National Transportation Safety Board
Aviation Accident Final Report

Location:	Elizabethton, TN	**Accident Number:**	ERA19FA248
Date & Time:	08/15/2019, 1537 EDT	**Registration:**	N8JR
Aircraft:	Textron Aviation Inc 680A	**Aircraft Damage:**	Destroyed
Defining Event:	Runway excursion	**Injuries:**	3 Minor, 2 None
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

The pilots were conducting a visual flight rules cross-country flight with three passengers onboard. The preflight, departure, and cruise portions of the flight were uneventful. During the initial approach to the airport, the flight crew discussed having some difficulty visually acquiring the airport. They also discussed traffic in the area and were maneuvering around clouds, which may have increased the pilots' workload.

As the approach continued, the airplane crossed a ridgeline at 710 ft above ground level (agl), which triggered a terrain awareness and warning system (TAWS) alert. Further, the flight crew made several comments about the airplane flying too fast and allowed the airspeed to increase well above the reference speed (V_{ref}) for the approach. At 1535:57 (about 1 minute 52 seconds before landing), the pilot pulled back the throttles to idle, where they stayed for the remainder of the approach. In an attempt to slow the airplane for landing, the pilot partially extended the speedbrakes when the airplane was below 500 ft agl, which is prohibited in the airplane flight manual (AFM). Five seconds before touchdown, the airplane's descent rate was 1,500 ft per minute (fpm), which exceeded the maximum allowed for landing per the AFM of 600 fpm.

When the airplane first touched down, it was traveling about 18 knots above V_{ref}. The pilot did not extend the speedbrakes upon touchdown, which the landing checklist required, but instead attempted to deploy the thrust reversers immediately after touchdown, which was a later item on the landing checklist. However, the thrust reversers did not unlock because the airplane bounced and was airborne again before the command could be executed, which was consistent with system design and logic: the thrust reversers will not unlock until all three landing gear are on the ground.

The airplane touched down four times total; on the third touchdown (after the second bounce), when all three landing gear contacted the runway, the thrust reversers unlocked as previously commanded during the first touchdown. Although the pilot subsequently advanced the throttles to idle, which would normally stow the thrust reversers, the airplane had bounced a

third time and had already become airborne again before the thrust reversers could stow. When the airplane became airborne, the system logic cut hydraulic power to the thrust reverser actuators; thus the reversers would not stow. The thrust reversers were subsequently pulled open due to the aerodynamic forces. The pilot attempted to go around by advancing the throttles when the airplane was airborne. However, the electronic engine controls prevented the increase in engine power because the thrust reversers were not stowed.

When the airplane touched down the fourth and final time, the pilot attempted to land straight ahead on the runway; the airplane touched down hard and the right main landing gear then collapsed under the wing. The airplane departed the paved surface and came to rest about 600 ft beyond the runway threshold. The passengers and crew eventually evacuated the airplane through the main cabin door, and the airplane was destroyed in a postaccident fire.

A postaccident examination of the airplane systems, structure, powerplants, and landing gear revealed no evidence of mechanical malfunctions or anomalies that would have precluded normal operation.

The airplane's approach was unstabilized: its airspeed during the approach and landing well exceeded V_{ref} and its descent rate exceeded the maximum allowed for landing just seconds before touchdown. Both the pilot and copilot commented on the airplane's high speed several times during the approach. During short final, the pilot asked the copilot if he should go around, and the copilot responded, "no." Although the copilot was the director of operations for the flight department and the direct supervisor of the pilot, the pilot stated that the copilot's position did not influence his decisions as pilot-in-command nor did it diminish his command authority. Neither the pilot nor copilot called for a go-around before landing despite awareness that the approach was unstabilized.

As the airplane touched down, the pilot failed to follow the AFM guidance and used the thrust reversers before the speedbrakes. According to the airplane manufacturer's calculations, the airplane could have stopped within the length of runway available if the airplane had not bounced and the speedbrakes and wheel brakes were used at the point of the first touchdown.

