AEM 1905

Sample calculation (of a terminal velocity)

$$V_T = \sqrt{\frac{2\ W_1}{\rho\ A_P\ C_{DP}}}$$ – from lecture slides

descent weight $W_1 = W_{kit} + W_{motor} - W_{propellant}$

$$W_1 = 37\,oz + 10.5\,oz - 4.87\,oz$$

$$W_1 = 52.37\,oz \left(\frac{1\,lb}{16\,oz}\right) = 3.27\,lb$$

air density $\rho = \frac{0.0749\,lb_{mass}}{ft^3} = \frac{0.0749\,lb}{(32\,ft/s^2)}\frac{1}{ft^3}$

$$\rho = 0.00234\,lb \cdot s^2/ft^4$$

parachute area -- 36" diameter chute with 6" dia. spill hole

$$A_p = \pi r_p^2 - \pi r_h^2$$

$$A_p = \pi (18\,in)^2 - \pi (3\,in)^2$$

$$A_p = \pi\, 315\,in^2 = 990\,in^2 \left(\frac{1\,ft}{12\,in}\right)^2 = 6.87\,ft^2$$

drag coefficient (given) $C_{DP} = 1.5$

Thus $$V_T = \sqrt{\frac{2 * 3.27\,lb}{0.00234\,lb \cdot s^2/ft^4 * 6.87\,ft^2 * 1.5}}$$

$$V_T = \sqrt{\frac{407\,ft^2}{s^2}} = 20.2\,ft/s$$

> Units worked.
> In expected range of safe descent speeds