

Consolidating All Boeing 757's into One B757 Categorization

Wake Turbulence Research Program

June 2010



Federal Aviation
Administration



Discussion Scope

- **Explain the recent change to the B757 in the US**
- **Discuss partial harmonization with ICAO as a result of this change**



Simple Summary

→ We DID NOT change the additional separation behind the non-heavy B757

- 7110.65 Section 5-5-4, Separation Minima, paragraph e still applies:

1. When applying wake turbulence separation criteria, directly behind means an aircraft is operating within 2500 feet of the flight path of the leading aircraft over the surface of the earth.

2. Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

- 1. Heavy behind heavy - 4 miles.*
- 2. Large/heavy behind B757 - 4 miles.*
- 3. Small behind B757 - 5 miles.*
- 4. Small/large behind heavy - 5 miles.*

→ We are treating all B757s the same regardless of weight



Background

- **Three types of B757s in inventory**
 - B757-200 (certificated at 255,000 lbs)
 - B757-200 (certificated at 255,500 lbs)
 - B757-300 (certificated at 272,500 lbs)

Table 1 Aircraft Classes, per FAA Order 7110.65

AIRCRAFT CLASSES – For the purposes of Wake Turbulence Separation Minima, ATC classifies aircraft as Heavy, Large, and Small as follows:

- a. Heavy** – Aircraft capable of takeoff weights of more than 255,000 pounds whether or not they are operating at this weight during a particular phase of flight.
- b. Large** – Aircraft of more than 41,000 pounds, maximum certificated takeoff weight, up to 255,000 pounds.
- c. Small** – Aircraft of 41,000 pounds or less maximum certificated takeoff weight.

Note: ICAO break point between Medium and Heavy is 300,000 lbs

Problem Statement

→ **Operational issues exist**

- ATC has difficulty determining which B752s are heavy
- International rejection of flight plans with B753 (or B752(H)) filed as Heavy

