

but from part (a)

$$H = \dot{m}_o c_p T_o \tau_2 (1 - \tau_t)$$

⇒

$$\tau_t = 1 - \frac{H}{\dot{m}_o c_p T_o \tau_2}$$

substitute:

$$\frac{F}{\dot{m}_i} = a_o \left\{ \left[ \frac{2}{r-1} \frac{\tau_2}{\tau_r} (\tau_r \tau_t - 1) \right]^{\frac{1}{2}} - M_o \right\}$$

⇒

$$\frac{F}{\dot{m}_i} = a_o \left\{ \left[ \frac{2}{r-1} \frac{\tau_2}{\tau_r} \left( \tau_r \left[ 1 - \frac{H}{\dot{m}_o c_p T_o \tau_2} \right] - 1 \right) \right]^{\frac{1}{2}} - M_o \right\}$$

QED