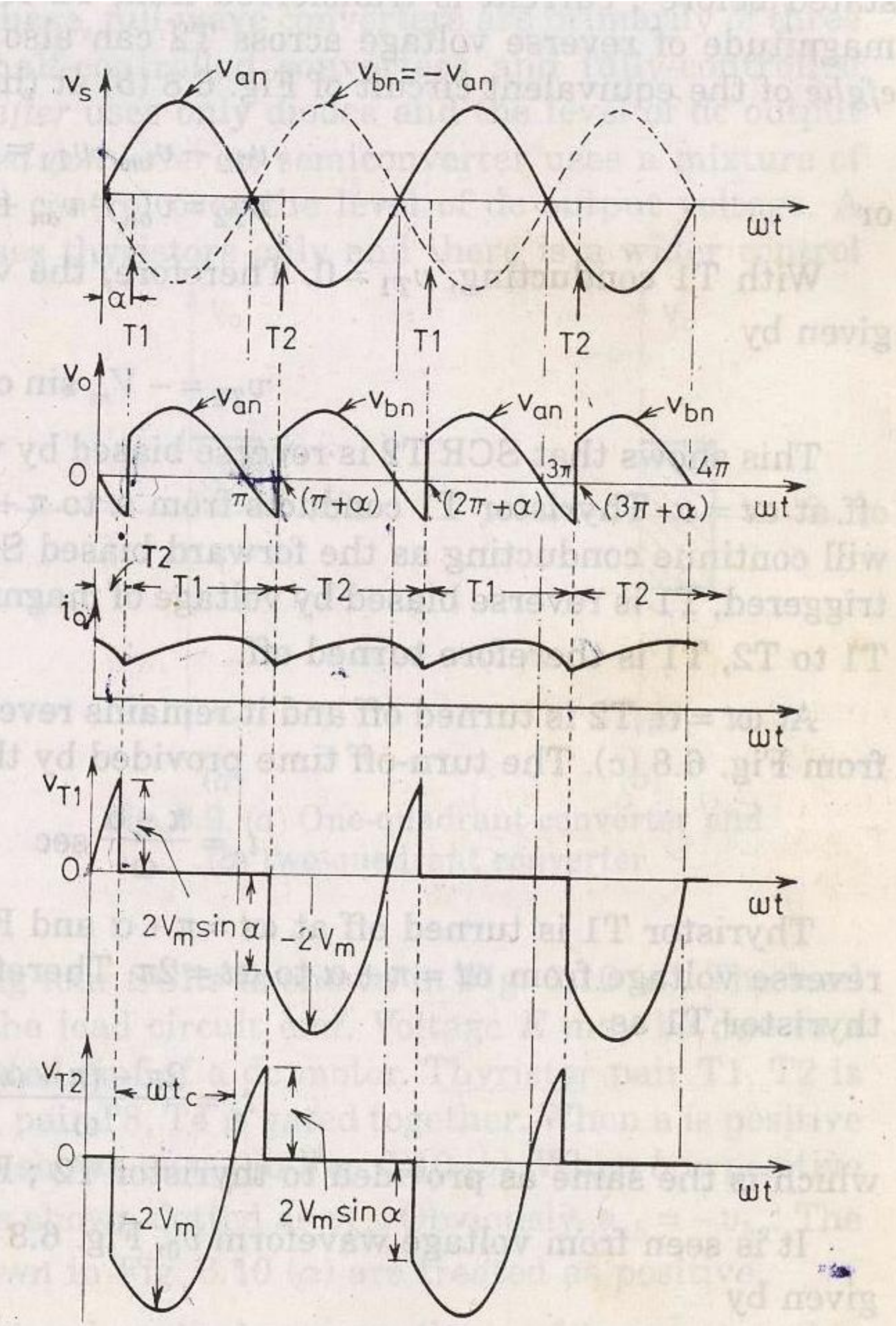
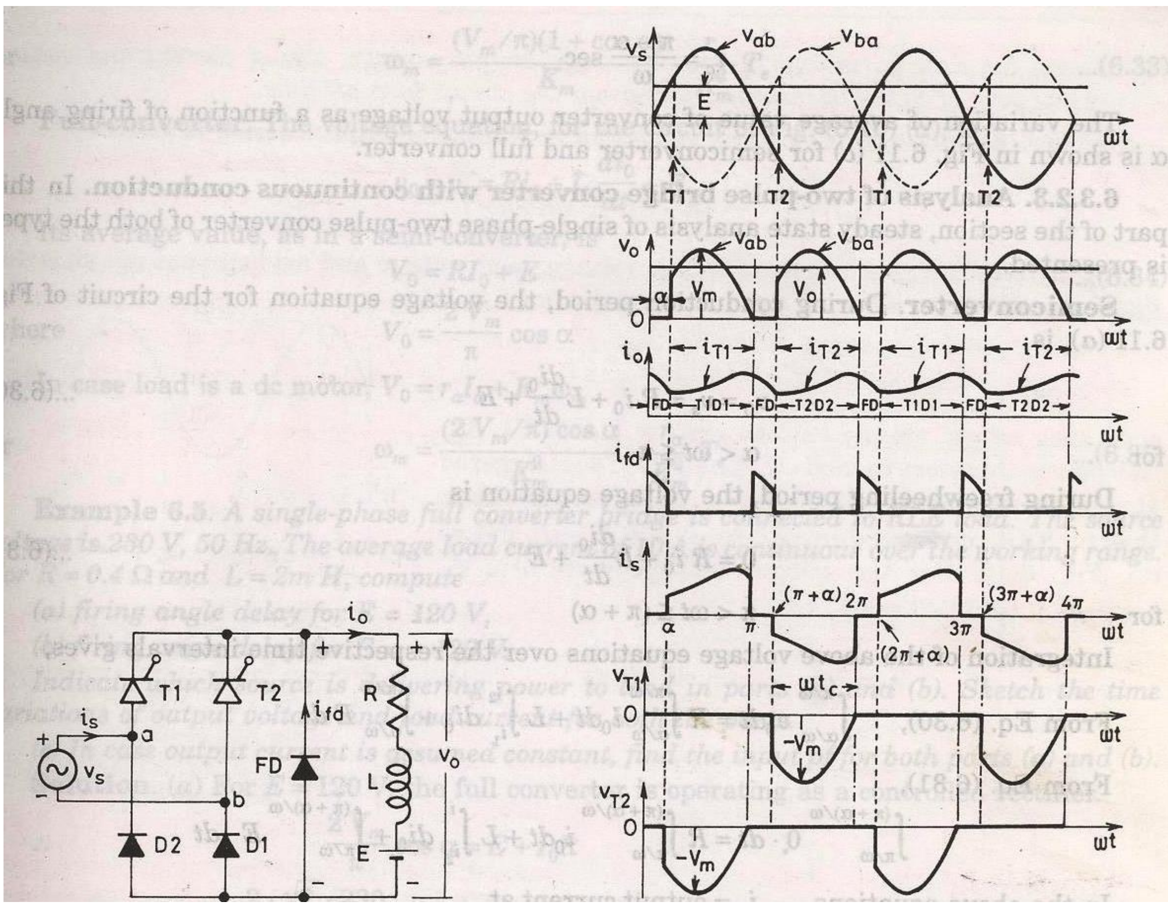