After the third touchdown, when the airplane became airborne again, the pilot attempted a go-around; the AFM prohibits touch-and-go landings after the thrust reversers are deployed. It is critical for pilots to know the point at which they should not attempt a go-around; a committed-to-stop (CTS) point is the point at which a go-around or rejected landing procedure will not be initiated and the only option will be bringing the aircraft to a stop. Establishing a CTS point eliminates the ambiguity for pilots making decisions during time-critical events. The FAA issued Information for Operators 17009, "Committed-to-Stop Point on Landings," to inform operators and pilots about the importance of establishing a CTS point; however, the director of operations was not aware of the concept of a CTS point during landing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's continuation of an unstabilized approach despite recognizing associated cues and the flight crew's decision not to initiate a go-around before touchdown, which resulted in a bounced landing, a loss of airplane control, a landing gear collapse, and a runway excursion. Contributing to the accident was the pilot's failure to deploy the speedbrakes during the initial touchdown, which may have prevented the runway excursion, and the pilot's attempt to go around after deployment of the thrust reversers.

Findings

Aircraft	Airspeed - Not attained/maintained (Cause)
	Descent rate - Not attained/maintained (Cause)
Personnel issues	Decision making/judgment - Pilot (Cause)
	Aircraft control - Pilot (Cause)
	Incorrect action sequence - Pilot (Factor)
	Lack of action - Pilot (Factor)
	Delayed action - Pilot (Factor)

Factual Information

History of Flight

Landing-flare/touchdown	Hard landing
	Abnormal runway contact
	Landing gear collapse
Landing	Runway excursion (Defining event)
Landing-landing roll	Collision with terr/obj (non-CFIT)
Post-impact	Fire/smoke (post-impact)

On August 15, 2019, about 1537 eastern daylight time, a Textron Aviation Inc. 680A, N8JR, was destroyed when it was involved in an accident near Elizabethton, Tennessee. The pilot and copilot were not injured and the three passengers sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 business flight.

In postaccident interviews and written statements, the pilot and copilot reported that the purpose of the flight was to drop off one of the three passengers at Elizabethton Municipal Airport (0A9), Elizabethton, Tennessee, before continuing the flight to San Antonio, Texas. The flight departed Statesville Regional Airport (SVH), Statesville, North Carolina, at 1519 and climbed to 12,500 ft mean sea level (msl). The preflight, departure, and en route portions of the flight were routine. Unless otherwise noted, the following sequence of events was derived from the download and review of data from onboard data and voice recording systems, and all speeds are indicated airspeed.

At 1527 (about 8 minutes after takeoff), the airplane began a descent from 12,500 ft msl to 5,400 ft msl; during the descent, the airplane turned right to varying headings between 325° and 342°. During this time, the flight crew discussed clouds in the area and the best ways to maneuver around them as well as traffic in the area and landmarks, including ridgelines, to help them identify 0A9. About 1530, the copilot announced via the airport's common traffic advisory frequency their intention to land on runway 24. At 1532:11, the pilot stated, "well it wouldn't hurt to slow down." About 33 seconds later, the descent resumed, and the airspeed decreased to 200 knots with the autothrottle engaged.

At 1533:00, the airplane began to turn left, and the crew conversation indicated that they had some difficulty visually acquiring the airport; the airplane then turned right and began to climb. At 1535:02, the descent resumed, and 10 seconds later the terrain avoidance and warning system (TAWS) excessive closure rate caution and warning alerts sounded in the cockpit as the airplane crossed a ridge at 710 ft above ground level (agl). The copilot asked the pilot if he saw the terrain, and the pilot responded, "yeah, I got it."

At 1535:27, the airplane began a shallow left turn to an extended final. As the approach to landing resumed, the descent rate increased; the autothrottle positioned the throttles to their minimum, 6° throttle lever angle, and the airspeed increased to 220 knots. At 1536:12, the pilot asked the copilot to position the flaps to the flaps 1 setting. The crew then manually positioned

the throttles to 0° throttle lever angle, which disengaged the autothrottle; the throttles were not moved for the remainder of the approach. At 1536:29, the pilot stated, "slow down." At 1536:31, the pilot asked the copilot to lower the landing gear, and the copilot responded that he would after the airplane slowed down more. At 1536:36, the speedbrake lever was partially extended to a 33° lever angle, and the TAWS excessive descent rate caution alert sounded about 5 seconds later. (See figure 1 for the accident airplane's flight path until the first touchdown.) At 1536:47, about 3 nautical miles from touchdown and at 2,783 ft msl (781 ft agl), the speedbrake lever was extended to 41° for a total of 21 seconds then retracted after the airspeed decreased to 205 knots. At 1536:50, the landing gear were extended, and 7 seconds later, flaps 2 (15°) was selected; these actions were performed when the airplane reached the maximum speeds to perform those functions (205 knots and 195 knots, respectively).

