Given a velocity of more than 8 km/sec, the ballistic trajectory will become part of an ellipse whose complete loop would be large enough to encompass the earth. The upper diagram on Figure 5 shows two elliptical trajectories for burnout velocities of 8.0 and 9.3 km/sec., and also an escape trajectory with a burnout velocity of 11.2 km/sec., which never returns to earth. If the burnout velocity is sufficiently great, and is aimed in a nearly horizontal direction at a point well above the atmosphere, as indicated by point B in the lower diagram of Figure 5, then the projectile will continue to orbit around the earth in an elliptical path without any further propulsion, and we can describe it as a satellite. The inner orbit on the lower diagram is circular, and maintains a constant velocity of 7.7 km/sec. The outer orbit has a higher burnout velocity (8.0 km/sec at point B), but will slow down while moving through the higher portion of its elliptical path.

The time taken to complete one orbit, known as the period, depends on the velocity at the point of burn out (B) and the altitude of that point. After propulsion has ceased, the force of gravity will slow the satellite if it rises above the altitude of B, and speed it up if it drops below that altitude. The velocity needed to maintain a constant altitude is slower for high than for low (circular) orbits, so that the period increases for higher orbits. Two low circular orbits to be examined in this paper have altitudes of 325 and 807 km, the periods for which are 91 and 101 minutes respectively.

At altitudes below 200 km the upper layers of the atmosphere will exert drag on the fast moving satellite, and unless some compensating velocity is added the satellite will descend into denser air and soon be burned up as a result of the heat build up caused by friction. A circular orbit at an altitude of 200 km would have a period of 88.7 minutes.

At an altitude of 35,900 km a circular orbit has a period of 24 hours. If it orbits in the plane of the equator, the satellite will remain above the same point on the earth's surface. Such a "geo-stationary" orbit is too high for useful radar surveillance, although not too high for detection of the heat from the booster rockets of large missiles, or for the relay of communications.