



National Transportation Safety Board Aviation Accident Final Report

Location:	Leonardtown, MD	Accident Number:	NYC07LA006
Date & Time:	10/12/2006, 1216 EDT	Registration:	N528WG
Aircraft:	Beech BE-200	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 None
Flight Conducted Under:	Part 91: General Aviation - Flight Test		

Analysis

With all cockpit indications showing the landing gear was down and locked, the airplane touched down on the runway. Immediately after touchdown, the pilots heard the landing gear warning horn sound intermittently for several seconds, and then the right main landing gear collapsed. The airplane veered to the right, exited the runway, and came to rest. A postcrash fire ensued, and the crew exited without injury. A postaccident examination of the airplane revealed that the collapsed right main landing gear had penetrated the right main fuel tank and the majority of the right side of the fuselage had been consumed by fire. Examination of the left and right main landing gear assemblies revealed, that both downlock plates had been installed backwards, providing only a fraction of the design contact area between the plate and throat of the downlock hook. Examination of the manufacturer's component maintenance manual, which was used for the assembly and installation of the left and right main landing gear, revealed no guidance regarding downlock plate orientation during installation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The airplane manufacturer's inadequate landing gear downlock plate maintenance orientation information, and the disengaged main landing gear.

Findings

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

Findings

1. (C) AIRCRAFT MANUALS,PROCEDURE INFORMATION - INADEQUATE
 2. MAINTENANCE,INSTALLATION - IMPROPER - OTHER MAINTENANCE PERSONNEL
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Occurrence #2: MAIN GEAR COLLAPSED
Phase of Operation: LANDING - ROLL

Findings

3. LANDING GEAR,GEAR LOCKING MECHANISM - DISENGAGED
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Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: LANDING - ROLL

Findings

4. TERRAIN CONDITION - RUNWAY

Factual Information

HISTORY OF FLIGHT

On October 12, 2006, at 1216 eastern daylight time, a Beech BE-200, N528WG, was substantially damaged while landing at St. Mary's County Regional Airport (2W6), Leonardtown, Maryland. The certificated airline transport pilot, the certificated commercial pilot, and the systems operator were not injured. Day visual meteorological conditions prevailed, and no flight plan was filed for the local test flight conducted under 14 Code of Federal Regulations Part 91.

According to the pilot, the airplane departed 2W6 to conduct a flight test in the Patuxent River restricted area at approximately 1115. After approximately 1 hour, they returned to 2W6 for a landing.

After entering the traffic pattern for runway 29, the flight crew completed the descent and before landing checklists. The checklists included verifying the landing gear position by visual observation of the landing gear indicator lights, which indicated "three green lights" and no "in-transit" lights. This was also reported over the intercom system to the systems operator, who was seated at his station in the cabin.

After flying the approach to runway 29, the airplane landed on the main gear in a "firm but normal" landing. The airplane touched down approximately 1,200 feet down the runway and within 4 to 5 feet to the right of the runway centerline. Immediately after touchdown, the pilots heard the landing gear warning horn sound intermittently for several seconds, and the right wing began to "drop." The airplane then veered to the right, so the pilot took over the flight controls and attempted to stop the right wing from dropping, but the right propeller struck the runway.

The pilot then moved both fuel condition levers to cutoff, and closed both firewall shutoff valves. The airplane continued to veer right, and the right wing contacted the unimproved grassy area to the right of the pavement, slowing the airplane to a stop. Moments later, the systems operator reported "fire right side," and all three crew members evacuated out of the main cabin door after securing the airplane.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot held an airline transport pilot certificate with ratings for airplane single and multi-engine land, and a type rating for the BE-200. He reported a total flight time of 7,140 hours, with 6,010 hours in multi-engine airplanes and 900 hours in the BE-200. His most recent FAA second-class medical certificate was issued on March 10, 2006.

According to FAA records, the copilot held a commercial pilot certificate with ratings for airplane single engine land, multi-engine land, and instrument airplane. He reported a total flight time of 1,100 hours, with 110 hours in multi-engine airplanes and 59 hours in the BE-200. His most recent FAA second-class medical certificate was issued on August 24, 2006.

AIRCRAFT INFORMATION

According to FAA and maintenance records, the airplane was a twin-engine, pressurized turbo-prop, manufactured in 1979. It was licensed in the experimental category and was used for

research and development by the operator.

The airplane's most recent continuous airworthiness inspection was completed on March 31, 2006, and at that time, the airplane had accumulated 11,077 total hours of operation.

METEOROLOGICAL INFORMATION

A weather observation taken at Patuxent River Naval Air Station (NHK), Patuxent River, Maryland, approximately 8 nautical miles east of the accident site, at 1200, included winds from 260 degrees at 6 knots, 7 miles visibility, scattered clouds at 1,500 feet, a broken ceiling at 3,000 feet, temperature 70 degrees Fahrenheit, dew point 57 degrees Fahrenheit, and an altimeter setting of 29.62 inches of mercury.

AIRPORT INFORMATION

St. Mary's County Regional Airport was a public use airport. It had one runway, oriented in an 11/29 configuration. The runway was asphalt, in good condition, and was 4,150 feet long by 75 feet wide.

WRECKAGE AND IMPACT INFORMATION

A postaccident examination of the airplane and accident site by a Federal Aviation Administration (FAA) inspector revealed that the right main landing gear had collapsed and penetrated the right main fuel tank. Skid and paint transfer marks were visible beginning at the approximate point of the airplane's touchdown and continued to where the airplane came to rest. