

Assignment 5: Flight Planning, ETOPS, and BADA Calculations

Due: February 28, 2024

Instructor: Trani

Problem 1

Check two instances of EVA Air flight 5 (EVA5). Use Flightaware to extract two flight plans filed on Thursday February 15, 2024 and Wednesday February 21, 2024.

- a) State the aircraft used to fly the route.
- b) Use Skyvector to plot the routes filed in the flight plans for both days. The flight plan waypoints are included in the Flight Data panel. Make a screen capture of the routes flown. You can show the routes individually.
- c) Use the Skyvector route and distance information to estimate the difference in distance flown for two flights. Provide some possible reasons for the observed changes in the routes flown.
- d) For the EVA5 flight on February 21, 2024, estimate the number of climbs performed during the flight and the approximate time between climbs to burn fuel.

Problem 2

Refer to pages 160-186 in the Aircraft Performance Notes 2 (section describing the BADA Model) to answer the questions. Figure 1 shows the descent profile of a UPS Boeing 767-300ER flying from Cologne to Philadelphia on February 13, 2024.

- Find the fuel burn (in kilograms per minute) for the Boeing 767-300 according to the BADA model while the aircraft holds altitude at FL 200 and flying at a true airspeed of 395 knots. Assume the aircraft has a mass of 152,000 kilograms. Use the BADA model **clean** drag polar to estimate the fuel burn.
- Compare your answer against the value reported in the table on page 186 for the Boeing 767-300 at FL 200. Explain any differences.
- Find the total fuel burned in the altitude hold at FL200.

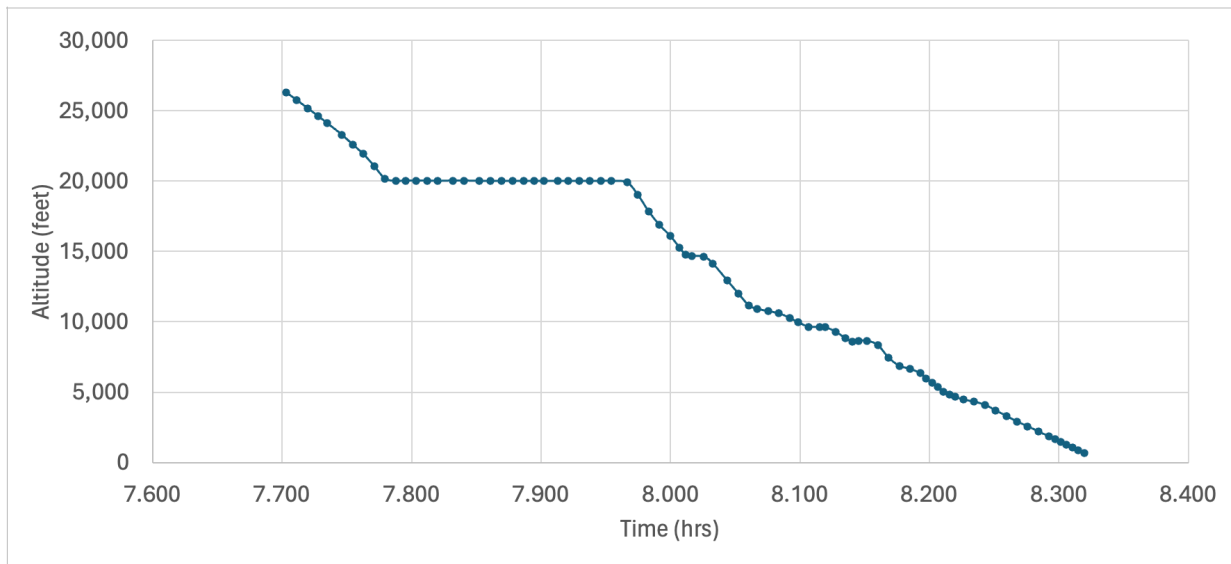


Figure 1. Descent Profile for a UPS Boeing 767-300ER Flying from Cologne to Philadelphia on February 13, 2024. The Altitude Hold at FL 200 Lasts 600 Seconds.

Problem 3

Use the new generation Transonic Truss-Braced Wing (TTBW) aircraft provided in class (http://128.173.204.63/cee5614/cee5614_pub/TTBW_class.m) to answer the questions. The TTBW flies a route between Vancouver (YVR) and Honolulu (HNL). The flight plan filed is as follows:

YVR ELMAA J70 HQM SEDAR A331 ZANNG A331 ZOULU A331 ZIGIE HNL

At waypoint ZINNO on airway A331 the aircraft has an engine failure. The aircraft is flying at FL 350 and Mach 0.76 when the engine failure occurs. At ZINNO, the TTBW has a mass of 63,000 kilograms and 7600 kilograms of fuel left. ZINNO is 1,008 nm from HNL and the pilot decides to continue the flight at a best single engine speed. The TTBW aircraft is certified for ETOPS 180 minutes.

- a) Estimate the best true airspeed and Mach number to reach the destination at the best single-engine speed. Explain your speed and single-engine selection procedure. Avoid speeds that are on the back side of the drag curve. Assume zero winds along the route.
- b) Find the fuel used to the destination airport from the point of engine failure.
- c) Given the ETOPS criteria for the aircraft, can the route be flown legally? Explain.