

Fuel Management Parts 121 & 135

You probably have a good understanding for fuel management so let's start this off with a quiz. You are flying a WestWind Express ERJ-145XR from Anchorage (PANC) International Airport to Saint Paul Island Airport (PASN.) We will assume that this route is a part of our normal route structure that WestWind flies every Monday and Friday. Today Saint Paul is forecasted at your time of arrival ± 1 hour to be 1,700' broken with 3 miles mist and winds at 350 and 6 knots. The ILS/DME 36 minimums are 200 and 3/4. There is no alternate available and there are no anticipated traffic delays. What are your fuel requirements?

- A. Fuel to fly from PANC to PASN make an approach, fly the missed approach procedure and then fly for 45 minutes at normal cruising fuel consumption.
- B. Fuel to fly from PANC to PASN make an approach, fly the missed approach procedure and then fly for 2 hours at normal cruising fuel consumption.
- C. Fuel to fly from PANC to PASN make an approach, fly the missed approach procedure and then fly for an additional 3 hours at normal cruising fuel consumption.
- D. Who cares load the airplane with full fuel, kick the tires and light the fires.



If you choose A then think again, that is a perfect answer if we were flying under part 91, but WestWind Virtual Airlines would fly under Part 121 of the FARs as a Flag Carrier. If you choose B then good job, did you guess or did you really know the answer? If you choose D then this tutorial is not for you.

Part 121.645(c) states that a Flag carrier flying a turbojet aircraft released to an airport for which an alternate airport is not available is the fuel to fly to that airport and then fly for 2 hours at normal cruising fuel consumption. Ok got it, let's change something, the dispatcher informs you that only 18 passengers booked the flight and there is an equipment change from the ERJ145 to the B1900, you are still qualified on the B190 and can fly the route. Now how much fuel is required? Part 121.641 says the answer is C. Nonturbine and Turbo-props are covered under different fuel requirements.

Lets look at the Part 121 fuel requirements:

§ 121.639 Fuel supply: All domestic operations.

No person may dispatch or take off an airplane unless it has enough fuel --

- (a) To fly to the airport to which it is dispatched;
- (b) Thereafter, to fly to and land at the most distant alternate airport (where required) for the airport to which dispatched; and
- (c) Thereafter, to fly for 45 minutes at normal cruising fuel consumption or, for certificate holders who are authorized to conduct day VFR operations in their operations specifications and who are operating nontransport category airplanes type certificated after December 31, 1964, to fly for 30 minutes at normal cruising fuel consumption for day VFR operations.

§ 121.641 Fuel supply: Nonturbine and turbo-propeller-powered airplanes: Flag operations.

(a) No person may dispatch or take off a nonturbine or turbo-propeller-powered airplane unless, considering the wind and other weather conditions expected, it has enough fuel --

- (1) To fly to and land at the airport to which it is dispatched;
- (2) Thereafter, to fly to and land at the most distant alternate airport specified in the dispatch release; and
- (3) Thereafter, to fly for 30 minutes plus 15 percent of the total time required to fly at normal cruising fuel consumption to the airports specified in paragraphs (a) (1) and (2) of this section or to fly for 90 minutes at normal cruising fuel consumption, whichever is less.

(b) No person may dispatch a nonturbine or turbo-propeller-powered airplane to an airport for which an alternate is not specified under § 121.621(a)(2), unless it has enough fuel, considering wind and forecast weather conditions, to fly to that airport and thereafter to fly for three hours at normal cruising fuel consumption.

§ 121.645 Fuel supply: Turbine-engine powered airplanes, other than turbo propeller: Flag and supplemental operations.

(a) Any flag operation within the 48 contiguous United States and the District of Columbia may use the fuel requirements of § 121.639.

(b) For any certificate holder conducting flag or supplemental operations outside the 48 contiguous United States and the District of Columbia, unless authorized by the Administrator in the operations specifications, no person may release for

flight or takeoff a turbine-engine powered airplane (other than a turbo-propeller powered airplane) unless, considering wind and other weather conditions expected, it has enough fuel --

- (1) To fly to and land at the airport to which it is released;
- (2) After that, to fly for a period of 10 percent of the total time required to fly from the airport of departure to, and land at, the airport to which it was released;
- (3) After that, to fly to and land at the most distant alternate airport specified in the flight release, if an alternate is required; and
- (4) After that, to fly for 30 minutes at holding speed at 1,500 feet above the alternate airport (or the destination airport if no alternate is required) under standard temperature conditions.

