Beechcraft | Cessna | Hawker

TEXTRON AVIATION

Air Safety Investigations
Aircraft Incident/Accident Technical Report

Aircraft Incident/ Accident Information	Year: 2015	Make: Textron Aviation	Model: 680
	Serial number: 680A0010	Registration: N8JR	
Location: Elizabethton, TN		Date: 08-15-19	Time: 1537 EDT

Aircraft Owner	Aircraft Operator
JRM Air LLC PO Box 330 Mooresville, NC 28115-0330	Same as Aircraft Owner

Report Information		
Air Safety Investigator: Peter J. Basile	Report #: ASI-19-CB-T	Report date: 01-21-20

Airframe

Impact Sequence and Airframe Structure

Per security video, the aircraft touched down on the runway and bounced. The aircraft appeared to climb back up to about 25' AGL before it descended rapidly and landed hard on the runway. The right main landing gear collapsed, and the right wing tip contacted the runway. Skid marks from the right main gear and right main gear door indicated the aircraft traveled slightly to the left before it turned back to the right. The aircraft departed the end of the runway on center line and traveled down a grass covered hill for approximately 400'. The aircraft traveled over an approximately 25' wide creek. The left main landing gear and nose gear separated from the aircraft when it struck the opposite creek bank. The aircraft traveled up a small grassy hill and came to rest next to the west bound lanes of Highway 91. The aircraft came to rest on a heading of 285° at an elevation of 1,551'. A post-impact fire consumed the aft portion of the fuselage and inboard wing areas.

Airframe Systems

Flight Control System Information		
Control lock: Not engaged		
Flight Control Cable Continuity		
Ailerons: See below	Elevators: See below	Rudder: See below
Aileron tab: See below	Elevator tab: See below	Rudder tab: See below
Flap and Trim Positions		
Flap indicator: Undt	Flap handle: Position 2	Flap actuators: See below
Elevator trim:	Indicator: Undetermined	Actuator: See below
Rudder trim:	Indicator: Undetermined	Actuator: See below
Aileron trim:	Indicator: Undetermined	Actuator: See below

Remarks:

Control cable continuity was not established while on-site due to rapid recovery efforts. The pilots did not report any flight control issues during their interview with the NTSB-IIC.

The left and right aileron trim actuators were extended 1.2”. The left elevator trim actuator was extended 1.6”. The right elevator trim actuator was extended 1.5”. The rudder trim actuator was extended 1.1”. Aileron, elevator, and rudder trim tab angular positions were not determined.

The primary stabilizer trim actuator was measured. Textron Aviation Engineering compared it to an exemplar experimental aircraft and confirmed the cockpit display indication would have been approximately -1.3°.

The flap selector was found in the #2 position (15° flaps extended). The on-site actuator measurements are listed below. Textron Aviation Engineering measured the flap actuators of an exemplar experimental aircraft with the flaps extended 15°; the findings are included in red below. The investigation confirmed the flaps were extended 15°.

The left inboard flap, inboard actuator was not examined.
The left inboard flap, outboard actuator was extended 14.5”. 14.375”
The left center flap, inboard actuator was extended 14.25”. 14.125”
The left center flap, outboard actuator was extended 12”. 12”
The left outboard flap, inboard actuator was extended 11.5”. 11.5”
The left outboard flap, outboard actuator was extended 9”. 9.25”

The right inboard flap, inboard actuator was not examined.
The right inboard flap, outboard actuator was extended 14.5”. 14.375”
The right center flap, inboard actuator was extended 14”. 14.125”
The right center flap, outboard actuator was extended 12”. 12”
The right outboard flap, inboard actuator was extended 11.75”. 11.5”
The right outboard flap, outboard actuator was extended 9.5”. 9.25”

Airframe Fuel System Condition, Controls, and Read Outs			
Fuel filter screen:	Left: Undetermined	Right: Undetermined	
Main fuel tank gauge:	Left: Undetermined	Right: Undetermined	
Crossfeed: Undetermined		Fuel boost pump:	Left: Not applicable Right: Not applicable

Remarks:
Per the pilots, the aircraft departed with 8,800 pounds of fuel. The majority of the fuel system was destroyed by the post-impact fire.

Landing Gear System Condition and Controls			
Gear position:	Nose: Extended	Left: Extended	Right: Extended
Actuator position:	Nose: Extended	Left: Extended	Right: Extended
Landing gear selector: Extended		Anti-skid: Undetermined	
Aux gear control: Stowed		Blow-down bottle quantity: Undt	

Environmental System Controls and Read Outs		
Cabin heater: Undt	Cabin vent: Undt	Defrost: Undt
Air conditioner: Undt	Oxygen system: Normal	Oxygen quantity: 1,730 psi

Pressurization System Controls and Read Outs	
Cabin VSI: Undetermined	Cabin altitude: Undetermined
Differential pressure: Undetermined	Source selector knob: Norm

Icing System Information and Switches			
Certified into known icing? Yes		De-icing boots installed? No	
Pitot heat: Undetermined		Stall heat: Undetermined	
De-ice:	Surface: Not applicable	Windshield: Not applicable	
Anti-ice:	Surface: Undetermined	Windshield: Undetermined	

ELT Information			
Installed? Yes	Manufacturer: Undetermined	Model: Undetermined	Type: Undetermined
Serial number: Undt	Battery due date: Undt	Armed: Undetermined	Activated: Undetermined

Remarks:

The nose landing gear and the left main landing gear were impact separated from the fuselage when it crossed the creek. The right main landing gear remained attached to the right wing via the hydraulic landing gear actuator and remained under the wing during the post-impact fire. The right main gear trunnion pin, located on the forward side of the trunnion, remained attached to the trunnion assembly and the securing hardware was observed. The bearing to which it installs in the wing structure was separated from the wing structure and was not observed. 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 post-impact 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 to the trunnion assembly was sheared. The inboard hole of the upper oleo/trunnion installation knuckle attachment was elongated. The threaded portion of the bolt and nut, with cotter key installed, were found on the runway. The fracture surface of the bolt exhibited metallurgical overload signatures. The head of the bolt was not located during the examination of the wreckage.

Additional cockpit observations: Left and Right Engine Bleed Air – Norm; Cockpit Temp – Norm; Cabin Temp – Norm; Pitch Reconnect – Norm; Left and Right Fire Bottle switches – IN

Cabin and Equipment/Furnishings

Restraint System Information						
Seat	Occupied	Restraint type	Restraint used	Condition	Manufacturer	
1	Yes	5-Point	Yes	Normal	Cessna	
2	Yes	5-Point	Yes	Normal	Cessna	
3	No	3-Point	N/A	Normal	Cessna	
4	No	3-Point	N/A	Normal	Cessna	
5	Yes	3-Point	Yes	Fire damaged	Cessna	
6	Yes	3-Point	Yes	Normal	Cessna	
7	No	3-Point	N/A	Fire damaged	Cessna	
8	No	3-Point	N/A	Fire damaged	Cessna	
9	No	3-Point	N/A	Fire damaged	Cessna	

Seat Condition Information					
Seat	Orientation	Feet intact	Back intact	Base intact	Rail intact
1	Forward facing	Yes	Yes	Yes	Yes
2	Forward facing	Yes	Yes	Yes	Yes
3	Rear facing	Yes	Yes	Yes	Yes
4	Rear facing	Yes	Yes	Yes	Yes
5	Forward facing	Partially	Partially	Yes	Yes
6	Forward facing	Yes	Yes	Yes	Yes
7	Forward facing	Yes	Yes	Yes	Yes
8	Forward facing	No	No	No	No
9	Side facing	Yes	No	Yes	Yes

Remarks:

The aft cabin sustained significant fire damage. The toilet seat, located in the aft right corner of the cabin, and seat 8 directly forward of the toilet, were destroyed by the post-impact fire. The base of seat 9, the side facing seat located directly across from the toilet on the left side of the cabin, remained attached to the floor. The seat 9 back was destroyed by fire. The seat 7 base remained attached to the floor. The seat 7 back sustained fire damage. The seat 5 base was loosely separated from the post-impact fire damaged floor structure and was observed leaning toward the right side of the cabin. The seat 5 base, back, and restraint system sustained thermal damage. Seats 3 and 4, the aft facing seats, and seat 6 remained attached to the floor structure; the seats had minor soot damage. The cockpit seats were unremarkable.

Instrument Panel

Navigation Instruments					
Analog primary instruments			AOA indicator: Undetermined		
Suction gage: Undetermined		Magnetic compass: Undetermined		Clock: Undetermined	
	Left side	Right side		Left side	Right side
Airspeed:	Undt	Undt	Turn coordinator (airplane):	Undt	Undt
Attitude (pitch):	Undt	Undt	Turn coordinator (ball):	Undt	Undt
Attitude (roll):	Undt	Undt	Heading indicator:	Undt	Undt
Altimeter:	Undt	Undt	Heading “bug”:	Undt	Undt
Altimeter setting:	Undt	Undt	Vertical speed indicator:	Undt	Undt

Communication and Navigation Radios							
Radio	Control	Active frequency	Stand-by frequency	Radio	Control	Active frequency	Stand-by frequency
Com 1:	Undt	Undetermined	Undetermined	Com 2:	Undt	Undetermined	Undetermined
Nav 1:	Undt	Undetermined	Undetermined	Nav 2:	Undt	Undetermined	Undetermined
Obs 1:	Undetermined			Obs 2:	Undetermined		
Transponder:	Mode: Undetermined		Active code: Undetermined		Stand-by code: Undetermined		

Electrical Switch Positions	
Master battery: Undetermined	Stand-by battery: See below
Left generator: On	Right generator: On
Avionics 1: Undetermined	Avionics 2: Undetermined
Inverter 1: Undetermined	Inverter 2: Undetermined

Lighting Switch Positions		
Navigation: Undetermined	Rotating beacon: Undetermined	Landing: Undetermined
Taxi: Undetermined	Strobe: Undetermined	Instrument: Undetermined
Wing ice: Undetermined		

Ignition Switch Positions	
Left engine: Undetermined	Right engine: Undetermined

Remarks:
Most of the avionics and instrument panel data was recorded by AReS and the Garmin G5000 data log software. The instrument readings and switch/lever configuration in the cockpit at the time of the accident were covered in the history of flight section.

