$$r = \frac{\vec{b}}{(1-at)}$$

$$v = \frac{dr}{dt} = \frac{ab}{(1-at)^2} \qquad a = \frac{2a^2 b}{(1-at)^3}$$

$t_1 = 0$ ; $r = b$ $\quad \frac{b}{(1-at)} = 0$

$$\Delta t = t_2 = \frac{1-b}{a}$$

$$S = \int_0^{\frac{1-b}{a}} v\,dt$$

$$S = \int_{t_1}^{t_2} v(t)\,dt$$

$$S = \vec{b}\int_0^{\frac{1}{a}} Ln(1-at)\,dt = \vec{b}\int_0^{\frac{1}{a}} Ln(1-at)\,d(-at)$$

$$\vec{b}\left[ Ln(1-at)\cdot(1-at) + at + C \right]_0^{\frac{1}{a}}$$

$$= \vec{b}\left[ Ln\,0 \cdot (0) + 1 - Ln\,1 \right]$$