
Ground collision between a Boeing 737 and Cessna 401 at Dallas Love Field, July 28, 1995

Micro-summary: This Boeing 737 collided with a Cessna 401 while taxiing.


Event Date: 1995-07-28 at 0737 CDT

Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: <http://www.nts.gov/>

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		NTSB ID: FTW95FA319A		Aircraft Registration Number: N675AA	
		Occurrence Date: 07/28/1995		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place DALLAS		State TX	Zip Code 75235	Local Time 0737	Time Zone CDT
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer BOEING		Model/Series 737-3A4		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
HISTORY OF FLIGHT					
<p>On July 28, 1995, at 0737 central daylight time, a Boeing 737- 3A4, N675AA, collided with a Cessna 401, N31DB, while both airplanes were taxiing at Love Field, Dallas, Texas. The Boeing was operating under Title 14 CFR Part 121 as Southwest Airlines Flight 5, scheduled service from Amarillo, Texas, to Dallas. The Cessna was operating under Title 14 CFR Part 135 as Raven Air 31, a non-scheduled cargo flight from Dallas to Tyler, Texas. The Boeing sustained minor damage and the Cessna was substantially damaged. There were no injuries to Raven Air's commercially rated captain and first officer or to Southwest's five crew members and 92 passengers. Visual meteorological conditions prevailed.</p> <p>At 0736:04, the Cessna received clearance from ground control to taxi from the Dalfort ramp to runway 13L and was advised of "the Boeing clearing that runway." The Cessna acknowledged having the Boeing 737 in sight and taxied from the ramp onto taxiway Bravo. After exiting runway 13L, at 0736:31, the 737 received clearance from ground control to taxi to parking and was advised of "traffic ahead to your left, twin Cessna outbound from Dalfort." The 737 responded with "into parking, Southwest five," and proceeded to taxi northwest on taxiway Mike. There was no further activity on the ground control frequency until 0737:21 when the Cessna transmitted "that 737 just hit us."</p> <p>Witness statements were submitted by six witnesses who observed the collision. Two witnesses (both passengers on the 737) described the Cessna and the 737 as moving in the same direction and at the same speed. Three witnesses reported the two aircraft were merging/converging with the Cessna's right wing tip slightly ahead of the 737's left wing tip. Four witnesses observed the leading edge of the 737's left wing contact the rudder of the Cessna. All six witnesses reported that, immediately following the impact, the Cessna made a sharp left turn of approximately 360 degrees before coming to a stop. They further reported that the 737 continued straight ahead for a "short" distance before coming to a stop.</p> <p>The captain of the Cessna reported in his written statement that, after intercepting taxiway Bravo, he "lost visual contact with the 737 due to my position on the taxiway." During an interview, he recalled observing the 737 while on taxiway Bravo by looking back over his right shoulder through the Cessna's right forward cabin window. The first officer of the Cessna was occupied with duties inside the cockpit during the taxi, and did not see the 737 until immediately prior to the collision. When the captain of the Cessna heard engine noise, he realized he was hearing the 737 and "added power trying to speed up." He felt the collision and applied left rudder, performing a 360 degree turn before coming to a stop.</p> <p>The captain and first officer of the 737 reported that they did not recall hearing any traffic advisories from ground control. Neither recalled seeing any general aviation aircraft that might</p>					
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be a hazard to their taxiing. Just after turning left off taxiway Mike to join Bravo, the captain of the 737 felt a "push" on his airplane. Seconds later he heard a radio transmission stating "the 737 just hit us." Realizing that the communication referred to his aircraft, the 737 captain stopped his aircraft. After ground personnel examined the 737 and found no damage or leaking fluids, the 737 contacted ground control, received clearance and taxied to the gate.

After the 737 was parked at the gate, a passenger came forward and identified himself to the crew as a witness. In his description of the event as recorded on the cockpit voice recorder (transcript attached), the passenger described the 737 as "overtaking" the Cessna and stated that the lead edge of the 737 "clipped" the Cessna.