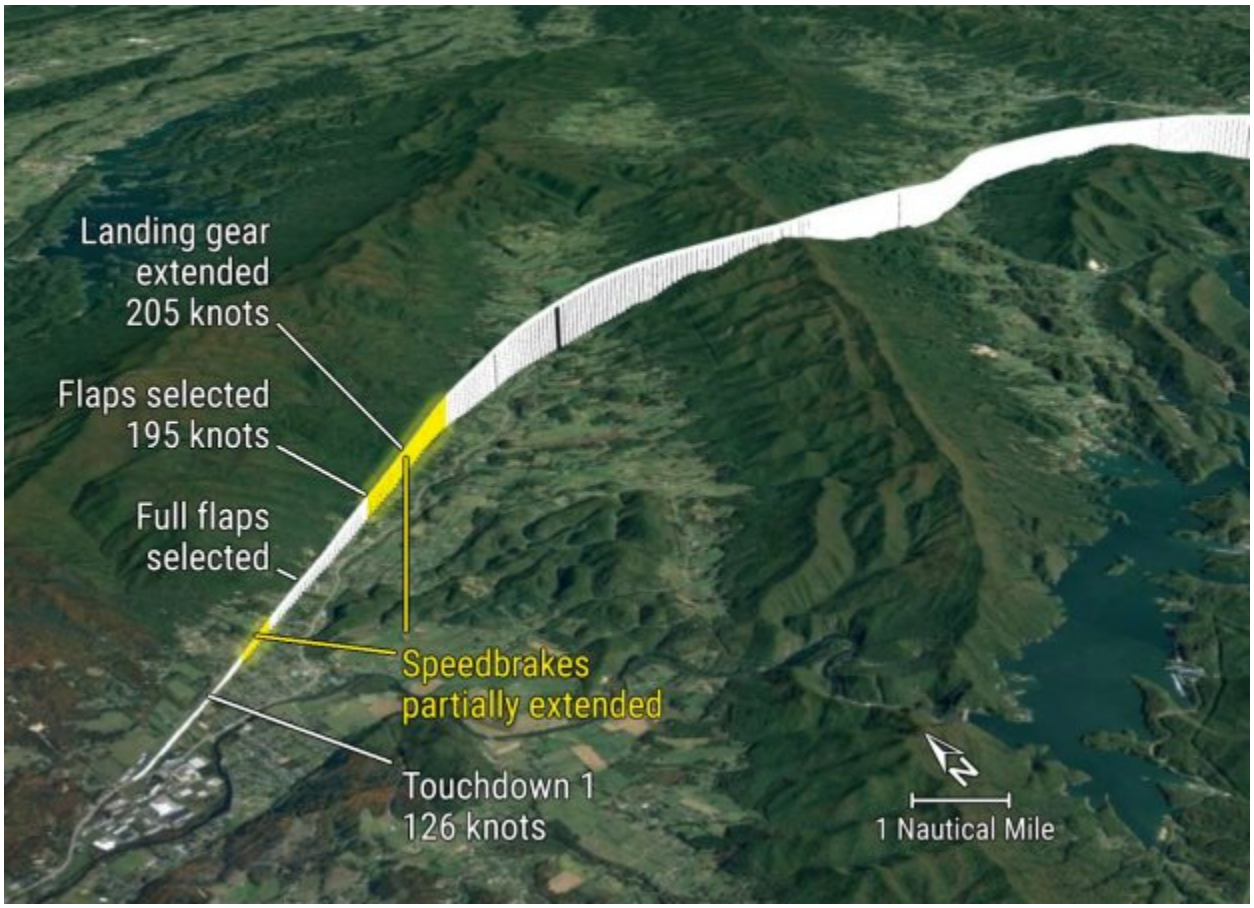

Figure 1: N8JR's approach, including speed and use of speedbrakes (in yellow), landing gear, and flaps.

