National Transportation Safety Board
Aviation Accident Final Report

Location:	West Chester, PA	**Accident Number:**	NYC08FA261
Date & Time:	07/30/2008, 1830 EDT	**Registration:**	N333MY
Aircraft:	Eclipse Aviation Corporation EA500	**Aircraft Damage:**	Substantial
Defining Event:	Landing area overshoot	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

During landing at its home airport, the airplane overran the runway and traveled down a 40-foot embankment before coming to rest against trees and sustaining substantial damage. According to the pilot, his speed on approach was a little fast but he thought it was manageable. Recorded data from the accident airplane revealed that 20 seconds before touchdown, when the pilot selected flaps 30 (landing flaps) the airspeed was approximately 27 knots above the maximum flap extension speed, and as the airplane touched down its airspeed was approximately 14 knots higher than specified for landing. The runway had a displaced threshold with 3,097 feet of runway length available. Skid marks from the accident airplane began approximately 868 feet beyond the displaced threshold, and continued for about 2,229 feet until they left the paved portion of the runway.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to obtain the proper touchdown point, and his excessive airspeed on approach.

Findings

Aircraft	Airspeed - Not attained/maintained (Cause)
Personnel issues	Aircraft control - Pilot (Cause) Incorrect action performance - Pilot (Cause)

Factual Information

HISTORY OF FLIGHT

On July 30, 2008, about 1832 eastern daylight time, an Eclipse Aviation Corporation EA500, N333MY, sustained substantial damage during a runway overrun while landing at Brandywine Airport (OQN), West Chester, Pennsylvania. The certificated airline transport pilot, and passenger were not injured. Day visual meteorological conditions prevailed for the flight that departed Wings Field Airport (LOM), Philadelphia, Pennsylvania. No flight plan was filed for the flight conducted under Title 14 Code of Federal Regulations (CFR) Part 91.

According to the pilot's written statement, He had the airplane "topped off" prior to departing for OQN.

During a visual approach for runway 27 at OQN, He "set up for a normal approach" and "dropped gear" and "one notch of flaps." A little while later when the airplane had slowed sufficiently he then selected landing flaps. He believed that he was "a little high" on the approach so he "dipped down." As he passed the runway threshold his speed was "a little high," but he thought it was manageable. After touchdown, he "got on the brakes" and felt the airplane skid, but decided not to "go around" due to the "distance left." At this point he was "pumping" the wheel brakes "continuously," and then applied "full brakes." The airplane then began to skid to the right and went off the end of the runway.

After leaving the runway, the airplane traveled down a 40-foot embankment and crossed a service road. The airplane came to rest against trees and a chain link fence approximately 184 feet beyond the departure end of runway 27, on a magnetic heading of 265 degrees.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot held an airline transport pilot certificate with multiple ratings, including airplane multi-engine land, and type ratings for the Eclipse 500, Hawker Siddeley 125, and Learjet. He reported 6,300 total hours of flight experience on his most recent application for an FAA first-class medical certificate, dated July 2, 2008.

According to the pilot in addition to flying the Eclipse 500 for the airplane owners, he also flew charter under 14 CFR Part 135 for a flight department in a Hawker 850.

AIRCRAFT INFORMATION

The Eclipse 500 was a low-wing, T-tail airplane powered by twin tail-mounted Pratt & Whitney Canada PW610F turbofan engines. It was one of a new class of part 23 airplanes, with highly integrated avionics systems commonly referred to as very light jets (VLJs).

The airplane was certificated under 14 CFR Part 23 by the FAA for single pilot operation and

was capable of carrying up to six occupants.

According to FAA and maintenance records, the airplane was manufactured in 2007. At the time of the accident, it had accumulated 76.2 total hours of operation. The airplane was based at OQN.

METEOROLOGICAL INFORMATION

The reported weather at OQN, at 1830, included: calm winds, visibility 10 miles, scattered clouds at 7,000 feet, temperature 28 degrees Celsius, dew point 18 degrees Celsius, and an altimeter setting of 29.75 inches of mercury.