Additional cockpit observations included: PFD’s, MFD, and all GTC lights – full on; left and right map light – Min; Oxygen – Passenger Oxygen Auto; Stand-by Power – Test; Fuel Crossfeed – OFF; APU Generator – On.

Powerplant Description

Engine Instruments					
Hour meter: 1,165.5					
	Left Engine	Right Engine		Left Engine	Right Engine
N1 RPM:	Undt	Undt	Oil temp:	Undt	Undt
N2 RPM:	Undt	Undt	Oil press:	Undt	Undt
ITT:	Undt	Undt	Ammeter:	Undt	Undt
Fuel flow:	Undt	Undt	Voltmeter:	Undt	Undt

Engine Control Positions					
Left engine:	Cockpit	Engine	Right engine:	Cockpit	Engine
Power lever:	See below	See below	Power lever:	See below	See below
Thrust reverser:	Extended	Stowed	Thrust reverser:	Extended	Stowed
Ground idle: Undetermined			Engine sync: Undetermined		

Fire Protection and Thrust Reverser Switch Positions		
	Left engine	Right engine
Emergency stow:	Undetermined	Undetermined
Covered fire switch:	In	In

Engine Condition		
	Left engine	Right engine
Engine attached to airframe:	Partially	Partially

Remarks:
On 11-06-19, the NTSB-IIC, an FAA inspector, a Pratt and Whitney investigator, a Pratt and Whitney maintenance technician, and this investigator examined the engines at Atlanta Air Salvage. The engines were at idle during the impact sequence and exhibited minor rotational signatures. The ignitors in both engines exhibited erosion. The oil and fuel filters appeared normal.

The power levers were found with the thrust reverser levers up. The power levers were located at the beginning of the reverse thrust range markings on the pedestal (idle speed). The left and right thrust reverser actuators, located in the engine nacelles, were found in the stowed position. The speed brake lever was in an approximately middle position.

Research & Testing

The Cockpit Voice Recorder and AReS box were recovered from the tail. The AReS box was shipped to the Wichita FAA-ACO and transported to Textron Aviation for data download. On 08-21-19, two representatives from the Wichita FAA-ACO, three Textron Aviation avionics engineers, and this investigator examined the AReS box. The compact flash card was removed, the card was imaged, and the data was downloaded. The data was provided to Textron Aviation Engineering for analysis. A report was produced and provided to the NTSB-IIC. The raw AReS data was exported to FT Reader and the CSV file was also provided to the NTSB.

An SD card, located in the top slot of the G5000 MFD, was removed from the aircraft and downloaded in the field. The data was provided to Textron Aviation Engineering for analysis.

The CVR was shipped to the NTSB Recorders Lab. On 09-25-19, the NTSB-IIC, an FAA AVP investigator, and a Textron Aviation flight test pilot attended the CVR transcription in Washington D.C. A copy of the CVR transcription will be obtained following release of the final report and the opening of the NTSB accident docket.

Notes:

Per the AFM, the Maximum Certified Landing Weight of the aircraft is 27,575 lbs. The pilots stated the aircraft weighed 27,508 lbs at landing.

The Maximum Flap Extend Speeds are: Flaps 1 at 250 KIAS, Flaps 2 at 200 KIAS, and Flaps Full at 175 KIAS. Per the AReS data, Flaps 1 was selected at approximately 201 KIAS, and while they were extended, the airspeed increased to a maximum of 220 KIAS. Flaps 2 was selected at 195 KIAS. Flaps Full was selected at 174 KIAS.

The Maximum Landing Gear Operating/Extended Speed is 210 KIAS. Per the AReS data, the landing gear was selected DOWN at 205 KIAS.

Per the AFM, “Except where otherwise specified by AFM procedure, speedbrakes must be stowed prior to 500 feet AGL for landing.” Per AReS data, the speedbrakes were partially extended on final approach at about 250’ AGL (22° lever angle for about 5 seconds).

Per the AFM, the use of thrust reversers is prohibited during touch-and-go landings. Per the pilot’s statement and the AReS data, the thrust reversers were commanded to the Extend position during the first touchdown (bounce). Following the third touchdown (bounce), the power levers were moved to full power in an attempt to stow the thrust reversers and perform a go-around.