As the flaps were extending, the TAWS forward looking terrain alert rate of terrain closure caution alert sounded twice (at 1536:59 and at 1537:09), then a warning alert sounded (at 1537:11). The airplane was at an altitude of 2,159 ft msl (471 ft agl). Following these alerts, the copilot selected full flaps and the descent rate and airspeed decreased. At 1537:26, the copilot

stated, "and I don't need to tell ya, we're really fast," and the pilot responded, "I'm at idle." Six seconds later, the pilot asked, "do I need to go around?" and the copilot responded, "no." At 1537:31, about 270 ft agl, the speedbrakes were partially extended for 5 seconds (to 140 ft agl). The pilot then stated, "I got the speed brakes out," to which the copilot responded, "well you should get rid of those because we don't wanna get a CAS [Crew Alerting System] m- or a thing sent to ya." Eight seconds before touchdown, at 1537:41, the pilot stated, "alright, I'll be on the T-Rs [thrust reversers] quickly." For the computed airplane weight, the reference speed (V_{ref}) for the final approach was 108 knots; the airplane's airspeed at the runway's displaced threshold was 126 knots. Five seconds before touchdown, the airplane's descent rate was over 1,500 ft per minute (fpm).

According to airport surveillance video and recorded data, the airplane first briefly touched down with a bounce on the runway designator about 240 ft past the displaced threshold with about 3,860 ft of paved surface remaining. The airplane then touched down two more times, bouncing each time, then continued airborne over the runway until it touched down a fourth time with about 1,120 ft of paved surface remaining. See figure 2 for a depiction of the bounced landing detailing the landing gear touchdowns, vertical acceleration, and thrust reverser actions (the speedbrakes were not extended after touchdown, although the landing checklist indicated they should be).

