

Assignment 5: Flight Planning, ETOPS, and BADA Calculations

Due: March 20, 2023

Instructor: Trani

Problem 1

A pilots files a flight plan with the following route information.

LAX DINTY DUETS DADIE DIALO DUSAC DENNS OGG

Cruise speed 440 knots

Cruise altitude FL 360

- State the origin and the destination airports (by name).
- Use Skyvector to plot the route in a map and tell me the route (or airway) flown. Make a screen capture of the route and include in your solution.
- Use the Skyvector route and distance information to estimate if a twin-engine aircraft certified for ETOPS 138 minutes can fly the route legally. Assume no wind conditions and the single-engine aircraft speed is 385 knots.
- What is the minimum ETOPS certification (in minutes) criteria to fly the route.

Problem 2

Refer to pages 160-163 in the Aircraft Performance Notes 2 (section describing the BADA Model) to answer the questions.

- Find the fuel burn (in kilograms per minute) for the Boeing 747-8 according to the BADA model while the aircraft enters a holding pattern (a racetrack to hold at a fix) at FL 310 and flying at a true airspeed of 493 knots. The aircraft has a mass of 366,330 kilograms. The aircraft is in the cruise configuration.
- Verify your answer against the value reported in table on page 163 for the Boeing 747-8.
- Find the indicated airspeed when the aircraft holds at 493 knots at FL 310.

Problem 3

Use the new generation Transonic Truss-Braced Wing (TTBA) aircraft provided in class (http://128.173.204.63/courses/cee5614/cee5614_pub/SUGAR_class.m) to answer the questions.

The TTBA flies the same route as in Problem 1. At waypoint DIALO the aircraft has a pressurization failure (cabin pressure is lost) and the pilot starts an emergency descent from FL 360 to FL100 (the highest flight level for passengers to breathe normally). At DIALO, the TTBA has a mass of 64,000 kilograms and 8000 kilograms of fuel left.

- Find the fuel used to the destination airport from the point of pressurization failure. The speed at FL100 to the destination airport is 275 knots indicated. Include the fuel used in descent from FL360 to FL 100 and from FL100 to the destination airport.
- Does the aircraft has enough fuel to reach the destination airport?

Problem 4

Use the new generation Transonic Truss-Braced Wing (TTBA) aircraft provided in class (http://128.173.204.63/courses/cee5614/cee5614_pub/SUGAR_class.m) to answer the questions.

The TTBA flies the same route as in Problem 1. At waypoint DIALO the aircraft has an engine failure. At DIALO, the TTBA has a mass of 64,000 kilograms and 8000 kilograms of fuel left.

- 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.
- b) Find the fuel used to the destination airport from the point of engine failure.
- c) If the TTBA aircraft is certified for ETOPS 180 minutes, can the route be flown legally. Explain.
- d) If another TTBA aircraft flies over high terrain near the Cho Oyu (see article in https://en.wikipedia.org/wiki/Cho_Oyu) as the engine fails, what actions would the pilot have to take to avoid an accident?