$$J = \frac{V_0}{n D_p}$$

V_0 - freestream fluid velocity (m/s)

n - rotational speed in rev/s

D_p - Propeller diameter (m)

Uncertainty Values

V_0 - 1.0 fps? Page 4 (1 pdf)

n - ± 1 rpm Page 8 (13 pdf)

D_p Should be 2.495 ft? Page 8 (13 pdf)
Ref Appendix I

Table III-6 is Page 124 of pdf

$$q_0 = \frac{\rho V_0^2}{2}$$

ρ = Mass density of airstream slugs/ft^3

Shroud total included frontal area. 5.7 OR ft³/-18/ft test
7.426 ft³ for 18 ft test

Net thrust, lb.

$$V_0 = V_U \left[1 + \frac{A_X}{\eta A_T} - \frac{T_{net}}{\eta A_T q_U \left[1 + \frac{T_{net}}{q_U A_P} \right]^{0.5}} \right]$$

Velocity of airstream uncorrected for blockage fps

Cross sectional area 49 ft² for 8 ft test sections & 268 ft² for 18 ft test sections

Dist are 2.494 ft.

Dynamic pressure uncorrected for blockage psf

$$V_U = M \left[\frac{\lambda g R T_{SC}}{1 + \frac{\lambda - 1}{2} M^2} \right]^{0.5}$$

λ = ratio of specific heat of air; 1.4

g = acceleration due to gravity; 32.16 ft/s

R = Gas constant; 1722 ft²/s²

T_{SC} = Settling chamber temp; °Rankine

M = Nominal mach number; ± .005 in. for 18 ft
± .021 in. for 8 ft