Nose gear-up landing, Boeing 717-200, August 9, 2001

Micro-summary: **This Boeing 717-200 experienced a nose-gear-up landing.**

Event Date: **2001-08-09 at 2025 CDT**

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

Investigative Body's Web Site: **http://www.ntsb.gov/**

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2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***

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National Transportation Safety Board **FACTUAL REPORT** **AVIATION**	NTSB ID: CHI01FA270	Aircraft Registration Number: N2417F
	Occurrence Date: 08/09/2001	Most Critical Injury: None
	Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Mascoutah	IL	62258	2025	CDT	

Airport Proximity: On Airport	Distance From Landing Facility: 0	Direction From Airport: 0

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Boeing	717-200	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

On August 9, 2001, about 2025 central daylight time, a Boeing 717-200, N2417F, operated as Trans World Airlines flight number 519 from Nashville, Tennessee, to Saint Louis, Missouri, sustained substantial damage on contact with runway 14L (10,000 feet by 150 feet, grooved concrete) during an emergency landing on runway 14L at Scott Air Force Base/Midamerica Airport (BLV), near Mascoutah, Illinois. The nose gear could not be extended and the flightcrew declared an emergency. After the airplane made an emergency landing, the airplane came to rest on its nose and main landing gear. An emergency evacuation of the airplane was conducted. The scheduled domestic passenger flight was operating under 14 CFR Part 121. Visual meteorological conditions prevailed at the time of the accident. The flight was on an instrument flight rules flight plan. The 2 flightcrew members, 3 cabin crew members, and 71 passengers were not injured. One passenger was taken to the hospital for observation. The flight originated in Nashville, Tennessee, and diverted to Springfield, Illinois for weather. The diverted flight departed from Capital Airport (SPI), near Springfield, Illinois at 1820. The flight was enroute to its destination, Lambert-Saint Louis International Airport (STL), near Saint Louis, Missouri, when the emergency was declared and the flight diverted to BLV for the emergency landing.

The captain stated:

> ... Ramp [at SPI] was congested with military and civilian aircraft. There was construction nearby. The aircraft was marshaled to a stop on the apron clear of the terminal.
>
> Repeated radio requests to obtain stairs to deplane were denied due to unavailability. Flight documentation was received over ACARS [Aircraft Communication Addressing and Reporting System]. Refueling was completed. Ground personnel delivered fuel documentation through the Captain's window. Received confirmation that the aircraft was all clear below for engine start and taxi.
>
> Engine start was normal. After beginning taxi roll a slight bump was felt that was compatible with a rough ramp area. During taxi a pack malfunction occurred and was eliminated prior to takeoff.
>
> During the takeoff roll, while passing a runway intersection, a noise was heard from the forward part of the aircraft compatible with runway crossing roughness.
>
> Gear retraction and subsequent departure from SPI was normal.
>
> Flew the Rivers 2 arrival to STL. Flight was all normal until gear down on final [runway] 12R. Nose gear indicator showed red light. Cycled landing gear with red

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Narrative (Continued)

nose gear light still illuminated. Did a Fly by of tower. Tower confirmed main gear down, nose gear up. Flight went around. Got radar vector to holding area. Completed Gear Red/Unsafe Light(s) Illuminated, and Manual Gear Extension checklists with no success. Coordinated with maintenance and Boeing and still no success. Flight attendants and passengers briefed on possible emergency landing. Second and third gear confirmation made by TSA [Trans States Airline] aircraft, tower, and TWA maintenance on 2nd second fly by. Declared emergency. Went back to departure control and coordinated with TWA dispatch/maintenance/flight ops/ATC [Air Traffic Control] for emergency landing at BLV. Flight attendants were briefed to prepare the cabin for emergency landing. Passengers were briefed on what to expect.

A passenger, who was an Airframe and Powerplant mechanic, stated:

Passengers were told [at SPI] we would not disembark, but await fuel and weather.

About 1 1/2 hours later the aircraft was fueled and the captain said he had updated weather and we were going to be seated [and] get ready to depart.

Engine starts were normal [and] APU [auxiliary power unit] was retired.

At this point with engines running it seemed that it took a great deal of thrust to get the aircraft moving. I heard the hydraulics when breaks were released, but thought it unusual to use such thrust to get moving on a level ramp without a jet-way. The aircraft was simply pulling straight ahead. There were then two sharp jolts. I thought the P.I.C. [pilot in command] was checking his brakes, which I thought unusual.

Ground personnel at SPI received the diverted flight 519. One of the ground personnel stated:

There was no ground crew free at the time to flag out FLT 519 as I was busy and the other two agents were getting FLT 7637 boarded and it departed at 635P. After flagging out FLT 533 I went over to where FLT 519 had been sitting and discovered the chocks lying on the ramp.

The ramp where flight 519 was parked during its diversion was examined. A piece of cast metal debris was found on the ramp.

