

and then moving to the southeast and behind the other side of the earth as seen on Figure 6. After 45.5 minutes the satellite will recross the equator, now moving southeastward above the far side of the earth, and will complete the southern half of its orbit by returning on a northeasterly course to recross the equator after 91 minutes.

During this 91 minutes, the earth, which is rotating at a rate of 360° every day (actually a sidereal day of 23 hrs, 56 min, 4 sec), about 15 degrees per hour, will have turned eastward by 22.75° . Therefore when the satellite recrosses the equator at the end of its first orbit it will be at 22.75° West longitude.

As projected on a map of the earth, the track will be repeated on subsequent orbits, with the same shape, but rotated by successive amounts of about 22.75° to the west (corresponding to a rotation of the earth during 91 minutes). Figure 7 shows, on a gnomonic projection covering the portion of the earth indicated by the dotted lines on Figure 6, the track of a satellite with the same orbit as in Figure 6, but now covering an interval of 24 hours, during which time 15.8 orbits will be completed.²⁹

During any one day, every point on the earth between 75°N and 75°S latitude will have one crossing moving northeast and one moving southeast within at most 11.4° of its longitude (representing a distance of 1270 km at the equator, but less at higher latitudes). At low latitudes the two closest passes will occur nearly twelve hours apart. Several successive tracks will come quite close to points on the earth near 75°N (and 75°S). But none of the area within 1600 km of either pole will ever be covered.

If the day shown on Figure 7 begins at midnight with the satellite crossing the equator at 0° longitude and heading northeast, it will first enter the area depicted on the figure along the track marked "1" which passes right-to-left over Scandinavia and the USSR. A bit less than 91 minutes later it will reappear as track 2. It will not cross

²⁹ These paths include the 2° per day correction for the rotation of the orbital plane because of the non-spherical shape of the earth.