



National Transportation Safety Board Aviation Accident Final Report

Location:	Mascoutah, IL	Accident Number:	CHI01FA270
Date & Time:	08/09/2001, 2025 CDT	Registration:	N2417F
Aircraft:	Boeing 717-200	Aircraft Damage:	Substantial
Defining Event:		Injuries:	76 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

The airplane sustained substantial damage on contact with the runway during an emergency nose gear up landing. Evacuation of the airplane was conducted via the emergency slides. The captain stated, "Repeated radio requests to obtain stairs to deplane were denied due to unavailability. ... Received confirmation that the aircraft was all clear below for engine start and taxi. ... After beginning taxi roll a slight bump was felt that was compatible with a rough ramp area." A passenger stated, "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." 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." NTSB Materials Laboratory report 01-102 on the debris found at Springfield, the spray deflector assembly, and the left hand support assembly stated, "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." 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."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The malfunction of the nose gear extension system, which resulted from a previous ground collision with a wheel chock. A factor was the wheel chock.

Findings

Occurrence #1: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: TAXI - TO TAKEOFF

Findings

1. (F) OBJECT - OTHER
 2. WHEEL CHOCKS - NOT REMOVED - GROUND PERSONNEL
 3. (C) WHEEL CHOCKS - ENCOUNTERED - FLIGHTCREW
 4. WHEEL CHOCKS - NOT VERIFIED - FLIGHTCREW
-

Occurrence #2: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: TAXI - TO TAKEOFF

Findings

5. (C) LANDING GEAR, NOSE GEAR ASSEMBLY - FOREIGN OBJECT DAMAGE
-

Occurrence #3: WHEELS UP LANDING
Phase of Operation: EMERGENCY LANDING

Findings

6. LANDING GEAR, NORMAL RETRACTION/EXTENSION ASSEMBLY - MALFUNCTION

Factual Information

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 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 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. 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 taxiing 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.

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.

Pilot Information

Certificate:	Airline Transport	Age:	46, Male
Airplane Rating(s):	Multi-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):		Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last Medical Exam:	05/29/2001
Occupational Pilot:		Last Flight Review or Equivalent:	06/29/2001
Flight Time:	12845 hours (Total, all aircraft), 318 hours (Total, this make and model), 6941 hours (Pilot In Command, all aircraft)		

Co-Pilot Information

Certificate:	Commercial	Age:	41, Male
Airplane Rating(s):	Multi-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):		Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Single-engine	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last Medical Exam:	07/11/2001
Occupational Pilot:		Last Flight Review or Equivalent:	01/08/2001
Flight Time:	8468 hours (Total, all aircraft), 653 hours (Total, this make and model), 1490 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Boeing	Registration:	N2417F
Model/Series:	717-200	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	55084
Landing Gear Type:	Retractable - Tricycle	Seats:	107
Date/Type of Last Inspection:	06/06/2001, Continuous Airworthiness	Certified Max Gross Wt.:	118000 lbs
Time Since Last Inspection:	45 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	845 Hours	Engine Manufacturer:	Rolls-Royce
ELT:	Not installed	Engine Model/Series:	BR715-A1-30
Registered Owner:	MDFC Equipment Leasing Corporation	Rated Power:	18500 lbs
Operator:	TRANS WORLD AIRLINES	Air Carrier Operating Certificate:	Flag carrier (121)
Operator Does Business As:	Trans World Airlines	Operator Designator Code:	TWAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night/Dark
Observation Facility, Elevation:	BLV, 459 ft msl	Observation Time:	1955 CDT
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:		Temperature/Dew Point:	24° C / 23° C
Lowest Ceiling:	Broken / 15000 ft agl	Visibility	6 Miles
Wind Speed/Gusts, Direction:	6 knots, 180°	Visibility (RVR):	
Altimeter Setting:	29.91 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	SPRINGFIELD, IL (SPI)	Type of Flight Plan Filed:	IFR
Destination:	ST LOUIS, MO (STL)	Type of Clearance:	IFR
Departure Time:	1820 CDT	Type of Airspace:	Class D

Airport Information

Airport:	SCOTT AFB (BLV)	Runway Surface Type:	Concrete
Airport Elevation:	459 ft	Runway Surface Condition:	Wet
Runway Used:	14L	IFR Approach:	Visual
Runway Length/Width:	10000 ft / 150 ft	VFR Approach/Landing:	Full Stop

Wreckage and Impact Information

Crew Injuries:	5 None	Aircraft Damage:	Substantial
Passenger Injuries:	71 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	76 None	Latitude, Longitude:	38.545278, -89.835278

Administrative Information

Investigator In Charge (IIC):	Edward F Malinowski	Adopted Date:	09/30/2003
Additional Participating Persons:	Pedro Rodriguez; Federal Aviation Administration; St. Ann, MO Noel B Wiebracht; Boeing; Kansas City, MO Hugh Schoelzel; Trans World Airlines, Inc.; Bridgeton, MO		
Publish Date:			
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 pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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