A cabin crewmember was asked for a statement to include the evacuation of the airplane at BLV and stated:

About 15 seconds after the aircraft stopped, the cockpit door was opened and I heard the captain say, 'Could I get some towels?' I opened the forward lavatory door got a handful of paper towels and handed them to the first officer.

Just then, I heard a loud noise as the R1 door was opened from the outside. The slide inflated. I saw about 3 or 4 firemen on the ground at the bottom of the slide. Then I heard the captain say again, 'Could I get some towels?' As I was handing him more towels, the L1 door was opened from the outside and the slide inflated. Again, I saw 3 or 4 fireman [at] the bottom of the slide.

By that time, the captain was out of his seat and said, 'Who opened that door?' I said, 'It was opened from the outside by fireman.' The captain then said, 'Alright, let's go.' The passengers were already in the aisle, ready to evacuate."

DAMAGE TO AIRCRAFT

The operator reported that damage was "limited to lower skin of aircraft, [electrical and

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environmental] door, door frame, one area of lower rib around door."

PERSONNEL INFORMATION

The operator reported that the captain held an airline transport pilot certificate with an airplane multiengine land rating. He held a first-class medical certificate with no limitations issued on May 29, 2001. The operator reported he had 12,845 hours total time and 318 hours in this make and model. The date of his last flight review was reported as June 29, 2001.

The operator reported that the first officer held a commercial certificate with an airplane multiengine land rating. He held a first-class medical certificate with limitations for corrective lenses issued on July 11, 2001. The operator reported he had 8,468 hours total time and 653 hours in this make and model. The date of his last flight review was reported as January 8, 2001.

AIRCRAFT INFORMATION

The accident airplane, N2417F, was a Boeing 717-200, serial number 55084, twin engine, low-wing airplane with retractable tricycle landing gear. The airplane was powered by two fuselage mounted Rolls Royce BR700-715A1-30, 11,500 pounds of thrust, turbo fan engines. The operator reported that the airplane was inspected under a continuous inspection program and the airplane was last inspected on June 6, 2001. The airplane accumulated 45 hours of flight since that inspection and accumulated 845 hours total time. The operator reported that the airplane was configured to seat 7 crewmembers and 100 passengers. This airplane was not equipped with stairs.

METEOROLOGICAL INFORMATION

At 1955, the BLV weather was: Wind 180 degrees at 6 knots; visibility 6 statute miles; present weather mist; sky condition broken 15,000 overcast 25,000; temperature 24 degrees C; dew point 23 degrees C; altimeter 29.91 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

An on-scene investigation was conducted. The nose of the airplane was raised. The nose landing gear (NLG) wheel well was examined. The left hand side of the NLG spray deflector assembly casting, marked as part number 5952241-501E, was found broken. The left hand support assembly, marked as part number 5961608-501A, was found with cast metal retained under two of the assembly's castellated nuts. This retained metal was similar in color to the cast metal that was found on the broken spray deflector assembly. The left hand support assembly and its vaned sideplate were found intact. That sideplate was found contacting the left hand side of the NLG wheel well. That sideplate and its support assembly were removed. The nlg was extended and it was found to go in its down and locked position. No other anomalies were observed.

The cast metal debris found on the SPI ramp where flight 519 was parked was similar in color to the broken spray deflector assembly. See appended photographs.

TESTS AND RESEARCH

The debris found at SPI, the spray deflector assembly, and the left hand support assembly were sent to the National Transportation Safety Board's Materials Laboratory Division for detailed examination. The Materials Laboratory produced report 01-102 which is appended to this report.

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That report stated:

> ... The left support separated from the center portion of the deflector assembly ... . According to a diagram in the Boeing Illustrated Parts Catalog, a deflector assembly support is attached on the left and right side of the center portion of the deflector assembly. In the assembled condition, each side support is attached by two bolts and nuts to the center portion of the deflector assembly. The bolts are inserted into two through holes in the center portion. ...
>
> Visual examination of the center portion revealed that pieces of the wall separated from areas around the through holes for the attachment bolts. Three pieces of the center portion were found secured between the attachment nuts and the wall of the support ... . A fourth fragment [identified as "M"] was found on the ramp of Springfield Airport, Springfield, Illinois, the airport from which the airplane had previously departed. No other piece fractured from the center portion of the deflector assembly.
>
> Bench binocular microscope examination of the four fractured pieces revealed features typical of overstress separation in a casting. No evidence of a preexisting crack was found on the fractures. Scanning electron microscope examination of the separated pieces verified the overstress fractures features. X-ray energy dispersive spectroscopy analysis of piece "M" ... produced a spectrum that contained a major peak of aluminum, silicon, iron, and copper. The silicon peak was nearly 1/3 the height of the aluminum peak. The spectrum generated from piece "M" was consistent with one of several 3XX series aluminum alloy casting compositions.