AIRPORT INFORMATION

According to the Airport Facility Directory, OQN had one runway oriented in a 09/27 configuration. Runway 27 was asphalt, and in good condition. The total length of the runway was 3,347 feet, and its width was 50 feet.

Multiple obstructions existed on the approach end of runway 27. These included trees 12 feet in height, which displaced the threshold by 250 feet. The trees were located 659 feet from the approach end of the runway pavement, and 131 feet right of the centerline. A 38:1 slope was required to clear the trees.

A 50:1 approach slope to the displaced threshold was published for the runway, and the available landing length was 3,097 feet. The runway sloped downward 1.0%. A Precision Approach Path Indicator was installed, but was inoperative at the time of the accident.

FLIGHT RECORDERS

Federal regulations regarding the carriage requirements of Flight Data Recorders (FDRs) on aircraft can be found in 14 CFR Part 91.609. The accident airplane was not operating in commercial service and was not required by the CFRs to be equipped with an FDR. The airplane was however, equipped with a Diagnostic Storage Unit (DSU).

On August 4, 2008, the Safety Board's Vehicle Recorder Division was provided a set of electronic files retrieved from the DSU in a proprietary data format which was used by Eclipse Aviation. A list of available parameters was provided to the Safety Board's Vehicle Recorder Division along with decoded flight data from the DSU.

The DSU collected aircraft-related data but was not designed to function as a flight data recorder. It did not meet any crash-survivability requirements and did not record all of the flight parameters as would be required on a flight data recorder per federal regulations. The DSU was also not required to be operational for flight, as it was not required equipment under the Eclipse 500 Master Minimum Equipment List (MMEL). However, an operational DSU does collect aircraft-related data in its solid state memory. Some of the collected data was used as part of Eclipse's FAA-approved flight operational quality assurance (FOQA) program; additionally the collected data was also used to diagnose anomalous behavior of some individual avionics boxes on the airplane.

Much of the data was collected at 1 second intervals, although some individual parameters were collected more frequently and some were collected less frequently.

The data file received from Eclipse Aviation contained approximately 10 minutes of data and

did contain the data from the accident flight.

Review of the Data

Review of the Data by the Safety Board revealed that the entire flight lasted approximately 5.8 minutes from takeoff at LOM to landing at OQN.

The airplane lifted off at 18:26:30. At 18:31:10 the landing gear handle was extended (selected to the gear down position at 1,521 feet above mean sea level (msl) at approximately 194 knots. Flaps 10 (T/O) was selected at 1,507 feet msl at approximately 193 knots.

Twenty seconds before touchdown, flaps 30 (LDG) was then selected at 694 feet msl at approximately 147 knots which was about 27 knots above the maximum flap extension speed for the airplane.

As the airplane approached the runway threshold the airplane's airspeed was at 123 knots. It crossed the threshold at approximately 108 knots which was approximately 14 knots higher than the specified approach reference speed.

The airplane touched down at 18:32:16 at approximately 92 knots which was about 14 knots higher than specified.

WRECKAGE AND IMPACT INFORMATION

Examination of runway 27 revealed, skid marks which matched the landing gear geometry of the accident airplane. The skid marks began approximately 868 feet west of the displaced threshold, and continued for about 2,229 feet till they left the paved portion of the runway where ground scars were present and two broken runway threshold lights were discovered.

During examination of the airplane no preimpact mechanical failures of the flight control system, brake system, engine control systems, or engines were discovered.

Examination of the airplane revealed multiple fractures and areas of crush and compression damage to the airframe and flight controls.

The nose landing gear had separated from its mounting location and the airplane had slid over the nose landing gear components, damaging the belly skin, the underlying structure from the nose landing gear well to approximately the forward edge of the entry door, the rudder quadrant, portions of the under floor electrical wiring, and both Byteflight data bus cables. The outboard right wing was bent upwards beginning about 5-feet inboard of the wing tip. The wing skin was deformed and the fuel tank was breached.

