Aviation Investigation Final Report

Location:	Danbury, Connecticut	**Accident Number:**	ERA15LA322
Date & Time:	August 21, 2015, 14:20 Local	**Registration:**	N120EA
Aircraft:	ECLIPSE AVIATION CORP EA500	**Aircraft Damage:**	Substantial
Defining Event:	Runway excursion	**Injuries:**	3 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

This report was modified on April 2, 2020. Please see the public docket for this accident to view the original report.

After the airplane touched down on the 4,422-ft-long runway, the airline transport pilot applied the brakes to decelerate; however, he did not think that the brakes were operating. He continued "pumping the brakes" and considered conducting a go-around; however, there was insufficient remaining runway to do so. The airplane subsequently continued off the end of the runway, impacted a berm, and came to rest upright, which resulted in substantial damage to the right wing.

During postaccident examination of the airplane, brake pressure was obtained on both sets of brake pedals when they were depressed, and there was no bleed down or reduction in pedal firmness when the brakes were pumped several times. Examination revealed no evidence off any preimpact anomalies with the brake system that would have precluded normal operation. In addition, the pilot indicated that he was not aware of and was not trained on the use of the ALL INTERRUPT button, which is listed as a step in the Emergency Procedures section of the airplane flight manual and is used to disable the anti-skid brake system functions and restore normal braking when the brakes are ineffective; thus, the pilot did not follow proper checklist procedures.

According to data downloaded from the airplane's diagnostic storage unit (DSU), the airplane touched down 1,280 ft beyond the runway threshold, which resulted in 2,408 ft of runway remaining (the runway had a displaced threshold of 734 ft) and that it traveled 2,600 ft before coming to rest about 200 ft past the runway. The airplane's touchdown speed was about 91 knots. Comparing DSU data from previous downloaded flights revealed that the airplane's calculated deceleration rate during the accident landing was indicative of braking performance as well as or better than the previous landings.

Estimated landing distance calculations revealed that the airplane required about 3,063 ft when crossing the threshold at 50 ft above ground level. The target touchdown speed was 76 knots. However, the

airplane touched down with only 2,408 ft of remaining runway faster than the target touchdown speed, which resulted in the runway overrun.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to attain the proper touchdown point and exceedance of the target touchdown speed, which resulted in a runway overrun.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Descent/approach/glide path - Not attained/maintained
Environmental issues	(general) - Contributed to outcome

Factual Information

History of Flight

Landing-flare/touchdown	Landing area overshoot
Landing-landing roll	Runway excursion (Defining event)
Landing	Collision with terr/obj (non-CFIT)

On August 21, 2015, about 1420 eastern daylight time, an Eclipse Aviation Corporation EA500, N120EA, sustained substantial damage during a runway overrun while landing at Danbury Municipal Airport (DXR), Danbury, Connecticut. The airline transport pilot and two passengers sustained minor injuries. Day visual meteorological conditions prevailed and an instrument flight rules flight plan had been filed for the personal flight. The flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. The flight originated from Wittman Regional Airport (OSH), Oshkosh, Wisconsin, about 1220.

According to the pilot, the approach to runway 26 "required a steeper than normal approach," because of trees near the runway. The airplane touched down near the displaced threshold and he applied the brakes to deceleratee; however, the "first pedal push was soft," which was "not unusual." Then, he continued "pumping the brakes" and considered a go-around; however, the remaining runway was too short. The pilot continued to "pump" the brakes, about six times; however, he did not think the brakes were operating. The airplane continued off the end of the runway, impacted a berm, and came to rest upright approximately 200 feet beyond the end of the runway.

According to an air traffic controller who witnessed the accident, the airplane touched down approximately 100 feet past the "D" taxiway intersection with the runway, which would have resulted in about 2,800 feet of runway remaining.

During the accident sequence, the right main landing gear punctured the underside of the right wing, which resulted in substantial damage. In addition, the nose landing gear separated from the airplane.

Pilot Information

Certificate:	Airline transport	**Age:**	62,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	April 7, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 27, 2015
Flight Time:	7846 hours (Total, all aircraft), 1111 hours (Total, this make and model), 7846 hours (Pilot In Command, all aircraft), 43 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

According to the pilot, he held an airline transport pilot certificate with a rating for airplane multiengine land and a private pilot certificate with ratings for airplane single-engine land and sea. In addition, he held a type rating for the EA-500S, which included the accident airplane model. The pilot was issued an FAA third-class medical certificate on March 27, 2015. He reported 7,846 hours of total flight experience, of which 1,111 hours were in the same make and model as the accident airplane, and 3.7 hours were accumulated during the 30 days that preceded the accident. In an interview, the pilot stated that the six previous landings he performed with the airplane were on runways that were over 6,000 feet long.

Aircraft and Owner/Operator Information

Aircraft Make:	ECLIPSE AVIATION CORP	**Registration:**	N120EA
Model/Series:	EA500 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2008	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	000199
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 26, 2015 Annual	**Certified Max Gross Wt.:**	5995 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:	858.1 Hrs at time of accident	**Engine Manufacturer:**	P&W CANADA
ELT:	C126 installed, not activated	**Engine Model/Series:**	PW610F-A
Registered Owner:	UF EQUIPMENT LLC	**Rated Power:**	950 Lbs thrust
Operator:	UF EQUIPMENT LLC	**Operating Certificate(s) Held:**	None

According to Federal Aviation Administration (FAA) records, the airplane was issued an airworthiness certificate on May 29, 2008, and was registered to a corporation. It was equipped with two Pratt & Whitney Canada W610F-A series, turbo fan engines that were each capable of producing 950 pounds of thrust. According to the pilot, the most recent annual inspection was performed on May 26, 2015. At the time of the accident, the airplane had accumulated 858.1 total hours.

