$\frac{dh}{dt}$ = velocity $= \frac{\Delta h}{\Delta t}$ (#7) & (#8)

$\frac{dV}{dt} = \frac{\Delta V}{\Delta t} = (1)(\text{burn-rate}) - (0.5\ \text{km/s})$

$\rightarrow \Delta t \cong 1\text{sec}$

$\rightarrow \Delta V = V_f - V_0 = [(\text{rate}) - (\frac{1}{2})]\Delta t \cong \text{rate} - \frac{1}{2}$

ΔV must always $= 0 - V_{current}$

$(0 - V_c) = \text{rate} - 0.5 \Rightarrow \Delta V + 0.5 = \text{burn-rate}$

$v = at \longrightarrow V_c = \left(\frac{V_i^2}{2h}\right)\cancel{t}$ } (b/c $dt \cong 1$)

$-(V_c) = (\text{burn-rate} - 0.5)$

$-1(\text{rate} - .5) = \frac{V_0^2}{2h}$

$\boxed{\text{rate} = \left(\frac{V_0^2}{2h}\right) + 0.5}$

code

{ + (* velocity velocity) / (* 2 (hight ship-state)) }

$V_0 = -0.5\ \text{Km/s}$

$\text{rate} = \left(\frac{.25}{2(50)}\right) + 0.5 = 0.5025$

$$v_f = 0.5 + .0025 = -0.50025$$

$$v_f = \frac{(-.50025)^2}{(49.5)2} + 0.5 =$$