96. The displacement of the one-way trip is the same as the displacement, which has magnitude $D = 4350$ km for the flight (we are in a frame of reference that rotates with the earth). The velocity of the flight relative to the earth is

$$\vec{v}_{fe} = \vec{va} + \vec{ae}$$

where $\vec{ae}$ is the velocity of the (eastward) jet stream (with magnitude $v > 0$), and $\vec{ae}$ is the velocity of the plane relative to the air (with magnitude $u = 966$ m/s). And the magnitudes of the eastward flight velocity (relative to earth) and of the westward flight velocity (primed) are, respectively,

$$|\vec{v}_{fe}| = \frac{D}{t} \quad \text{and} \quad \left|\vec{v}'_{fe}\right| = \frac{D}{t'} \ .$$

The time difference (5/6 of an hour) is therefore

$$\begin{aligned} t' - t &= \frac{D}{\left|\vec{v}'_{fe}\right|} - \frac{D}{|\vec{v}_{fe}|} \\ \Delta t &= \frac{D}{u - v} - \frac{D}{u + v} \ . \end{aligned}$$

Using the quadratic formula to solve for v, we obtain

$$v = \frac{-D + \sqrt{D^2 + u^2(\Delta t)^2}}{\Delta t} = 89 \text{ km/h} \ .$$