From the *Vis-Visa Integral*, an expression for the total energy of systems in celestial mechanics, it can be shown that, for a small object orbiting the Sun, the semi-major axis *a* of its orbital ellipse is given by

$$a = \frac{1}{\frac{2}{r} - \frac{v^2}{Gm_s}} \qquad (1)$$

The variables can be expressed in any consistent system of units. Thus, if we choose the *mks* (meters-kilograms-seconds) system, we have for Mulge-Tab at the moment of "release":

r = distance from Sun to object = 450 x 10^9 m
$v^2_{M-T} = v^2_{M-T,r} + v^2_{M-T,t}$ referring to the velocity components as provided on the main page, but expressed in m sec^{-1}
G = Gravitational Constant ~ 6.67 x 10^{-11} m^3 kg^{-1} s^{-2}
m_s = mass of Sun = 1.99 x 10^{30} kg

From the *Law of Areas*, the *ellipticity* of the solar orbit of a small object is:

$$e=\sqrt{1-\frac{r^2 v_t^2}{G\,m_s a}} \qquad (2)$$

For Mulge-Tab at the moment of "release" we use

$v_{M-T,t}$ = tangential velocity of Mulge-Tab provided on main page