(c) No person may release a turbine-engine powered airplane (other than a turbo-propeller airplane) to an airport for which an alternate is not specified under § 121.621(a)(2) or § 121.623(b) unless it has enough fuel, considering wind and other weather conditions expected, to fly to that airport and thereafter to fly for at least two hours at normal cruising fuel consumption.

(d) The Administrator may amend the operations specifications of a certificate holder conducting flag or supplemental operations to require more fuel than any of the minimums stated in paragraph (a) or (b) of this section if he finds that additional fuel is necessary on a particular route in the interest of safety.

(e) For a supplemental operation within the 48 contiguous States and the District of Columbia with a turbine engine powered airplane the fuel requirements of § 121.643 apply.

§ 121.647 Factors for computing fuel required.

Each person computing fuel required for the purposes of this subpart shall consider the following:

- (a) Wind and other weather conditions forecast.
- (b) Anticipated traffic delays.
- (c) One instrument approach and possible missed approach at destination.
- (d) Any other conditions that may delay landing of the aircraft. For the purposes of this section, required fuel is in addition to unusable fuel.

Finally the requirements for alternates are laid out in 121.621 as:

§ 121.621 Alternate airport for destination: Flag operations.

(a) No person may dispatch an airplane under IFR or over-the-top unless he lists at least one alternate airport for each destination airport in the dispatch release, unless --

(1) The flight is scheduled for not more than 6 hours and, for at least 1 hour before and 1 hour after the estimated time of arrival at the destination airport, the appropriate weather reports or forecasts, or any combination of them, indicate the ceiling will be:

- (i) At least 1,500 feet above the lowest circling MDA, if a circling approach is required and authorized for that airport; or
- (ii) At least 1,500 feet above the lowest published instrument approach minimum or 2,000 feet above the airport elevation, whichever is greater; and

- (iii) The visibility at that airport will be at least 3 miles, or 2 miles more than the lowest applicable visibility minimums, whichever is greater, for the instrument approach procedures to be used at the destination airport; or
- (2) The flight is over a route approved without an available alternate airport for a particular destination airport and the airplane has enough fuel to meet the requirements of § 121.641(b) or § 121.645(c).
- (b) For the purposes of paragraph (a) of this section, the weather conditions at the alternate airport must meet the requirements of the certificate holder's operations specifications.
- (c) No person may dispatch a flight unless he lists each required alternate airport in the dispatch release.

To understand what fuel requirements are effective we must also understand how the FAA issues an air carrier certificate.

Domestic operation means any scheduled operation conducted by any person operating any airplane described in paragraph (1) of this definition at locations described in paragraph (2) of this definition:

- (1) Airplanes:
 - (i) Turbojet-powered airplanes;
 - (ii) Airplanes having a passenger-seat configuration of more than 9 passenger seats, excluding each crewmember seat; or
 - (iii) Airplanes having a payload capacity of more than 7,500 pounds.
- (2) Locations:
 - (i) Between any points within the 48 contiguous States of the United States or the District of Columbia; or
 - (ii) Operations solely within the 48 contiguous States of the United States or the District of Columbia; or
 - (iii) Operations entirely within any State, territory, or possession of the United States; or
 - (iv) When specifically authorized by the Administrator, operations between any point within the 48 contiguous States of the United States or the District of Columbia and any specifically authorized point located outside the 48 contiguous States of the United States or the District of Columbia.

