In fact engine with aft burner off is just turbofan but with modified power balance

Will do from scratch since part (a) goes through core.

$$\frac{T_{t9'}}{T_{9'}} = 1 + \frac{\gamma-1}{2} M_{9'}^2 = \frac{T_{t9'}}{T_{t3'}} \frac{T_{t3'}}{T_{t2}} \frac{T_{t2}}{T_{t0}} \frac{T_{t0}}{T_0} \frac{T_0}{T_{9'}}$$

$$1 + \frac{\gamma-1}{2} M_{9'}^2 = \tau_{c'_0} \tau_r \frac{T_0}{T_{9'}}$$

$$\frac{T_{9'}}{T_0} = \tau_{c'_0} \tau_r \left(1 + \frac{\gamma-1}{2} M_{9'}^2\right)^{-1}$$

and

$$\frac{P_{t9'}}{P_{9'}} = \left(1 + \frac{\gamma-1}{2} M_{9'}^2\right)^{\frac{\gamma}{\gamma-1}} = \frac{P_{t9'}}{P_{t3'}} \frac{P_{t3'}}{P_{t2}} \frac{P_{t2}}{P_{t0}} \frac{P_{t0}}{P_0} \frac{P_0}{P_{9'}}$$

$$= \pi_{c'_0} \pi_r = \left(\tau_{c'_0} \tau_r\right)^{\frac{\gamma}{\gamma-1}}$$

$$1 + \frac{\gamma-1}{2} M_{9'}^2 = \tau_{c'_0} \tau_r$$

$$M_{9'} = \sqrt{\frac{2}{\gamma-1}\left(\tau_{c'_0} \tau_r - 1\right)}$$