

Notwithstanding these limitations, if a heavier launching vehicle is available, it is possible to include a limited capability for manoeuvring propulsion in the orbiting satellite. The dynamics of low-earth orbits are such that a slight increase in the minimum height (as may be necessary to stay above the drag of the atmosphere) does not require very much additional energy. However, changing the plane of the elliptical orbit (as would be necessary to alter the locations on the earth over which the satellite tracks pass) is very expensive in fuel.

### Summary

The outstanding characteristics which need to be kept in mind when considering the use of satellites for surveillance of territory in the latitudes in the vicinity of Canada are:

- (i) The most northerly latitude on the surface of the earth that can be surveyed is determined by the inclination of the plane of the orbit;
- (ii) Although possible, it is extremely costly to provide the capability for a satellite to alter the plane of its orbit; and
- (iii) For low altitude orbits (likely to be the most attractive for surveillance), the track of the satellite will pass within at least 900 km (and often much less) of all points on the surface of the earth with latitudes north of  $45^{\circ}\text{N}$  but lower than the inclination of the satellite's orbit, twice every day, at intervals of about twelve hours. For points with latitudes close to the angle of inclination there will be several crossings closer than this every 24 hours.

### Coverage of Canadian Territory by a Single Satellite

Figure 7 showed the ground tracks of a single satellite in a low circular orbit with a period of 91 minutes and an inclination of  $75^{\circ}$ , as it passed across the part of the earth in the vicinity of Canada, during an interval of 24 hours. Examination of the diagram