



# National Transportation Safety Board Aviation Incident Final Report

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<b>Location:</b>	Dallas, TX	<b>Incident Number:</b>	DFW081A074A
<b>Date &amp; Time:</b>	03/01/2008, 1012 CST	<b>Registration:</b>	N741SA
<b>Aircraft:</b>	BOEING 737-7H4	<b>Aircraft Damage:</b>	Minor
<b>Defining Event:</b>	Ground collision	<b>Injuries:</b>	107 None
<b>Flight Conducted Under:</b>	Part 121: Air Carrier - Scheduled		

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## Analysis

The airplane was taxiing to a terminal gate utilizing the taxiway centerline as it passed a stationary airplane that had completed a "pushback" from a terminal gate. The taxiing airline transport pilot perceived the distance between the two airplanes adequate to continue to the terminal gate, however, the left winglet from the taxiing airplane struck the right horizontal stabilizer of the stationary airplane. The top portion of the winglet sheared off, and imbedded itself in the horizontal stabilizer of the stationary airplane resulting in minor damage to both airplanes.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The failure of the taxiing flight crew to maintain an adequate clearance from the stationary airplane.

## Findings

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<b>Personnel issues</b>	Perception - Pilot (Cause) Monitoring other aircraft - Pilot (Cause)
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## Factual Information

### HISTORY OF FLIGHT

On March 1, 2008, at 1012 central standard time, a Boeing B-737-7H4, N741SA, operated by Southwest Airlines Company under provisions of 14 Code of Federal Regulations (CFR) Part 121 scheduled passenger service as Southwest Airlines (SWA) Flight 411, collided during taxi with a stationary Boeing 737-3H4, N652SW, operated by Southwest Airlines Company under provisions of 14 Code of Federal Regulations (CFR) Part 121 scheduled passenger service as Southwest Airlines (SWA) Flight 15 during ground operations at Dallas Love Field (DAL), Dallas, Texas. There were no injuries to the two airline transport pilots, three flight attendants, and the 102 passengers onboard SWA411, or to the two airline transport pilots, three flight attendants, and the 132 passengers onboard SWA15. Both airplanes sustained minor damage. Day instrument meteorological conditions prevailed and an instrument flight rules (IFR) Flight plan had been filed for SWA411 on the flight from the Birmingham International Airport, Birmingham, Alabama. An IFR flight plan had been filed for SWA15 with the intended destination of William P. Hobby Airport (HOU), Houston, Texas.

SWA411 had landed on runway 13 left and had a clearance to taxi to gate 2. While taxiing southbound on taxiway D past SWA15 at gate 11, the left winglet of SWA411 collided with the left horizontal stabilizer of SWA15. SWA411 immediately stopped in position on taxiway D and shut down both engines.

At the time of the collision SWA15 had completed a pushback from gate 11 and the ground crew had disconnected and left the area. SWA15 was stationary with the parking brake set waiting for SWA411 to pass before beginning to taxi for takeoff. SWA15 was on an approximate heading of 060 degrees with the closest part of that airplane, the left horizontal stabilizer, positioned approximately 20 feet away from the east edge marking for taxiway D.

The captain of SWA411 later stated that it appeared to him that they could safely pass SWA15 on their left. The first officer of SWA411 said he asked the captain about wing clearance as they approached SWA15 and the captain looked over his left shoulder and said they had enough room.

After initial photographs were taken SWA411 was towed to gate 2 and the passengers and crew deplaned normally through the jetbridge. SWA15 was towed to gate 11 and the passengers and crew deplaned normally through the jetbridge.

### PERSONNEL INFORMATION

#### SWA411

The captain of SWA411 was a 57-year-old airline transport pilot with 23,000 total flight hours, including 18,000 hours as PIC, and 9,000 hours on the B737. He was type rated in the B737 and four other airplane types. He had flown 3 hours in the last 24 hours and 28 hours in the last 30 days. He held a first class airman medical certificate dated October 23, 2007. The medical certificate contained the limitation "must have available glasses for near vision".

The first officer of SWA411 was a 50-year-old airline transport pilot with 8,090 total flight hours, including 2,610 hours as PIC, and 4,920 hours on the B737. He was type rated in the B737. He had flown 3 hours in the last 24 hours and 78 hours in the last 30 days. He held a first class airman medical certificate dated April 12, 2007. The medical certificate contained

the limitation "must wear corrective lenses".

#### SWA15

The captain of SWA15 was a 52-year-old airline transport pilot with 16,250 total flight hours, including 10,900 hours as PIC, and 10,980 hours on the B737. He was type rated in the B737 and three other airplane types. He had flown 7 hours in the last 24 hours and 86 hours in the last 30 days. He held a first class airman medical certificate dated January 17, 2008.

The first officer of SWA15 was a 48-year-old airline transport pilot with 6,800 total flight hours, including 2,150 hours as PIC, and 4,200 hours on the B737. He was type rated in the B737. He had flown 2 hours in the last 24 hours and 75 hours in the last 30 days. He held a first class airman medical certificate dated September 17, 2007.

#### AIRCRAFT INFORMATION

SWA411, N741SA, is a Boeing 737-7H4 S/N 29277 manufactured in 1998. The wingspan is 117 feet 5 inches and the top of the winglet is 21 feet 4 inches high. The horizontal stabilizer is 47 feet 2 inches wide.

SWA15, N652SW, is a Boeing 737-3H4 S/N 27722 manufactured in 1997. The wingspan is 102 feet 5 inches and the top of the winglet is 17 feet 9 inches high. The horizontal stabilizer is 41 feet 8 inches wide and 17 feet high.

#### METEOROLOGICAL INFORMATION

At 0953 hours central standard time, the weather observation facility at DAL reported, wind from 140 degrees at 6 knots, visibility 3 statute miles in haze, overcast clouds at 500 feet, temperature 59 degrees Fahrenheit, dew point 57 degrees Fahrenheit, and a barometric pressure of 30.27 inches of Mercury.

#### COMMUNICATIONS AND DISPATCH INFORMATION

A review of the recorded air traffic control ground position indicated that SWA411 had been cleared to taxi to gate 2, SWA15 had called for pushback from gate 11 and was cleared to taxi to runway 13 left with an instruction to "use caution for company behind you".

#### FLIGHT RECORDERS

##### Cockpit Voice Recorders

Both SWA411 and SWA15 were equipped with a cockpit voice recorders (CVR). The CVRs were secured and sent to the National Transportation Safety Board's Audio Laboratory for readout. The recordings consisted of excellent quality audio information. A CVR group was not formed and a transcript was not prepared.

##### Flight Data Recorders

SWA411 was equipped with a digital flight data recorder (DFDR). The operator provided a readout of the DFDR data which showed the right engine had been shut down 150 seconds after touchdown and the maximum groundspeed during taxi was 25 knots. At the time of impact the recorded groundspeed was 7 knots and the airplane was on a magnetic heading of 180 degrees. The magnetic heading did not change significantly at the time of the event. There was a perturbation in all three accelerometer values: vertical acceleration of 1.05G, Longitudinal acceleration of -0.42G (with braking), and lateral acceleration of +/- 0.05G, as

well as application of significant braking at a recorded time of 10:13:42.

SWA15 was equipped with a digital flight data recorder (DFDR). The operator provided a readout of the DFDR data which showed the engines were at idle power (N1 ~ 22%), the parking brake was set, and the aircraft was on a magnetic heading of 60 degrees at time of the incident. There was a perturbation in all three accelerometer values: vertical acceleration of 1.04G, Longitudinal acceleration of -0.05G, and lateral acceleration of -0.18G at a recorded time of 10:12:33.

#### WRECKAGE AND IMPACT INFORMATION

SWA411, N741SA, had minor damage to left winglet when a portion of the winglet separated after striking the horizontal stabilizer of SWA15.

SWA15, N652SW, had minor damage to the leading edge of the left horizontal stabilizer where part of the separated left winglet from SWA411 remained imbedded in the leading edge of the horizontal stabilizer. The left horizontal stabilizer of SWA15 had a smear on the underside skin beginning at the location of the separated winglet embedded in the leading edge and continuing to the rear of the left elevator. That smear measured at an angle of 56 degrees from the leading edge of the horizontal stabilizer. The horizontal stabilizer on SWA15 has a leading edge sweep of approximately 25 degrees.

#### ADDITIONAL INFORMATION

Southwest Airlines Flight Operations Manual Bulletin 24-05, dated November 10, 2005 provided additional dimensional and lateral clearance information and guidance for the 737 - 700/-300/-500, and instructed pilots that "When the aircraft is not on a taxi line, a lateral clearance of 10 feet is considered minimum acceptable separation... Caution:

Lateral clearance, particularly to the top of the winglet, is difficult to judge. ... If lateral clearance is in question: Stop the aircraft, and request a wing walker, request a tug, or wait for the other aircraft to move."

The SWA Training Topics 2006-01, dated March 24, 2006, cautions all pilots that the winglets on the -700 "changed the sight lines to the wingtip and creates a situation where the winglets extend beyond what is actually visible to the Pilot" and for the pilots to "never underestimate how difficult it is to determine clearance by looking back at the wingtip."

SWA Training Topic 1-07, dated January 31, 2007, reinforces that and adds the caution that from the cockpit the winglet appears to be at the edge of the position light, but is in fact 42 inches further outboard from the apparent position of the wing tip.

#### CORRECTIVE ACTIONS

Southwest Airlines Company issued SWA Read Before Fly memorandum A-08-19, dated March 5, 2008, which informed all pilots about the incident and instructed them to use vigilance and caution when taxiing in congested areas and when unsure of wingtip clearance to stop taxiing and use a wing-walker or to wait as long as necessary for equipment or other aircraft to be moved. This memorandum also directed all pilots to review SWA Training Topic 1-07.

Southwest Airlines Company issued SWA Read Before Fly memorandum A-08-30, dated

March 20, 2008, which informed all pilots that at DAL "effective on or about March 22, 2008, the red line parallel to Taxiway D and Gates 4, 5, 7, 9, 11, and 14 will no longer define the non-movement area. The airport is adding standard yellow markings for the non-movement area on that date. The DAL 10-7 is scheduled to reflect the new line in the 4 APR 08 revision. All gates will continue to require a pushback call as stated on DAL page 10-7. DAL ATC will now control clearance from Gates 4, 5, 7, 9, 11, and 14 to the movement area. Please remain vigilant; perform the pushback calls and confirm ATC clearance before entering the movement area."

On March 24, 2008, the City of Dallas, Department of Aviation completed painting new yellow and black markings showing the new edge of the non-movement area approximately 93 feet from the center line of taxiway D."

On March 25, 2008, the City of Dallas, Department of Aviation, entered into a Letter of Agreement with the FAA Dallas Air Traffic Control Tower (DAL ATCT) and notified the all the operators involved that the "city shall require all aircraft operators conducting push back operations at gates 4, 5, 7, 9, 11, 14, 30, 31, 32 and the Cargo Ramp to obtain approval from the Tower prior to moving aircraft."

On March 25, 2008, the Dallas air traffic control tower changed their internal procedures so that the ground controller will no longer allow taxi operations on taxiway D at the same time they allow pushback operations from the affected gates.

Southwest Airlines Company framed and prominently mounted the separated top portion of the winglet from SWA411 on the wall of a stairway in their flight training center. That actual winglet portion is now a graphical and visual reminder to all pilots of this incident.

## History of Flight

Taxi-from runway	Ground collision (Defining event)
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## Pilot Information

<b>Certificate:</b>	Airline Transport; Flight Instructor; Flight Engineer	<b>Age:</b>	46, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Sea	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With Waivers/Limitations	<b>Last Medical Exam:</b>	10/23/2007
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	11/02/2007
<b>Flight Time:</b>	23000 hours (Total, all aircraft), 14500 hours (Total, this make and model), 18000 hours (Pilot In Command, all aircraft), 221 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Co-Pilot Information

<b>Certificate:</b>	Airline Transport	<b>Age:</b>	50, Male
<b>Airplane Rating(s):</b>	Multi-engine Land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With Waivers/Limitations	<b>Last Medical Exam:</b>	04/12/2007
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	09/16/2007
<b>Flight Time:</b>	8090 hours (Total, all aircraft), 4920 hours (Total, this make and model), 2610 hours (Pilot In Command, all aircraft), 238 hours (Last 90 days, all aircraft), 78 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	BOEING	<b>Registration:</b>	N741SA
<b>Model/Series:</b>	737-7H4	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>		<b>Serial Number:</b>	29277
<b>Landing Gear Type:</b>		<b>Seats:</b>	145
<b>Date/Type of Last Inspection:</b>	02/29/2008, Continuous Airworthiness	<b>Certified Max Gross Wt.:</b>	154500 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo Fan
<b>Airframe Total Time:</b>	34448 Hours	<b>Engine Manufacturer:</b>	CFM INTL
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	CFM-56-7
<b>Registered Owner:</b>	SOUTHWEST AIRLINES CO	<b>Rated Power:</b>	24000 lbs
<b>Operator:</b>	SOUTHWEST AIRLINES CO	<b>Air Carrier Operating Certificate:</b>	Flag carrier (121)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	SWAA

## Meteorological Information and Flight Plan

Observation Facility, Elevation:	KDAL, 487 ft msl	Observation Time:	0953 CST
Distance from Accident Site:		Condition of Light:	Day
Direction from Accident Site:		Conditions at Accident Site:	Instrument Conditions
Lowest Cloud Condition:	Thin Overcast / 500 ft agl	Temperature/Dew Point:	15° C / 12° C
Lowest Ceiling:	Overcast / 500 ft agl	Visibility	3 Miles
Wind Speed/Gusts, Direction:	6 knots, 140°	Visibility (RVR):	
Altimeter Setting:	30.27 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	BIRMINGHAM, AL (BHM)	Type of Flight Plan Filed:	IFR
Destination:	DALLAS, TX (DAL)	Type of Clearance:	IFR
Departure Time:	0830 CST	Type of Airspace:	Class B

## Airport Information

Airport:	DALLAS LOVE FIELD (DAL)	Runway Surface Type:	
Airport Elevation:	500 ft	Runway Surface Condition:	
Runway Used:		IFR Approach:	
Runway Length/Width:		VFR Approach/Landing:	

## Wreckage and Impact Information

Crew Injuries:	5 None	Aircraft Damage:	Minor
Passenger Injuries:	102 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	107 None		

## Administrative Information

Investigator In Charge (IIC):	Thomas Latson	Adopted Date:	05/12/2009
Additional Participating Persons:	Willard F McMillen; DFW FSDO; Fort Worth, TX Court Goodroe; Southwest Airlines Co; Dallas, TX John Gadzinski; SWAPA; Dallas, TX		
Publish Date:	05/12/2009		
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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