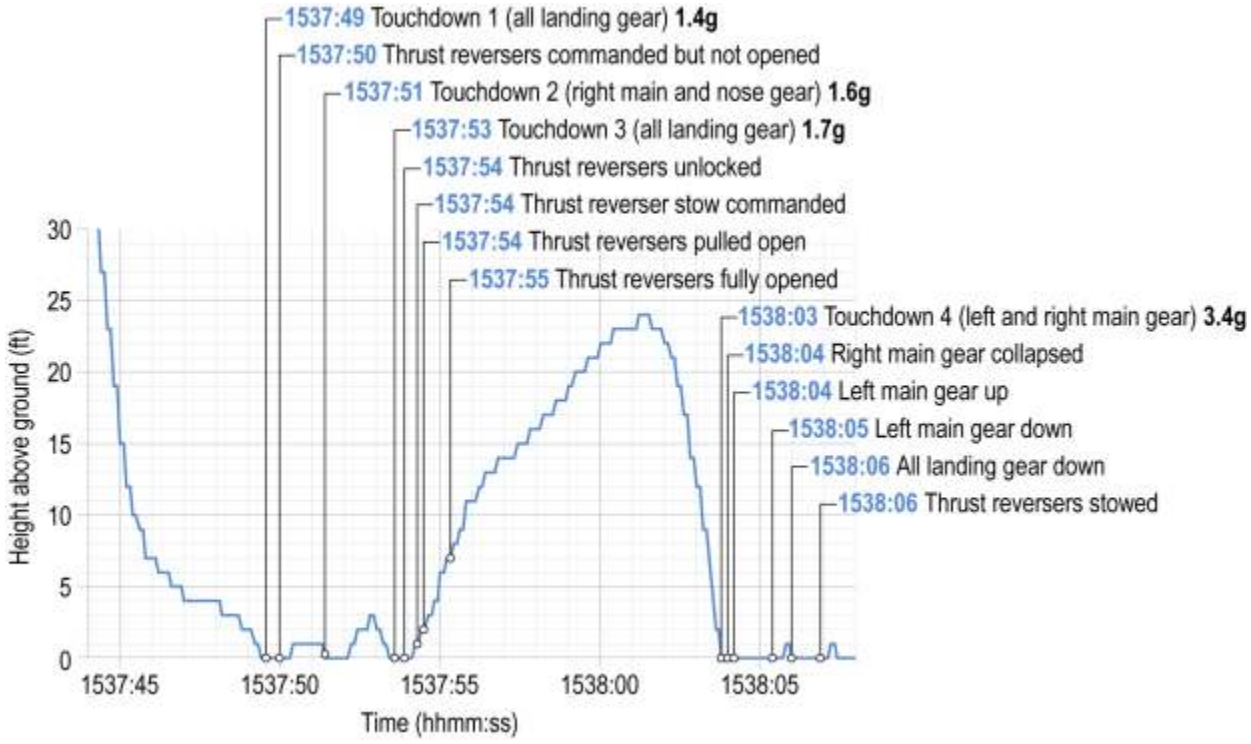

Figure 2. Graph depicting the airplane's thrust reverser actions, landing gear touchdowns, and vertical acceleration (bold) during its bounced landing.

When the airplane touched down initially at 1537:49, it was travelling 126 knots (18 knots above V_{ref}) and had a descent rate of 600 fpm (the maximum allowed per the airplane flight manual [AFM]). All three landing gear registered "on-ground" simultaneously with a vertical acceleration of 1.4 gravitational acceleration (g), and thrust reverser deployment was commanded 0.4 second after the landing gear first touched the ground as the throttles were moved to the reverse idle position; however, the airplane bounced after touching down for 0.6 second and was airborne again before the thrust reverser command could be executed.

When the airplane touched down a second time, 1.2 seconds later at 1.6 g, the nose landing gear touched down first, followed immediately by the right main landing gear. The left main landing gear never registered on-ground during the touchdown, and the airplane bounced and became airborne again after 0.4 second.

The airplane touched down a third time, 1.8 seconds later at 1.7 g and about 1,000 ft down the runway with about 3,100 ft of paved surface remaining. The thrust reversers unlocked 0.4 second after all three landing gear registered on-ground because the reverser deployment command from the first touchdown was still active. Almost immediately after the thrust reversers unlocked, the pilot advanced the throttles to idle, sending a thrust reverser stow command at 1537:54; however, the landing gear status changed to "in-air" almost simultaneously when the command was executed.

The airplane bounced after 0.6 second and became airborne a third time, and the in-air landing gear status triggered a cut in hydraulic power to the thrust reverser actuators, which is intended to prevent the airborne deployment of a thrust reverser. The cut in hydraulic power to the thrust reversers allowed the unlocked thrust reversers to be pulled open by aerodynamic forces. The amber "T/R UNLOCK CAS" message illuminated and the thrust reverser emergency stow switches began to flash. The pilot advanced the throttles to maximum takeoff power 0.7 second later in an attempt to go around; however, the thrust reversers reached full deployment 0.4 second after that. The airplane's full authority digital engine controls (FADEC), by design, prevented an increase in engine power while the thrust reversers were deployed. The red "T/R DEPLOY CAS" message was displayed in the cockpit, indicating that the thrust reversers were deployed, and the thrust reverser emergency stow switches continued to flash.

The pilots later reported that they attempted to conduct a go-around; however, the engines did not respond as expected, so they landed straight ahead on the runway. While the airplane was airborne, the crew partially retracted the flaps as the airspeed decreased from 119 knots to 91 knots. The pilot retarded the throttles partially but not to idle, then pushed the throttles forward again with no effect because the FADEC continued to prevent an increase in thrust; the pilot then pulled back the throttles to idle. While airborne for 9.6 seconds, the airplane reached an altitude of about 24 ft agl.

The stick shaker activated 0.5 second before the airplane touched down for the fourth and final time at 1538:03, warning of an imminent stall. The airplane touched down hard with a peak acceleration of 3.2 g on the left and right main landing gear, then the left main landing gear

came off the ground then contacted the ground again. The nose gear contacted the ground about 0.5 second later. The left inboard wheel brake pressure increased to near maximum after the left main gear touched down; however, the left outboard and right wheel brake pressure did not increase significantly, indicating that only the left inboard tire was firmly contacting the runway. When all three landing gear touched down on the runway at 1538:06, the thrust reverser system was reenergized and the thrust reversers stowed 0.9 second later because the throttles were at idle.