Both main gear had sheared off at the forward spar fitting and had penetrated the lower and upper surfaces of the wing structure. The left main gear had also rotated aft and upward impacting the left flap in approximately the middle of the flap separating it into two sections at the middle flap track location and the right main gear had also rotated aft and upward impacting the right flap in approximately the middle of the flap bending it upwards.

The main gear tires were flattened, the rubber was torn, and areas of the tires were flat spotted, and worn through. The wing flaps and the flap lever were in the landing position.

Both elevator horns were bent downward near the location of the elevator horns balance weights.

The forward and aft engine beams were also bent. The forward beam was bent downward on each end and the aft beam was bent upwards towards the middle of the beam.

SURVIVAL FACTORS

According to the Goshen Fire Company, both engines were still running and fuel was leaking from the airplane when they arrived on scene. An attempt was made to shutdown the engines but there was "no shutdown mechanism available." This prompted the fire department to shutdown the engines by flooding them with Aqueous Film Forming Foam and blanketing the associated area.

Examination of the cabin revealed, that the floor in front of the pilots' seat had been pushed upwards and the throttle quadrant had been displaced towards the right side of the instrument panel.

Both the main entry door and the emergency exit door remained operational, and neither of the 2 occupants received any injuries during the impact sequence or subsequent egress.

Seat Energy Absorbing Device (EAD)

All of the seats in the Eclipse 500 incorporated an EAD and were designed to absorb crash impact loads according to 14 CFR Part 23.785 and 14 CFR Part 23.562.

The EAD on the seat had a stroke of about 11/2 inch. Examination of the pilot's seat revealed that the EAD had been compressed approximately one-half of its travel (3/4 inch).

At the request of the Safety Board, the airplane manufacturer compared this measurement with the measurements derived during development and certification testing of the crew and passenger seats, taking in to account the differences between the 170 pound dummy weight used during the certification testing and the 194 pound weight of the pilot who was involved in the accident. This comparison revealed that during the post landing impact, the pilot seat had absorbed an amount of energy less than what could be absorbed in the 19G crew seat and probably closer to the amount of energy absorbed during the "15G down test" that was used in certification.

This comparison along with the damage that the airframe incurred indicated that the airplane impacted with a vertical deceleration between 15g and 26g.

TESTS AND RESEARCH

During a post accident interview with the pilot, he stated that, he took off about "1030-1130 or so" for Cleveland Burke Lakefront Airport (BKL), Cleveland, Ohio with his 2 passengers, his daughter and "one bag."

He then flew his passengers down towards Harrisburg, Pennsylvania and then flew back to OQN with just his daughter onboard. He landed at approximately 1415, took on fuel, and then departed at 1540 for Nantucket Memorial Airport (ACK), Nantucket, Massachusetts with his

daughter. He picked up a passenger at ACK, and then flew his daughter, the passenger, and 1 bag to LOM where the runway length was 3,700 feet long. He cancelled his IFR flight plan inbound to the field and landed at approximately 1815.

He was on the ground for "45 minutes." After "everyone got off" and "got their bags," he took off again at approximately 1900.

He did not "go IFR" or "talk to ATC" enroute to OQN. He took off from runway 24 at LOM and" Flew over" to OQN at 2,500 feet. On arrival he "did a visual approach." He joined the traffic pattern on a "dog leg."

He flew an "8-mile final." When he was 7 miles out, he was already on the final at 200 knots and "configured, to get down to 120 knots." At 4 miles out he was fully configured. The VASIs were "out that day," so he "judged a 3-degree glideslope very carefully." He descended at 700-800 fpm and was at Vref+10 (103 knots) on the approach, when he was 3 miles out."

He would always land with full flaps and would touch down "a couple of hundred feet" past the "numbers," and "if the VASIs were working that day, that's where it puts me."

He also advised that a couple of times a month the VASI "goes down," and that he did not check the NOTAMS the day of the accident.