COMMUNICATIONS

A transcript is attached of the transmissions on the Love Field Air Traffic Control Tower local and ground control frequencies during the time periods pertinent to the accident. On August 3, 1995, the controller who was working the ground control position at the time of the accident was interviewed by the investigator-in-charge. Representatives of all parties to the investigation were also present at the interview. In response to questions, the controller provided the following information.

He came on duty at 0630. He was acting as the controller-in-charge. Approximately 0727, he relieved the ground controller. Also present in the tower and working their respective positions were three other controllers: local, radar, and clearance delivery. He considered the traffic to be minimal.

Prior to the accident, airport operations personnel were in the process of closing runway 13R. He was coordinating the closure with FAA maintenance and airport operations. The local controller was coordinating on the land-line concerning arrivals being handled by regional approach.


Approximately 0736, Raven 31 called to request taxi instructions from the Dalfort FBO. He instructed the pilot to taxi to runway 13L and issued traffic advisories about a Boeing 737 (Southwest 5) clearing runway 13L and a Baron taxiing in the opposite direction on the inboard taxiway (taxiway B.) Raven 31 reported both aircraft in sight and acknowledged the taxi instructions.

He then issued a traffic advisory to the Baron about the opposite direction twin Cessna (Raven 31) and received an acknowledgment. Southwest 5 called for taxi instructions to gate 4C. He advised Southwest about the twin Cessna traffic outbound from Dalfort and instructed the pilot to taxi into parking. Southwest 5 acknowledged.

Once he heard verbal acknowledgment from both aircraft he had "anticipation of separation." There was a large separation between the airplanes and he anticipated they would stay separated. In his mind, Raven was first and Southwest was following.

He did not observe the actual taxiing of the two aircraft after issuing the taxi clearances. He diverted his attention to another duty, logging the closure of runway 13R in the facility log. While he was typing, he heard the pilots of both aircraft call ground control.

Approximately 0738, he requested a transmission repeat. The pilot of Raven 31 stated that the 737 had just hit him. He saw the collision damage to Raven 31 and asked Southwest if they required any assistance. He then requested position relief and made the initial accident notification calls.

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AIRPORT INFORMATION

Love Field has three runways, two of which are parallel, runway 13L/31R and runway 13R/31L. Taxiway Bravo is the main taxiway on the southwest side of runway 13L/31R. The Dalfort Aviation ramp is located southwest of runway 13L/31R, adjacent to taxiway Bravo. To the north of the Dalfort ramp, the centerline of taxiway Bravo curves towards runway 13L/31R to maintain clearance from a gate structure. (See attached diagram.)

Taxiway Mike is the inner taxiway on the southwest side of runway 13L/31R. It runs parallel to runway 13L/31R and extends from taxiway Bravo 1 to Bravo 3. At Bravo 3, an aircraft proceeding northwest on the taxiway centerlines would turn 90 degrees left off Mike onto Bravo 3, and then turn 90 degrees right off Bravo 3 onto Bravo. Tower personnel reported aircraft heading northwest on Mike seldom follow these markings onto Bravo. The majority of aircraft take the same path as that used by the accident 737 and "cut the corner," turning left approximately 20 degrees from Mike directly onto Bravo.

FLIGHT RECORDERS

The Cessna 401 was not equipped with a cockpit voice recorder (CVR) or flight data recorder (FDR), nor was it required to be so equipped under current Federal Aviation Regulations.

The Boeing 737 was equipped with a Fairchild Model A-100A CVR, S/N 60937. The attached CVR transcript begins at 0735:19 as the 737 was about to touch down on runway 13L and continues until 0756:39 after the aircraft was parked at the terminal gate. The traffic advisory made by ground control to the 737 at 0736:31 concerning the "twin Cessna outbound from Dalfort" was recorded by the CVR. Conversation between the crew concerning the quality of the landing appears on the transcript from 0736:59 to 0737:14. At 0737:17, a sound similar to an increase in reciprocating engine RPM was recorded by the cockpit area microphone. Following the collision, both the captain and first officer of the 737 made remarks indicating they had not seen the Cessna at any time during their taxi.

