



National Transportation Safety Board Aviation Accident Final Report

Location:	FISHERS ISLAND, NY	Accident Number:	NYC98LA198
Date & Time:	06/19/1998, 2144 EDT	Registration:	N41SH
Aircraft:	Cessna CE-500	Aircraft Damage:	Substantial
Defining Event:		Injuries:	4 None
Flight Conducted Under:	Part 91: General Aviation - Executive/Corporate		

Analysis

The airplane landed on a dark night on a 2,328 ft long runway. The pilot and co-pilot reported the airplane touched down on the numbers, and after initial braking and deceleration, the brakes ceased to work, but the brake pedals remained firm. The pilot attempted to reach the emergency brake handle but was restrained by the shoulder harness which had locked. He then pressed very hard on the brake pedals and overrode the anti-skid system and was able to momentarily push the brakes into manual. He was unable to stop the airplane on the runway and struck a rock seawall at the departure end of the runway. Post accident examination found an intermittent short in the wiring on the right wheel anti-skid system. According to the anti-skid manufacturer, with an intermittent short, the ANTI-SKID FAIL light would not illuminate. Photos of tire marks on the runway indicated the system was occasionally reverting to manual braking due to the pilot pushing extremely hard on the brake pedals. The required landing distance of 2,146 feet was computed with the airplane crossing the runway threshold at 50 feet.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: An intermittent short in the right wheel anti-skid system which caused a loss of braking and subsequent overrun.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: LANDING - ROLL

Findings

1. (C) LANDING GEAR,ANTI-SKID BRAKE SYSTEM - SHORTED
2. (C) LANDING GEAR,NORMAL BRAKE SYSTEM - INOPERATIVE

Occurrence #2: OVERRUN
Phase of Operation: LANDING - ROLL

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Findings

3. OBJECT - WALL/BARRICADE

Factual Information

HISTORY OF FLIGHT

On June 19, 1998, at 2144 eastern daylight time, a Cessna CE-500, N41SH, was substantially damaged when it overran the runway while landing at Elizabeth Field, Fishers Island, New York. There were no injuries to the two certificated airline transport pilots and two passengers. Visual meteorological conditions prevailed for the corporate flight that originated from Teterboro, New Jersey. No flight plan had been filed for the flight that was conducted under 14 CFR Part 91.

In a written statement the pilot reported:

"...Upon touch down at the numbers of Runway 12...[the co-pilot] deployed the speed brakes and I started to apply the brakes, at first we started to decelerate then both brake peddles became hard and all braking failed to decelerate the aircraft. I yelled to...[the co-pilot] to hold the control wheel and we lost the brakes, at the same time I reached for the Emergency Brake Control and my shoulder harness locked and prevented me from reaching the Emergency Brake Control. I then shut down both engines while steering the aircraft to the right side of the runway and still attempting to reach the Emergency Brake Control. Upon the aircraft right wing tip contacting the stone sea wall beyond the right side of the runway, my shoulder harness released and I struck the Instrument panel as the aircraft rotated to the right and pitched up and then stopped."

"After the aircraft came to rest I yelled to...[the co-pilot] to get to the door and evacuate our passengers, I secured the cockpit and then went for the emergency exit. [The co-pilot]...could not open the [main cabin] door and yelled that it was jammed, I was successful in opening the emergency exit and directed all persons out of the exit and away from the aircraft...."

The co-pilot stated:

"...on final approach to runway 12. The wind was calm, conditions were VFR, and the runway was dry. [The pilot]...landed the airplane at the beginning of the runway at Vref. I deployed the speed brakes. Initially, I felt a slight deceleration, but immediately thereafter we stopped decelerating. [The pilot]...shouted towards me that he had no brakes. I quickly glanced over towards him and noticed that he was standing hard on the brakes, but nothing was happening. [The pilot]... shut down the engines quickly while I helped hold the yoke back. Toward the end of the runway, he turned the aircraft hard to the right. It impacted some rocks and climbed up onto them. Upon stopping, I tried but was unable to open the main cabin door. [The pilot]...opened the emergency hatch, and we all exited there...."

A witness sitting on his front porch reported that when he first saw the airplane, it was higher than normal, did not appear to be on the ground yet, and he thought it was going to land long. He then heard brakes or tires, which squealed and he heard the crash. He went inside and called 911, and then went to the firehouse as he was a volunteer fireman and proceeded to the accident sight. When he got to the accident site, the runway was dry.

Interviews with the emergency personnel who responded to the accident site revealed several people had reported observing a single tire mark that led to the airplane. One witness did report seeing a fainter second tire mark from what he thought was the left main wheel. The runway was reported as dry.

In follow-up telephone interviews, the pilot reported he did not conduct a rejected landing because when he lost the brakes, he felt there was insufficient runway to successfully complete a rejected landing. The co-pilot reported they had completed the anti-skid check prior to landing and the system checked OK.

AIRCRAFT INFORMATION

The airplane was a 1975 Cessna CE-500. It had been modified in accordance with Sierra industries, Inc Supplemental Type Certificate (STC) SA 2172 NM, for the long wing modification, and Aviation Brake Systems, Ltd, STC SA2925 WE, for the addition of an anti-skid system.