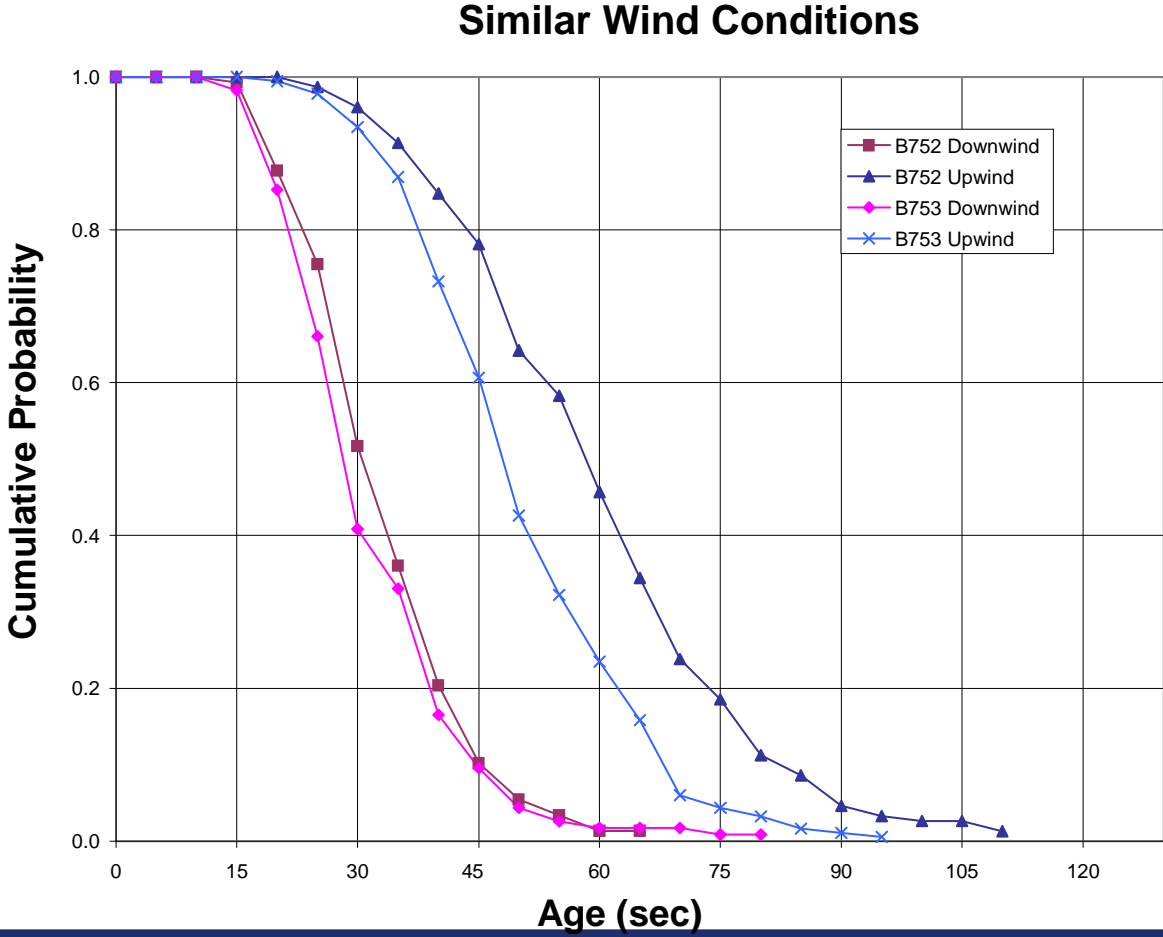


Background (continued)

- **All three versions of B757s have exactly the same wing (with and without winglets)**
- **Approach speeds for heavier a/c with same wing are higher than for lighter a/c with same wing**
 - Vref for B752 is 137 kts
 - Vref for B753 is 143 kts
 - => Initial wake strength will be slightly higher for B753 but will decay faster
- **Increased weight of B752(H) is 500 lbs and inconsequential**
- **Increased weight of B753 is 17,500 lbs is in elongated fuselage**
 - => All three types will have similar rolling moments of inertia and will be equally vulnerable to a wake encounter from a leading Heavy

Example Data: Approach at Threshold (65 ft AGL)

Figure 1 Wake Survival Probability Curve for Arrivals Near Threshold



ATC Handbook Change

Appendix A. Aircraft Information Fixed-Wing Aircraft

AIRCRAFT WEIGHT CLASSES

a. Heavy. Aircraft capable of takeoff weights of more than 255,000 pounds, whether or not they are operating at this weight during a particular phase of flight.

NOTE-

For the purposes of applying separation standards prescribed in this order, all B752 and B753 aircraft, regardless of weight certification, are to be considered a large aircraft when following another aircraft and a B757 when the lead aircraft.



ATC Handbook Change (concluded)

BOEING COMPANY (USA)

(Also GRUMMAN, IAI, LOCKHEED-BOEING, Mc DONNELL DOUGLAS, NORTHROP-GRUMMAN, ROHR)

Model	Type Designator	Description	Performance Information			
			Number & Type Engines/ Weight Class	Climb Rate (fpm)	Descent Rate (fpm)	SRS Cat.
No change						
757-200 (C32)	B752	2J/L	3,500	2,500	III	7
757-300	B753	2J/L	3,500	2,500	III	8



Approval Went Further Than Request

- ➔ **AOV requested the weight boundary between Large and Heavy move from FAA 255,000 lbs to ICAO 300,000 lbs**
 - Other than the extra mile behind a B757, US treats all aircraft types with variants between 255,000 and 300,000 as Heavy (e.g., DC8, B707, A310)
 - ICAO, with the exception of B707-100, also treats aircraft types with variants on both sides of 300,000 lbs boundary as Heavy (e.g., DC8, A310)
 - Separate Document Change Proposal (DCP) developed for weight boundary change
 - ⇒ Does not affect separation
 - ⇒ Does not affect automation

Status

→ **B757 Reclassification**

- SRMD approved July 22, 2009
- FAA Order 7110.520 signed Feb 19, 2010 and effective April 8, 2010

→ **Weight Boundary Change**

- DCP circulated for comment, concur/non-concur
- FAA Order 7110.525 added weight boundary change to 7110.520 and was signed April 6, 2010 and effective April 8, 2010