The flight data recorders were reviewed by the operator. The operator's report on the four previous flight's data on engine pressure ratio (EPR) while the airplane started taxiing showed that the highest reading for EPR was on the third departure prior to the flight from SPI. That reading was 1.06 on the airplane's left engine and 1.04 on the right engine. The highest recorded EPR reading during the accident flight's taxi out was 1.08 on the left engine and 1.04 on the right engine. See appended operator's report. An excerpt from Section 20 "Taxi - Before Takeoff", in the Trans World Airlines 717 flight handbook, stated, "... Use equal thrust on both engines to start aircraft rolling. Keep engine thrust as low as possible when maneuvering in the ramp area. Maximum thrust without ground clearance is 1.1 EPR."

ADDITIONAL INFORMATION

The parties to the investigation included the FAA, Trans World Airlines, Air Line Pilots Association, International, and Boeing.

The aircraft wreckage and retained parts were released to a representative of the operator.

A Boeing Flight Operations Bulletin, dated July 13, 2001, stated, "Several MD-80/B717 operators have reported incidents of Nose Landing Gear (NLG) spray deflector damage occurring when taxing or operating over rigid military arresting gear."

Subsequent to the accident, a Boeing Flight Operations Bulletin, dated September 20, 2001, stated:

> The purpose of this revision is to clarify and broaden the scope of this operations bulletin, to include possible damage to the NLG SPRAY DEFLECTOR caused by taxiing over a chock, striking a taxiway light or other obstruction, dropping the nosewheel into a pothole, etc. The consequences of such operation may result in damage to the NLG SPRAY DEFLECTOR that may prevent subsequent retraction or extension of the nose gear.

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Subsequent to the accident, Boeing revised the 717 Flight Crew Operating Manual's taxi procedure to add the following caution note:

CAUTION: Taxiing over any surface obstruction, including arresting cables, may cause damage to the nosewheel spray deflector. Damage to the nosewheel spray deflector may cause the nosewheel to jam during extension or retraction. Therefore, avoid nosewheel contact with any obstruction, including arresting cables. If any contact is suspected with the nosewheel spray deflector, the nosewheel should be inspected prior to flight.

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Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
SCOTT AFB	BLV	459 Ft. MSL	14L	10000	150

Runway Surface Type: Concrete

Runway Surface Condition: Wet

Type Instrument Approach: Visual

VFR Approach/Landing: Full Stop

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Boeing	717-200	55084

Airworthiness Certificate(s): Transport

Landing Gear Type: Retractable - Tricycle

Homebuilt Aircraft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	107	118000 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Fan	Rolls-Royce	BR715-A1-30	18500 LBS

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness	06/2001	45 Hours	845 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?
No	No	No

Owner/Operator Information

Registered Aircraft Owner	Street Address	City	State	Zip Code
MDFC Equipment Leasing Corporation	3780 Kilroy Airport Way, Suite 750	Long Beach		90806

Operator of Aircraft	Street Address	City	State	Zip Code
TRANS WORLD AIRLINES	11495 Natural Bridge Road	Bridgeton	MO	63044

Operator Does Business As: Trans World Airlines

Operator Designator Code: TWAA

- 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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Occurrence Date: 08/09/2001

Occurrence Type: Accident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	46

Sex: M | Seat Occupied: Left | Principal Profession: Civilian Pilot | Certificate Number: On File

Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA:

Instrument Rating(s): Airplane

Instructor Rating(s):

Type Rating/Endorsement for Accident/Incident Aircraft? Yes | Current Biennial Flight Review? 06/2001

Medical Cert.: Class 1 | Medical Cert. Status: Valid Medical--no waivers/lim. | Date of Last Medical Exam: 05/2001

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	12845	318								
Pilot In Command(PIC)	6941	318								
Instructor										
Last 90 Days		204								
Last 30 Days		51								
Last 24 Hours		5								

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
SPRINGFIELD	IL	SPI	1820	CDT

Destination	State	Airport Identifier
ST LOUIS	MO	STL

Type of Clearance: IFR

Type of Airspace: Class D

Weather Information

Source of Briefing: Company

Method of Briefing: Aircraft Radio

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
BLV	1955	CDT	459 Ft. MSL	0 NM	0 Deg. Mag.

Sky/Lowest Cloud Condition: Ft. AGL

Condition of Light: Night/Dark

Lowest Ceiling: Broken 15000 Ft. AGL

Visibility: 6 SM

Altimeter: 29.91 "Hg

Temperature: 24 °C

Dew Point: 23 °C

Wind Direction: 180

Density Altitude: Ft.

Wind Speed: 6

Gusts:

Weather Condtions at Accident Site: Visual Conditions

Visibility (RVR): Ft.

Visibility (RVV) SM

Intensity of Precipitation:

Restrictions to Visibility: None

Type of Precipitation:

Accident Information

Aircraft Damage: Substantial

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				71	71
- TOTAL ABOARD -				76	76
Other Ground					
- GRAND TOTAL -				76	76

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Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

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