$$\frac{F}{\dot m} = a_0 \left\{ \left[\frac{2}{\gamma-1}\left(\tau_\lambda - \tau_r(\tau_c - 1) - \frac{\tau_\lambda}{\tau_r \tau_c} \right) + \frac{\tau_\lambda}{\tau_r \tau_c} M_0^2 - \frac{2}{\gamma-1}\, \frac{\tau_\lambda}{\tau_r \tau_c}(\tau_r - 1) \right]^{1/2} - M_0 \right\}$$

$$\frac{F}{\dot m} = a_0 \left\{ \left[\frac{2}{\gamma-1}\underbrace{\left(\tau_\lambda - \tau_r(\tau_c - 1) - \frac{\tau_\lambda}{\tau_c} \right)} + \frac{\tau_\lambda}{\tau_r \tau_c} M_0^2 \right]^{1/2} - M_0 \right\}$$

$$= \frac{\tau_\lambda}{\tau_c}(\tau_c - 1) - \tau_r(\tau_c - 1)$$

$$= \left(\frac{\tau_\lambda}{\tau_c} - \tau_r \right)(\tau_c - 1) = \tau_r \left(\frac{\tau_\lambda}{\tau_r \tau_c} - 1 \right)(\tau_c - 1)$$

$$\boxed{\frac{F}{\dot m} = a_0 \left\{ \left[\frac{2\tau_r}{\gamma-1}\left(\frac{\tau_\lambda}{\tau_r \tau_c} - 1 \right)(\tau_c - 1) + \frac{\tau_\lambda}{\tau_r \tau_c} M_0^2 \right]^{1/2} - M_0 \right\}}$$

This is Oates eqn. (5.30) for the turbojet

For specific fuel consumption

$$S = \frac{f_{tot}}{F/\dot m} \qquad f_{tot} = \frac{c_p T_0}{h}\left(\tau_{\lambda AB} - \tau_r \right)$$

$$\tau_{\lambda AB} = \tau_\lambda \tau_t \Rightarrow$$

$$f_{tot} = \frac{c_p T_0}{h}\left(\tau_\lambda \tau_t - \tau_r \right) = \frac{c_p T_0}{h}\left(\tau_\lambda \left[1 - \frac{\tau_r}{\tau_\lambda}(\tau_c - 1) \right] - \tau_r \right) = \frac{c_p T_0}{h}\left(\tau_\lambda - \tau_r \tau_c + \tau_r - \tau_r \right)$$

$$f_{tot} = \frac{c_p T_0}{h}\left(\tau_\lambda - \tau_r \tau_c \right) \Rightarrow \text{Oates eqn. } (5.31)$$