Airport surveillance video showed that the right main landing gear collapsed at 1538:04 and that the outboard section of the right wing contacted the runway immediately thereafter. The airplane then departed the 97-ft-long paved surface beyond the end of the runway and traveled through a 400-ft-long open area of grass, down an embankment, through a creek, through a chain-link fence, and up an embankment. Photographs of the accident scene showed that the airplane came to rest on the edge of a four-lane highway about 600 ft beyond the runway threshold. In postaccident interviews with the flight crew, they reported that they secured the engines after the airplane came to a stop and assisted the passengers with the evacuation through the main entry door as a postaccident fire erupted, which eventually destroyed the airplane.

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	56, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 With Waivers/Limitations	**Last FAA Medical Exam:**	06/19/2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	10/24/2018
Flight Time:	5800 hours (Total, all aircraft), 765 hours (Total, this make and model)		

Co-Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	52, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without Waivers/Limitations	**Last FAA Medical Exam:**	12/05/2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	10/24/2018
Flight Time:	11000 hours (Total, all aircraft), 1165 hours (Total, this make and model)		

The pilot, seated in the left cockpit seat and acting as the pilot-in-command, and the copilot, seated in the right cockpit seat, both held a type rating in the accident airplane.

Both the pilot and copilot completed their most recent recurrent training together at TRU Simulation, Tampa, Florida. A review of the TRU Simulation syllabus for recurrent training revealed that the thrust reverser system was covered in ground training. In postaccident interviews, both the pilot and co-pilot reported that the thrust reverser system was adequately covered in initial and recurrent training.

According to the copilot, who also served as the director of operations for the airplane operator, he and the pilot were the only pilots who flew the accident airplane. Both the pilot and copilot were qualified to act as pilot-in-command. The normal procedure for the crew was to "switch seats" often, with the pilot in the left seat always acting as pilot-in-command. As the director of operations, the copilot on the accident flight was also the direct supervisor of the pilot in the left seat. The pilot reported that this relationship neither influenced his decisions as pilot-in-command nor diminished his command authority. When asked if he thought there may have been repercussions from the copilot if he had discontinued the approach, the pilot responded "absolutely not."

The pilot and copilot stated in postaccident interviews that they did not think that their maneuvers around clouds and traffic and identification of landmarks near 0A9 distracted them or increased their workload. In addition, the pilot and copilot said there was no pressure from the passengers to land rather than go around, and the copilot added that the airplane left SVH on time and that there were no other time constraints. The pilot recalled hearing the TAWS excessive closure rate warning alert on short final; however, he did not think that the alert contributed to the outcome. In retrospect, he felt the initial touchdown was too hard, possibly from an inadequate landing flare between final approach and touchdown, which would have slowed the descent rate and created a softer touchdown.

When the copilot was asked in postaccident interviews if he thought the approach was stabilized, he responded "no."

Aircraft and Owner/Operator Information

Aircraft Make:	Textron Aviation Inc	**Registration:**	N8JR
Model/Series:	680A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	680A0010
Landing Gear Type:	Retractable - Tricycle	**Seats:**	11
Date/Type of Last Inspection:	07/26/2019, Continuous Airworthiness	**Certified Max Gross Wt.:**	31025 lbs
Time Since Last Inspection:	17 Hours	**Engines:**	2 Turbo Fan
Airframe Total Time:	1165 Hours at time of accident	**Engine Manufacturer:**	P&W Canada
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	306D1
Registered Owner:	JRM Air LLC	**Rated Power:**	5907 lbs
Operator:	JRM Air LLC	**Operating Certificate(s) Held:**	None

The airplane, also known as a Citation Latitude, had a low-wing, cruciform tail design with twin, fuselage-mounted engines. It was equipped with two cockpit seats and nine passenger seats.

The pilots reported that the airplane departed SVH with about 1,312 gallons of fuel on board. According to the AFM, the maximum certified landing weight was 27,575 lbs, and the crew reported that the airplane weighed 27,508 lbs at the time of the accident and required 3,000 ft of runway for landing.

According to the AFM, speedbrakes must be stowed before 500 ft agl and remain stowed until landing. The maximum landing descent rate was 600 fpm.