The airplane was delivered with an unpressurized, toe-actuated, multiple disk brake system. A pneumatic backup emergency brake control handle was installed under the left instrument panel. The anti-skid system pressurized the existing wheel brake system. According to the anti-skid system flight manual supplement:

"The Power Brake and Skid Control Systems are energized when the System Switch is placed in the 'ANTI-SKID' position and the aircraft Master Switch is 'ON'. The Power Brake and Skid Control Systems are disengaged when the System Switch is in the 'MANUAL' position; however, the accumulator will provide diminishing Power Brake (but NOT Skid Control) capability for about 20 minutes or 16 brake applications (whichever comes first) after System Switch is selected 'MANUAL'."

"The brake pedals will have a 'firm feel' feel when the system is energized. The brake pedals will feel 'soft' and have greater 'travel' when the system is disengaged, similar to that in the unmodified airplane."

"NOTE: The system operates in the 'power brake' mode at all speeds; however, the anti-skid feature of this system is operational only at speeds above 15 MPH."

"CAUTION: The 'ANTI-SKID INOP' lights should always be illuminated, when the 'POWER BRAKE LOW PRESSURE' lights are illuminated. Illumination of the 'ANTI-SKID' lights alone indicates that the system is in the power brake mode WITHOUT anti-skid protection. In this event, follow ABNORMAL PROCEDURES...."

"ABNORMAL PROCEDURES - All probable system failures will either be annunciated or detected by improper results during NORMAL PROCEDURES checks. In all such cases: 1. Place the system switch in the 'MANUAL' position. 2. Bleed off the 'boost pressure' by repeated application of the brakes. The 'boost pressure' has been depleted when the pedals feel 'soft' and have an increased 'travel'. 3. Manual Braking ONLY will then be available...."

The insurance adjuster reported that the emergency brake air bottle was properly charged.

AIRDROME INFORMATION (Destination)

Elizabeth Field Airport was an uncontrolled, unattended airport. According to FAA data, runway 12 was 2,328 feet long, 100 feet wide, and had an asphalt surface. Medium intensity runway edge lights were on the sides of the runway. The data also indicated that a two light PAPI was available on the left side of the runway with a 3 degree glideslope, and runway end identifier lights. No information was listed on overruns, or displaced thresholds.

According to the pilot, after the accident, he measured the overrun on each runway and

found the landing overrun measured 115 feet for runway 12, and 240 feet for runway 30.

The insurance adjuster reported that the first runway light on the north side of runway 12 was inoperative.

WRECKAGE AND IMPACT INFORMATION

The airplane had been delivered to a salvage company prior to start of the investigation. Copies of photographs and written reports were requested and received from the Federal Aviation Administration and the insurance adjuster. The photographs revealed the airplane departed the end of the runway on the right side and came to rest on a rock sea wall. The nose landing gear had collapsed rearward and the underside of the fuselage was bent in a wavy manner. The right wing tip had separated from the airplane and the outer spar on the right wing was distorted and bent rearward. There was a fuel leak from the right wing. A single tire mark was visible, about 10 to 15 feet right of runway centerline. The tire mark then curved to the right and departed the end of the runway on the right side, pointing toward the airplane. The pilot identified the tire mark, which alternated between heavy and light, as coming from the right main landing gear tire.

According to the insurance adjuster's report, "...The first significant skid marks on RWY 12 are 612 ft from the threshold. The right tire make a significant skid while the left made light intermittently skipping skid marks...."

ADDITIONAL INFORMATION

Safety Board Notification & History of Previous Investigation

The Safety Board received initial notification of the occurrence on the night of the accident. Inspectors from the FAA Flight Standards Office located at Farmingdale, New York, traveled to the accident site on June 20, 1998, and conducted an on-site examination. They informed the Safety Board investigator that the damage was below the threshold of an accident. Therefore, the Safety Board did not conduct an investigation.

On June 27, 1998, the insurance adjuster examined the brakes. There is no record of any discrepancies being found.

On July 24, 1998, the anti-skid system was examined by Columbia Air Services, Inc. The examination found shorted wires between the right transducer to the anti-skid box connector. No other problems were noted.

On July 29, 1998, Columbia Air Services, sent a letter to the FAA Airworthiness inspector assigned to the investigation. The letter included a complete description of the examination and findings including the shorted wires, and the following:

"...I also spoke with the Engineering Department at Crane Hydro-Aire and was told the Control Box has a time signal delay and if the short was happening fast enough, and not lasting that [long] the control box may not send out the signal to illuminate the 'Anti-skid inop light.'

No documentation was available to indicate further investigation was done or any follow-up was conducted with Crane Hydro-Aire to know the significance of the shorted wires or the anti-skid light not illuminating.

On August 4, 1998, the FAA closed out the investigation with the following comment:

"...Follow-up by maintenance revealed no abnormalities with brakes, hydraulics, or anti-skid

system."

