FROM SEPARATE STREAM TURBOFAN ANALYSIS:

$$\frac{F}{\dot m_c+\dot m_F} = \frac{980.3}{1+8.36}\left\{\left[\frac{2}{\gamma-1}\,\frac{7}{1.968(2.17)}\,\big(1.968(2.17)(0.399)-1\big)\right]^{1/2} - 2.2\right.$$

$$\left. + \; 8.36\left(\left[\frac{2}{\gamma-1}\,\big(1.968(1.12)-1\big)\right]^{1/2} - 2.2\right)\right\}$$

$$\frac{F}{\dot m_c+\dot m_F} = 235.6\ \frac{\text{lbf}\cdot\text{s}}{\text{slug}} = \underline{\underline{7.32}}\ \frac{\text{lbf}\cdot\text{s}}{\text{lbm}}$$

$$f = \frac{(6006)\,4100}{4.89(10)^8}\big(7 - 1.968(2.17)\big) = 0.0134$$

$$S^* = \frac{3600\,(0.0134)}{(1+8.36)(7.32)} = \underline{\underline{0.704}}\ \frac{\text{lbm}}{\text{lbf}\cdot\text{hr}}$$

c) RECALCULATE w/ $\tau_{\lambda b} = 6.8$.

THE FAN STREAM WILL NOT BE AFFECTED BY THE AFTERBURNING.

FOR THE CORE STREAM, FOR NO AFTERBURNING:

$$\left.\frac{U_9}{U_0}\right)_0 = \frac{1}{2.2}\left[\frac{2}{\gamma-1}\,\frac{7}{1.968(2.17)}\,\big(0.399(1.968)(2.17)-1\big)\right]^{1/2}$$

$$\left.\frac{U_9}{U_0}\right)_0 = 1.058$$

FROM THE EQUATION DERIVED IN (a):

$$\frac{U_9/U_0}{(U_9/U_0)_0} = \left[\frac{6.8}{7-1.968(2.17-1)}\right]^{1/2} = 1.203$$

$$U_9/U_0 = 1.203\,(1.058) = 1.273$$

FOR THE FAN STREAM:

$$\frac{U_9'}{U_0} = \left[\frac{1}{M_0^2}\,\frac{2}{\gamma-1}\,(\tau_{c'}\,\tau_r - 1)\right]^{1/2}$$

$$= \frac{1}{2.2}\left[\frac{2}{\gamma-1}\,\big(1.968(1.12)-1\big)\right]^{1/2} = 1.115$$

$$\frac{F}{\dot m_c+\dot m_F} = \frac{a_0 M_0}{1+\alpha}\left[\left(\frac{U_9}{U_0}-1\right) + \alpha\left(\frac{U_9'}{U_0}-1\right)\right]$$

$$\frac{F}{\dot m_c+\dot m_F} = \frac{(980.3)(2.2)}{1+8.36}\Big[(1.273-1) + 8.36(1.115-1)\Big]$$

$$\frac{F}{\dot m_c+\dot m_F} = \underline{\underline{8.34}}\ \frac{\text{lbf}\cdot\text{s}}{\text{lbm}}$$