The airplane was equipped with a cockpit voice recorder (CVR), a Garmin G5000 advanced integrated flight deck with flat screen displays and touch screen controls, a Textron Aircraft Recording System (AReS), and a Pratt and Whitney Canada FADEC on each engine. The CVR and G5000 memory card were removed from the airplane and sent for analysis to the National Transportation Safety Board (NTSB) Vehicle Recorder Division, Washington, DC. Textron reviewed the AReS data and provided a report to the NTSB.

According to the airplane manufacturer, speedbrake extension at touchdown has a "significantly greater effect" than thrust reverser use. The manufacturer calculated the landing distance of the accident airplane model if it had been traveling at an airspeed of 126 knots at touchdown, which was 18 knots above V_{ref} and was the speed of the accident airplane at the

displaced threshold. According to the manufacturer's calculations, an airplane could have stopped within the length of runway available to the accident airplane if only speedbrakes and wheel brakes were used during the first touchdown and the airplane did not bounce.

The AFM included three checklists to be completed during approach and landing: the approach checklist, the before landing checklist, and the landing checklist. The before landing checklist included lowering the landing gear, selecting full flaps, and confirming V_{ref}; the landing checklist included extending speedbrakes at touchdown then deploying thrust reversers after nosewheel touchdown.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	K0A9, 1592 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	1535 EDT	**Direction from Accident Site:**	70°
Lowest Cloud Condition:	Scattered / 4700 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	Broken / 7000 ft agl	**Visibility (RVR):**	
Wind Speed/Gusts:	Calm /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	29°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Statesville, NC (SVH)	**Type of Flight Plan Filed:**	None
Destination:	Elizabethton, TN (0A9)	**Type of Clearance:**	None
Departure Time:	1519 EDT	**Type of Airspace:**	Class G

Airport Information

Airport:	Elizabethton Muni (0A9)	**Runway Surface Type:**	Asphalt
Airport Elevation:	1592 ft	**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	5001 ft / 75 ft	**VFR Approach/Landing:**	Full Stop; Traffic Pattern

The airport's runway surface was in excellent condition. Runway 24 had a 902 ft displaced threshold and runway 6 had a 97 ft displaced threshold.

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Minor	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Minor, 2 None	**Latitude, Longitude:**	36.367222, -82.181667

The airplane came to rest upright but rolled toward the left about 42°; it was on a true heading of 285° and at an elevation of 1,551 ft msl. The fuselage aft of the main entry door, the right wing, the empennage, and most of the fuel system were destroyed by the postaccident fire.

The left and right thrust reverser actuators, located in the engine nacelles, were found in the stowed positions.

The flap handle in the cockpit and the flap actuators were found in the flaps 2 position. The speedbrake handle in the cockpit was found in the midrange position, neither stowed nor extended. Flight control cable continuity was not established on scene; however, the AReS data did not reveal any evidence of a flight control issue nor did the flight crew report one.

Both engines were heavily damaged by fire and soot. Visual and borescope examinations of the engines did not reveal any evidence of preimpact mechanical anomalies or failures that would have precluded normal engine operation. The oil and fuel filters on both engines were unobstructed. Review of the AReS data revealed normal engine parameters throughout the flight and accident sequence; the engines operated as commanded by the crew.

The nose landing gear and the left main landing gear were impact-separated during the collision with the creek bed and embankment and were found adjacent to the main wreckage. The right main landing gear remained attached to the right wing by the hydraulic landing gear actuator and remained under the wing during the postaccident fire. The right main landing gear trunnion pin, located on the forward side of the trunnion, remained attached to the trunnion assembly. The trunnion bearing in the wing structure was separated from the wing and was not found. The forward trunnion pin-bearing installation hole in the wing structure was elongated. The aft trunnion pin was not observed because the aft trunnion assembly sustained postaccident fire damage and was melted. The aft trunnion bearing remained in place in the aft wing spar and was unremarkable. The upper bolt used to install the right main landing gear oleo strut to the trunnion assembly was sheared (the oleo strut absorbs shock in the landing gear during landing). The inboard hole of the upper oleo and trunnion installation knuckle attachment was elongated. The threaded portion of its bolt and nut, with the cotter key installed to keep the upper oleo and trunnion connected, was found on the runway. The fracture surface of the bolt exhibited metallurgical signatures consistent with overstress; the head of the bolt was not located during the wreckage examination.