The Boeing 737 was also equipped with an Allied Signal solid state FDR, S/N 0599. A printout of selected parameters is attached. The playback data revealed an impact signature in the longitudinal and vertical acceleration traces. Approximately 3 seconds after this signature, the airplane began to decelerate. At the time deceleration began, the airplane was traveling at a groundspeed of approximately 21 knots. The airplane traveled about 106 feet in the 3 seconds before deceleration began and an additional 179 feet from the time deceleration began until it came to a stop.

WRECKAGE AND IMPACT INFORMATION

A 2 foot section of the rudder from the Cessna 401 was located on the centerline of taxiway Bravo at the approximate location where an airplane merging from taxiway Mike would intercept taxiway Bravo. The Cessna 401 was located approximately 100 feet south of the rudder section on a heading of about 360 degrees. The vertical stabilizer was crushed to the right and forward and the rear portion of the right tip tank was bent outboard.

The Boeing 737 sustained surface scratches to the left wing #2 leading edge slat and the upper and lower wing surfaces. A 12 inch wide band of scratches and green paint smears was located on the left engine inlet at the 3 o'clock position.

ADDITIONAL INFORMATION

The Cessna 401 was released to a representative of the owner on July 28, 1995, at the completion of the on scene investigation. The Boeing 737 was released to a representative of the owner on July

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28, 1995, after it was examined at the operator's hangar. The CVR and DFDR from the 737 were returned to the operator after they were read out and the final wreckage release was signed on January 8, 1996.

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Landing Facility/Approach Information					
Airport Name LOVE FIELD	Airport ID: DAL	Airport Elevation 487 Ft. MSL	Runway Used 13L	Runway Length 7753	Runway Width 150
Runway Surface Type: Concrete					
Runway Surface Condition: Dry					
Type Instrument Approach: NONE					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer BOEING		Model/Series 737-3A4		Serial Number 23253	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 145	Certified Max Gross Wt. 130000 LBS	Number of Engines: 2		
Engine Type: Turbo Fan	Engine Manufacturer: Cfm	Model/Series: CFM56-3	Rated Power: 20000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection	Time Since Last Inspection Hours	Airframe Total Time 29223 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner FIRST SECURITY BANK OF UTAH NA		Street Address 79 S MAIN ST			
		City SALT LAKE CITY	State UT	Zip Code 84111	
Operator of Aircraft SOUTHWEST AIRLINES CO.		Street Address P. O. BOX 36611			
		City DALLAS	State TX	Zip Code 75235	
Operator Does Business As: SOUTHWEST			Operator Designator Code: SWAA		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only					
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First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 51
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review?
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 06/1995
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	20000	14000	100	19900	7500	5000	300			
Pilot In Command(PIC)	18500	12500	100	18400						
Instructor										
Last 90 Days	250	250		250						
Last 30 Days	90	90		90						
Last 24 Hours	7	7		7						

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point AMARILLO	State TX	Airport Identifier AMA	Departure Time 0640	Time Zone CDT
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Destination Same as Accident/Incident Location	State	Airport Identifier DAL	
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Type of Clearance: VFR Flight Following

Type of Airspace: Class B

Weather Information

Source of Briefing:

Method of Briefing:

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
DAL	0745	CDT	487 Ft. MSL	0 NM	0 Deg. Mag.

Sky/Lowest Cloud Condition: Clear 0 Ft. AGL Condition of Light: Day

Lowest Ceiling: None 0 Ft. AGL Visibility: 15 SM Altimeter: 29.00 "Hg

Temperature: 29 °C Dew Point: 21 °C Wind Direction: 180 Density Altitude: Ft.

Wind Speed: 5 Gusts: Weather Conditions at Accident Site: Visual Conditions

Visibility (RVR): 0 Ft. Visibility (RVV) 0 SM Intensity of Precipitation: Unknown

Restrictions to Visibility: None

Type of Precipitation: None

Accident Information

Aircraft Damage: Minor Aircraft Fire: None Aircraft Explosion: None

Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				3	3
Other Crew					
Passengers				92	92
- TOTAL ABOARD -				97	97
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	97	97

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Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

GEORGIA R. SNYDER

Additional Persons Participating in This Accident/Incident Investigation:

JOHN B COX
FAA FSDO
DALLAS, TX 75247