

Assignment 6: ETOPS Operations and ATC

Date Due: October 21, 2015

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Problem 1

A new generation large twin engine aircraft with performance similar to the Boeing Dreamliner (http://128.173.204.63/courses/cee5614/cee5614_pub/boeing787_class.m) flies the route San Francisco (KSFO) to Auckland (NZAA) - see Figure 1. The route requires ETOPS certification because most of the flight crosses the Pacific Ocean. Assume the aircraft is flying at Mach 0.82 and 36,000 feet with a mass of 193,000 kg (with 53 metric tons of fuel remaining) when one of the engines is shut down in flight due to low pressure oil indication. At the time of the engine failure, the aircraft is located 1,200 nm from Honolulu, Hawaii and 1,090 nm from Cassidy International Airport (PLCH) in Kiribati (Christmas Island). Assume ISA conditions. The wind vector in the detour to Christmas Island is estimated to be -19 knots (headwind). The wind vector in the detour to Hawaii is estimated to be -36 knots (headwind).

- Estimate the best Mach number and cruise altitude to continue to any one of the two alternate airports. Justify your selection.
- Find the best alternate for this flight. Is the flight legal within the 180 minute ETOP rule? IN your analysis justify your selection based on the single engine capability of the aircraft, the flight to the closest alternate and the runway length available at the alternate airports.
- Find the fuel used to the best alternate and the travel time considering wind conditions.

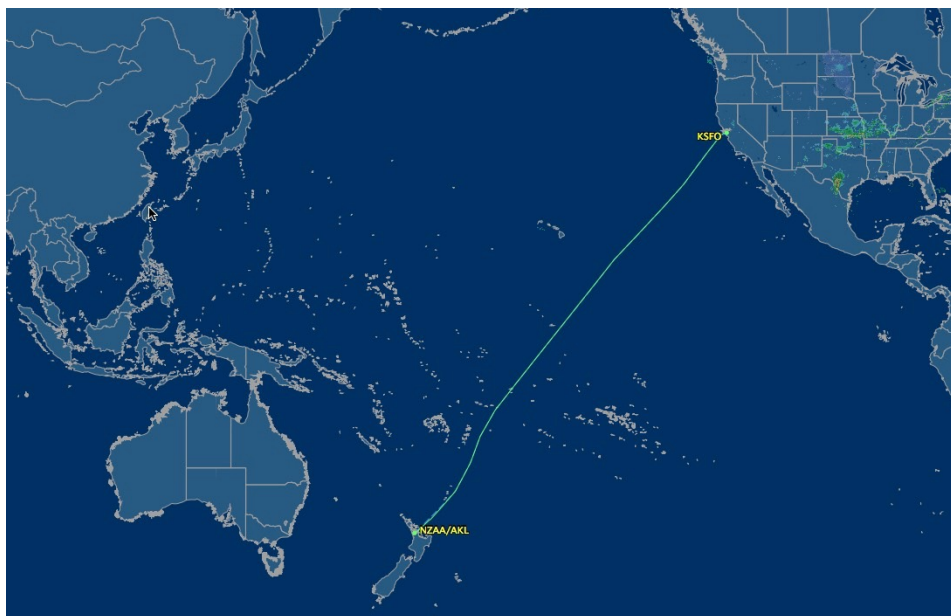


Figure 1. Route San Francisco (SFO) to Auckland (NZAA). Source Map: Flightaware.

Problem 2

For the selected alternate selected in Problem1, now assume the failure is a combination of pressurization and one engine failure. Estimate the travel time and fuel used to the best alternate. State all your assumptions.

Problem 3

Short answers.

- a) Can Atlanta conduct triple independent approaches in VMC conditions? Explain.
- b) Can Raleigh (North Carolina) conduct undefended approaches in IMC conditions? Explain.
- c) Read the summary NextGen Implementation Plan 2015 and, in two paragraphs, discuss some of the terminal automation tools the FAA will introduce as part of NextGen.
- d) Briefly describe (in 2-3 paragraphs) some of the improvements to multiple runway operational procedures expected under NextGen.