v_s
v_{an}
$v_{bn} = -v_{an}$
ωt
α
T1
T2
T1
T2
v_o
v_{an}
v_{bn}
v_{an}
v_{bn}
O
π
$(\pi+\alpha)$
$(2\pi+\alpha)$
3π
$(3\pi+\alpha)$
4π
ωt
T2
T1
T2
T1
T2
i_o
ωt
v_{T1}
O
$2V_m \sin\alpha$
$-2V_m$
ωt
v_{T2}
ωt_c
O
$-2V_m$
$2V_m \sin\alpha$
ωt

$$V_0 = \frac{1}{\pi}\int_{\alpha}^{\pi+\alpha} V_m \sin(\omega t)d(\omega t)$$

$$= \frac{2V_m}{\pi}\sin\alpha$$

Single phase semi converter:



$$V_0 = \frac{1}{\pi}\int_{\alpha}^{\pi} V_m \sin(\omega t)d(\omega t)$$

$$= \frac{V_m}{\pi}\cos\alpha$$

full converter:

steady state analysis

$$V_s = Ri_o + L\frac{di_0}{dt} + E$$

$$V_0 = RI_0 + E$$

$$V_0 = \frac{2V_m}{\pi}\cos\alpha$$

So in case of DC motor load

$$V_0 = r_a I_a + \alpha_m \omega_m$$

So $\omega_m = \dfrac{\frac{2V_m}{\pi}\cos\alpha - r_a I_a}{\alpha_m}$

$$T = \alpha_m I_a$$

$$\Rightarrow I_a = \frac{T_e}{\alpha_m}$$

Put $I_a = \dfrac{T_e}{\alpha_m}$

So $\omega_m = \dfrac{(\frac{2V_m}{\pi})\cos\alpha}{\alpha_m} - \dfrac{r_a T_e}{\alpha_m^2}$