Technical Note:

Maneuvering the rocket to fly on a more southerly trajectory requires using part of the thrust of the engines to give lateral acceleration to rotate the horizontal component of the rocket’s velocity. As discussed in the text, this is done following burnout of the second stage. I assume a three-stage model of the rocket, I assume this lateral thrust acts throughout the third-stage burn. In my calculation, the velocity and angle are 4.3 km/s and 75 degrees at the start of third-stage burn and 8.7 km/s and 72 degrees at the end of third-stage burn. The horizontal components of velocity at these two times are therefore 1.1 and 2.7 km/s.

To estimate the rotation angle $\theta$ of the horizontal component of velocity that could result from $\Delta V = 1$ km/s, I use the formula:

$$\Delta V = 2V \sin \left( \frac{\theta}{2} \right)$$

with an average horizontal velocity of $V = (1.1 + 2.7)/2 = 1.9$ km/s. That gives a maneuvering angle $\theta$ of about 30 degrees.