Flag operation means any scheduled operation conducted by any person operating any airplane described in paragraph (1) of this definition at the locations described in paragraph (2) of this definition:

- (1) Airplanes:
 - (i) Turbojet-powered airplanes;
 - (ii) Airplanes having a passenger-seat configuration of more than 9 passenger seats, excluding each crewmember seat; or
 - (iii) Airplanes having a payload capacity of more than 7,500 pounds.
- (2) Locations:
 - (i) Between any point within the State of Alaska or the State of Hawaii or any territory or possession of the United States and any point outside the State of

Alaska or the State of Hawaii or any territory or possession of the United States, respectively; or

(ii) Between any point within the 48 contiguous States of the United States or the District of Columbia and any point outside the 48 contiguous States of the United States and the District of Columbia.

(iii) Between any point outside the U.S. and another point outside the U.S.

Supplemental operation means any common carriage operation for compensation or hire conducted with any airplane described in paragraph (1) of this definition that is a type of operation described in paragraph (2) of this definition:

(1) Airplanes:

(i) Airplanes having a passenger-seat configuration of more than 30 seats, excluding each crewmember seat;

(ii) Airplanes having a payload capacity of more than 7,500 pounds; or

(iii) Each propeller-powered airplane having a passenger-seat configuration of more than 9 seats and less than 31 seats, excluding each crewmember seat, that is also used in domestic or flag operations and that is so listed in the operations specifications as required by § 119.49(a)(4) for those operations; or

(iv) Each turbojet powered airplane having a passenger seat configuration of 1 or more and less than 31 seats, excluding each crewmember seat, that is also used in domestic or flag operations and that is so listed in the operations specifications as required by § 119.49(a)(4) for those operations.

(2) Types of operation:

(i) Operations for which the departure time, departure location, and arrival location are specifically negotiated with the customer or the customer's representative;

(ii) All-cargo operations; or

(iii) Passenger-carrying public charter operations conducted under part 380 of this title.

We must remember that it is the airline that is certified and not the flight. As such all flights conducted by WestWind Airlines (VA) are flag operations. WestWind operates outside the 48 contiguous States thus earning its flag status. Thus all operations, either Part 121 Passenger or Cargo or Part 135 charter operations must operate in accordance with flag operations. For our charter operations the following rules apply.

§ 135.209 VFR: Fuel supply.

(a) No person may begin a flight operation in an airplane under VFR unless, considering wind and forecast weather conditions, it has enough fuel to fly to the first point of intended landing and, assuming normal cruising fuel consumption --

(1) During the day, to fly after that for at least 30 minutes; or

(2) At night, to fly after that for at least 45 minutes.

(b) No person may begin a flight operation in a helicopter under VFR unless, considering wind and forecast weather conditions, it has enough fuel to fly to the

first point of intended landing and, assuming normal cruising fuel consumption, to fly after that for at least 20 minutes.

§ 135.223 IFR: Alternate airport requirements.

(a) Except as provided in paragraph (b) of this section, no person may operate an aircraft in IFR conditions unless it carries enough fuel (considering weather reports or forecasts or any combination of them) to --

- (1) Complete the flight to the first airport of intended landing;
- (2) Fly from that airport to the alternate airport; and
- (3) Fly after that for 45 minutes at normal cruising speed or, for helicopters, fly after that for 30 minutes at normal cruising speed.

(b) Paragraph (a)(2) of this section does not apply if part 97 of this chapter prescribes a standard instrument approach procedure for the first airport of intended landing and, for at least one hour before and after the estimated time of arrival, the appropriate weather reports or forecasts, or any combination of them, indicate that --

- (1) The ceiling will be at least 1,500 feet above the lowest circling approach MDA; or
- (2) If a circling instrument approach is not authorized for the airport, the ceiling will be at least 1,500 feet above the lowest published minimum or 2,000 feet above the airport elevation, whichever is higher; and
- (3) Visibility for that airport is forecast to be at least three miles, or two miles more than the lowest applicable visibility minimums, whichever is the greater, for the instrument approach procedure to be used at the destination airport.