On November 16, 1998, the pilot sent a letter to the FAA Eastern Region, Regional Counsel. In it he expressed concern in several area and included the following comment:

"...this should be an aircraft accident not a incident, based on the aircraft was a total loss due to a bent wing spar....."

According to the reply, some of his concerns would be address by FAA Flight Standards, and all others would be addressed by the Regional Counsel's office. No correspondence was supplied to indicate that the FAA responded to any of the pilot's concerns including his comment about the occurrence being an accident.

Current Investigation

The Safety Board was again contacted on March 25, 1999, by the FAA Eastern Region Headquarters. The FAA had been contacted by the insurance company who had declared the hull a total loss, and were searching for a report on the occurrence. Based upon initial information, the investigation was re-opened.

On March 26, 1999, the Safety Board investigator-in-charge (IIC) sent a request to the FAA, Office of Accident Investigation, AAI-100, and requested all material related to this occurrence. In addition written statements were requested from the FAA inspectors involved as to why they had classified the occurrence as an incident.

According to written statements from the FAA Inspectors, they classified the occurrence as an incident in accordance with FAA Order 8020.11A, paragraph 5. In addition, the FAA Operations Inspector reported that the Safety Board investigator who was notified of the occurrence agreed with them.

Paragraph 5, of FAA Order 8020.11A contained definitions. The definitions of an aircraft accident and substantial damage matched the definitions found in 49 CFR 830.2.

In a follow-up telephone interview, the Safety Board Investigator who received the initial telephone call reported he was called by the FAA inspectors after they had visited the accident site. They assured him the damage was not substantial, and based upon their description, he agreed with them, and no further action was taken. When asked, the Safety Board investigator further added that he was not aware of the bent spar on the wing, or the fact that the fuselage had been deformed to the point that the main cabin door could not be opened, and the occupants exited through the fuselage emergency exit.

Shoulder Harnesses

According to a representative of Cessna Aircraft Company, the airplane was equipped with shoulder harnesses for the two pilot seats. The shoulder harnesses were designed to lock in place during a rapid forward movement of the harness. It would unlock when the pressure on the harness was released. The lock and release was not connected to the deceleration of the airplane.

Landing Performance

The landing distance was computed using the following criteria; landing weight - 9,850 pounds; elevation - sea level; temperature - 68 F; winds - calm; wing flaps - landing; airspeed - Vref at 50 feet. Runway Required 1,985 feet + 161 feet (additive factor) = 2,146

feet Crane Hydro-aire Comments

The pilot statements, photographs of tire marks on the runway, and previous testing results were submitted to Crane Hydro-Aire the manufacturer of the anti-skid control box for comments. Crane Hydro-Aire reported the system used an averaged speed from both wheel transducers. When one wheel indicated a skid, the brake pressure was reduced on both wheels. They further reported:

"...it is possible that N41SH could have suffered a partial or complete loss of braking as a result of the stated intermittent short in the right wheel speed transducer electrical circuit. This would have given the pilot 'firm' brake pedal feel while experiencing a partial or complete braking loss of braking ability. It was also evident that the pilot was able to momentarily override the power brake supply pressure and shuttle the right brake into a 'manual ' mode at times during the landing rollout."

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	43, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last Medical Exam:	03/24/1998
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	13651 hours (Total, all aircraft), 750 hours (Total, this make and model), 12559 hours (Pilot In Command, all aircraft), 160 hours (Last 90 days, all aircraft), 67 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Cessna	Registration:	N41SH
Model/Series:	CE-500 CE-500	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	500-0267
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	05/06/1998, Continuous Airworthiness	Certified Max Gross Wt.:	12500 lbs
Time Since Last Inspection:	67 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	6598 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	JT15D-1A
Registered Owner:	WINDRISE INC.	Rated Power:	2200 lbs
Operator:	WINDRISE INC.	Air Carrier Operating Certificate:	None
Operator Does Business As:	JJU AVIATION INC.	Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night/Dark
Observation Facility, Elevation:	GON, 10 ft msl	Observation Time:	2200 EDT
Distance from Accident Site:	5 Nautical Miles	Direction from Accident Site:	8°
Lowest Cloud Condition:	Scattered / 8500 ft agl	Temperature/Dew Point:	20° C / 17° C
Lowest Ceiling:	None / 0 ft agl	Visibility	10 Miles
Wind Speed/Gusts, Direction:	Calm, Variable	Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	TETERBORO, NJ (TEB)	Type of Flight Plan Filed:	None
Destination:	(088)	Type of Clearance:	None
Departure Time:	2115 EDT	Type of Airspace:	Class G

Airport Information

Airport:	ELIZABETH FIELD AIRPORT (08B)	Runway Surface Type:	Asphalt
Airport Elevation:	9 ft	Runway Surface Condition:	Dry
Runway Used:	12	IFR Approach:	None
Runway Length/Width:	2328 ft / 100 ft	VFR Approach/Landing:	Full Stop

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	2 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	ROBERT L HANCOCK	Adopted Date:	08/03/2000
Additional Participating Persons:	JOSEPH MANO; WASHINGTON, DC ANDREW HALL; WICHITA, KS		
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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