According to the airplane flight manual, the braking system was "mechanically actuated and hydraulically operated. Braking was provided by hydraulically operated single disc brakes on each main gear. When pressure is applied to the toe brakes, hydraulic pressure is applied to the corresponding main gear brake."

The brake fluid reservoir was located outside the forward pressure bulkhead. "An optical sensor triggers a BRAKE FLUID LOW advisory message when the brake fluid is low."

The airplane manufacturer released a mandatory modification bulletin (MB 500-32-003) on April 3, 2015, pertaining to the Anti-Skid Brake System (ABS) Pressure Switch and Harness Route. The reason for the bulletin was to improve the harness routing and ABS installation. According to the pilot, the maintenance described in the modification bulletin had not been performed on the airplane, however, it was scheduled for a later date.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	DXR,457 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	14:25 Local	**Direction from Accident Site:**	68°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	350°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	28°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	OSHKOSH, WI (OSH)	**Type of Flight Plan Filed:**	IFR
Destination:	Danbury, CT (DXR)	**Type of Clearance:**	IFR
Departure Time:	12:20 Local	**Type of Airspace:**	

At 1425, the recorded weather at DXR included wind from 350° at 6 knots, a few clouds at 6,000 feet above ground level, clear skies, 10 statute miles visibility, temperature 28° C, dew point 16° C, and an altimeter setting of 30.04 inches of mercury.

Airport Information

Airport:	DANBURY MUNI DXR	**Runway Surface Type:**	Asphalt
Airport Elevation:	456 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	26	**IFR Approach:**	Global positioning system
Runway Length/Width:	4422 ft / 150 ft	**VFR Approach/Landing:**	Full stop

Danbury Municipal Airport was located 3 miles southwest of Danbury, Connecticut, at an elevation of 456 feet above mean sea level (msl). It had two intersecting runways, which were designated 8/26 and 17/35. Runway 8/26 was 4,422 feet by 150 feet and runway 17/35 was 3,135 feet by 100 feet. In addition, runway 26 had a displaced threshold of 734 feet. At the time of the accident, the airport had an operating air traffic control tower, that operated between the hours of 0700 and 2200 daily.

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Minor	**Latitude, Longitude:**	41.36861,-73.491386(est)

Tests and Research

Examination of the airplane by a representative from the manufacturer under the supervision of an FAA inspector noted that brake pressure was obtained on both sets of brake pedals when they were depressed. There was no bleed down or reduction in pedal firmness when the brakes were pumped several times. Both antilock brake system drive adapters were connected, and the wheel speed sensors rotated freely. In addition, the hydraulic reservoir was "full," and there were no leaks noted throughout the brake system, including the reservoir, brake lines, or around the brake assembly. No anomalies were noted during the examination of the brake system. Furthermore, in his written statement, the pilot did not report any crew alerting system messages or any alerts involving the brake system.

The Eclipse Aviation Diagnostic Storage Unit (DSU) was sent to the NTSB recorders laboratory for data download. A review of the data revealed that several parameters were recorded during the accident flight. In addition, the data revealed several sets of data from previous flights.

Additional Information

Performance Study

A review of the DSU data revealed that the ground speed recorded at the weight on wheels (WOW) transition on the accident flight was the highest of the flights reviewed. Utilizing ground speed data, the time between WOW transition through 50 knots, the accident flight had the largest deceleration calculated from the available data, which was 2.2 knots per second (kts/s). The data for previous downloaded flights revealed a deceleration rate that averaged 0.7 kts/s. Although the airplane's calculated reference speed for the weight at the time of the accident was 89 knots and the target touchdown speed was 76 knots, the airplane's touchdown speed was 91 knots on the accident flight. However, the touchdown speed on the accident flight was 12 to 18 knots faster than the reviewed prior landings. In addition, integration of the airplane's recorded ground speed indicated that it touched down 1,280 feet from the threshold of Runway 26 and traveled 2,600 feet before coming to a stop, which was about 200 feet beyond the runway.

Landing Distance Data

According to the downloaded DSU data and the performance section of the airplane flight manual, under the conditions that existed at the time of the accident, the estimated landing distance required was approximately 3,063 feet when crossing the runway threshold at 50 feet above ground level. According to the recorded data, the airplane touched down 1,280 feet beyond the threshold of runway 26, which left 2,408 feet of the runway remaining since the displaced threshold was at 734 feet of the 4,422 foot runway.

Emergency Procedures

According to the Airplane Flight Manual, Section 3 Emergency Procedures, the Brakes Ineffective or Pulling to One Side procedure was to be used when the braking "with ABS becomes ineffective or causes the aircraft to pull to one side." The procedure included:

1. Maintain directional control using rudder and steering.
2. Brakes – Release.
3. ALL INTERRUPT – PRESS and HOLD
4. Reapply Brake (Pump Brakes as required) – Stop Normally

In an interview with a manufacturer representative, the pilot stated that he was not aware of that procedure until after the accident. In addition, he stated that he "was not trained" on the use of the ALL INTERRUPT button, which disabled the anti-skid brake system functions and restored normal braking, when the brakes were ineffective.

Administrative Information

Investigator In Charge (IIC):	Moats, Heidi
Additional Participating Persons:	Robert McCauley; FAA/FSDO; Windsor Locks, CT Ken Ross; Eclipse Aviation ; Albuquerque, NM
Original Publish Date:	March 5, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91843