The examination of the airframe and engine did not reveal any preaccident anomalies that would have precluded normal operation.

Survival Aspects

The airplane was equipped with two exits: a cabin entry door on the left side of the fuselage and an emergency over-wing escape hatch located near the lavatory (rear) on the right side of the fuselage.

According to postaccident pilot and passenger statements, the pilots attempted to open the cabin entry door after the airplane came to a stop but could not open it. Around the same time, one of the passengers attempted to open the emergency escape hatch but had difficulty opening it. Both the pilot and copilot came to the back of the airplane to assist in opening the emergency escape hatch, but they could not open it either.

The pilots and passenger continued to struggle with the emergency escape hatch and observed heavy smoke coming from the lavatory, followed by flames. The copilot attempted to open the cabin entry door a second time, and he was able to push the door partially open with enough clearance to get all the occupants out. In a postaccident interview, the copilot reported that the exterior handle was likely pushing against the ground at the time, preventing it from opening fully.

At the airplane's final attitude, the exterior paddle-type handle on the cabin entry door impinged on the ground, preventing full extension of the handle. When the fuselage was lifted during the recovery of the wreckage, investigators opened and closed the cabin entry door fully without restrictions. During the examination of the emergency exit at the accident site, investigators noted that a metal post from the chain-link fence was impaled into the emergency escape hatch near the round hatch window (see figure 3). Although there was extensive postaccident fire damage to the hatch, the latching pin was found in the closed and latched position. After investigators removed the hatch from its frame and the pole pinning it in place, the handle operated in a normal manner with full range of motion.

Figure 3: Emergency escape hatch impaled by a metal fence post.

Additional Information

A committed-to-stop (CTS) point is a point in the landing sequence beyond which a go-around should not be attempted. The NTSB has previously addressed the need for airplane manufacturers to incorporate CTS points in their AFMs. On July 31, 2008, a Hawker Beechcraft Corporation 125-800A airplane crashed near Owatonna, Minnesota, after the captain failed to immediately deploy the lift-dump system after touchdown, then attempted a go-around late in the landing sequence with insufficient runway remaining. A review of operator and manufacturer guidance found that neither had identified a CTS point beyond which a go-around should not be attempted. As a result, the NTSB issued Safety Recommendation A-11-18, which asked the FAA to require manufacturers to incorporate in their AFMs a CTS point in the landing sequence. The NTSB also issued Safety Recommendation A-11-19, which asked the FAA to require Part 121, 135, and 91K operators and Part 142 training schools to incorporate the information from the revised manufacturers' AFMs into their manuals and training.

During the FAA's evaluation of these recommendations, it found that operational factors were too numerous and varied to establish a single CTS point to be included in the manufacturers'

AFMs. The FAA believed that operators were in a better position to make the determination based on their aircraft and operation. Thus, the FAA issued Information for Operators (InFO) 17009, "Committed-to-Stop Point on Landings," which informs turbine-powered aircraft operators about the importance of establishing a point during landing where a go-around or rejected landing procedure will not be initiated and the only option will be stopping the aircraft. The InFO encourages operators to include a CTS point in the approach briefing and in their standard operating procedures, flight operations manual, initial and recurrent training, and crew resource management training program. As a result, the NTSB classified the A-11-18 as "Closed—Reconsidered" and A-11-19 as "Closed—Acceptable Alternate Action."

A review of the accident airplane's AFM revealed that it did not include information about a CTS point and it did not specify that a go-around should not be attempted after use of thrust reversers; the AFM did state that the use of thrust reversers is prohibited during touch-and-go landings.

The copilot stated that he had not heard of a CTS point.

Administrative Information

Investigator In Charge (IIC):	Ralph E Hicks	**Report Date:**	09/23/2020
Additional Participating Persons:	Rocky Davidson; FAA/FSDO; Nashville, TN Peter Basile; Textron Aviation; Wichita, KS Jeffery Davis; P&W Canada; Longueuil, QC		
Publish Date:	09/23/2020		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=100066		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.