So let's recap fuel reserve requirements:

For WestWind charter operations operating under Part 135 the basic 30 minutes day VFR, 45 minutes night VFR and 45 minutes IFR fuel reserves requirements. For WestWind Passenger (all) and Ceilo operations nonturbine and turboprop aircraft with an alternate, requires 30 minutes plus 15% of the time flown or 90 minutes fuel which ever is less, without an alternate 3 hours reserve must be carried. For turbine aircraft for operation inside the 48 contiguous States we may use 45 minutes reserve. For turbine operations outside the 48 contiguous States we must have an additional 10% of the fuel required to reach the destination plus 30 minutes at 1,500' AGL at holding speed. If an alternate is not specified then on a turbine airplane we must have a reserve of 2 hours. In all cases we must carry sufficient fuel to take-off make an approach, fly a missed approach then proceed to the furthest alternate (unless and alternate is not specified) plus the above reserves.

Ready for the Quiz?

1. Under which Air Carrier Certificate does WestWind Operate?

- a. Domestic

- b. Flag
- c. Supplemental
- d. Commercial Operating Certificate

2. You are operating our B737-700 from John F. Kennedy (KJFK) to Dallas Fort Worth (KDFW) with an alternate of Austin-Bergstrom (KAUS.) How much fuel is required?

- a. Enough fuel to fly to Dallas, make an instrument approach, fly the missed approach procedure, fly to Austin, then cruise for an additional 45 minutes.
- b. Enough fuel to fly to Dallas plus 10% of the time required, make an instrument approach, fly the missed approach procedure, fly to Austin, then hold at 1,500' AGL for 30 minutes at holding speed.
- c. Enough fuel to fly to Dallas, make an instrument approach, fly the missed approach procedure, then cruise for an additional 2 hours.
- d. Enough fuel to fly to Dallas, make an instrument approach, fly the missed approach procedure, fly to Austin, then a reserve of 30 minutes plus 15% of the time flown or 90 minutes which ever is less.

3. You are operating our B737-700 from John F. Kennedy (KJFK) to Gander (CYQX) with an alternate of Bangor (KBGR.) How much fuel is required?

- a. Enough fuel to fly to Gander, make an instrument approach, fly the missed approach procedure, fly to Bangor, then cruise for an additional 45 minutes.
- b. Enough fuel to fly to Gander plus 10% of the time required, make an instrument approach, fly the missed approach procedure, fly to Bangor, then hold at 1,500' AGL for 30 minutes at holding speed.
- c. Enough fuel to fly to Gander, make an instrument approach, fly the missed approach procedure, then cruise for an additional 2 hours.
- d. Enough fuel to fly to Gander, make an instrument approach, fly the missed approach procedure, fly to Bangor, then a reserve of 30 minutes plus 15% of the time flown or 90 minutes which ever is less.

4. You are operating our Cielo DC-3 from John F. Kennedy (KJFK) to Gander (CYQX) with an alternate of Bangor (KBGR.) How much fuel is required?

- a. Enough fuel to fly to Gander, make an instrument approach, fly the missed approach procedure, fly to Bangor, then cruise for an additional 45 minutes.
- b. Enough fuel to fly to Gander plus 10% of the time required, make an instrument approach, fly the missed approach procedure, fly to Bangor, then hold at 1,500' AGL for 30 minutes at holding speed.
- c. Enough fuel to fly to Gander, make an instrument approach, fly the missed approach procedure, then cruise for an additional 2 hours.
- d. Enough fuel to fly to Gander, make an instrument approach, fly the missed approach procedure, fly to Bangor, then a reserve of 30 minutes plus 15% of the time flown or 90 minutes which ever is less.

5. You are scheduled to fly a charter flying our C550 Citation Bravo from Seattle-Tacoma (KSEA) to Anchorage (PANC.) Anchorage is VFR but this flight will be conducted under IFR. How much fuel is required?

- a. Enough fuel to fly to Anchorage, make an instrument approach, fly the missed approach procedure, then cruise for an additional 45 minutes.
- b. Enough fuel to fly to Anchorage plus 10% of the time required, make an instrument approach, fly the missed approach procedure, and then hold at 1,500' AGL for 30 minutes at holding speed.
- c. Enough fuel to fly to Anchorage, make an instrument approach, fly the missed approach procedure, then cruise for an additional 2 hours.
- d. Enough fuel to fly to Anchorage, make an instrument approach, fly the missed approach procedure, and then a reserve of 3 hours at cruise.

Answers: 1A, 2A, 3B, 4D, 5A.