When asked what speed he would be at crossing the threshold he stated that he would have been at 93 knots when he "crossed the numbers," and that he had been "bleeding it (the airspeed) off from 4 miles out, to the threshold."

He was surprised that when he "touched down" it "felt different." He "applied the brakes," released them and then re-applied them but, he "could not stop." He was confused as to why it would not stop and stated that, "It always stops," and that "the levers were at idle."

He was not sure of the airplane's speed after he touched down and estimated that he may have "gone off the end at 40 knots." He decided not to abort the landing as "they teach" that it could take 5 to 7 seconds for the engines to "spool up."

When the airplane traveled off the end of the runway, it "moved forward, then came down" the embankment. Both engines were still running. He shut off the airplane "top to bottom." First he shutoff the FADEC, then turned off the shutoff valves but did not discharge the fire "bottles." He then shutoff the generators, and "all 5 switches," and during the egress the door "opened fine."

He had approximately 93 hours in the airplane, had been trained by Higher Power Aviation, and had been trained in a simulator. He did not receive any of his training in the airplane. He was then assigned a "Mentor Pilot," who flew the airplane home with him.

He had practiced brake failures in the simulator. He advised that, "I don't like to be slow out there" and if you need to slow down, "you can raise the nose."

He stated that the runway at Brandywine was the "shortest length I have landed."

Brakes and Tires

As a result of the pilot's statement regarding the landing and rollout The NTSB examined the braking system and tires on the airplane. No preimpact failures or malfunctions were discovered.

The brakes were of a single disk type and were controlled by toe brakes on the rudder pedals. Operating pressure was less than 1,000 pounds per square inch (psi). An antiskid capability is not included in this system.

The main landing gear tires were 95 psi, 8-ply radials. Examination of the tires revealed that they displayed dissimilar wear. According to the pilot, at the time of the accident the right side main landing gear tire was new, and the left side tire had approximately 90 landings.

History of Flight

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

Pilot Information

Certificate:	Airline Transport	**Age:**	39, 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:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 With Waivers/Limitations	**Last Medical Exam:**	07/02/2008
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	05/12/2008
Flight Time:	6300 hours (Total, all aircraft), 93 hours (Total, this make and model), 2500 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 35 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Eclipse Aviation Corporation	**Registration:**	N333MY
Model/Series:	EA500	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	113
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	07/19/2008, Conditional	**Certified Max Gross Wt.:**	5995 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Fan
Airframe Total Time:	98 Hours	**Engine Manufacturer:**	Pratt and Whitney
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	PW610
Registered Owner:	Michael Young	**Rated Power:**	900 lbs
Operator:	My Aviation LLC	**Air Carrier Operating Certificate:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	OQN, 466 ft msl	**Observation Time:**	1830 EST
Distance from Accident Site:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 7000 ft agl	**Temperature/Dew Point:**	28°C / 18°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	Calm	**Visibility (RVR):**	
Altimeter Setting:	29.75 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Philadelphia, PA (LOM)	**Type of Flight Plan Filed:**	None
Destination:	West Chester, PA (OQN)	**Type of Clearance:**	None
Departure Time:	1617 EDT	**Type of Airspace:**	

Airport Information

Airport:	Brandywine Airport (OQN)	**Runway Surface Type:**	Asphalt
Airport Elevation:	466 ft	**Runway Surface Condition:**	Dry
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	3347 ft / 50 ft	**VFR Approach/Landing:**	Straight-in

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	39.989167, -75.588333

Administrative Information

Investigator In Charge (IIC):	Todd G Gunther	**Adopted Date:**	09/19/2011
Additional Participating Persons:	Robert Hendrickson; FAA AVP-100; Washington, DC Denis Rivard; TSBC; Montreal, Canada, Terrance E Pearce; Eclipse Aviation; Albuquerque, NM Douglas Hardy; Pratt & Whitney Canada; Longueuil, Canada,		
Publish Date:	09/19/2011		
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.ntsb.gov/pubdms/.		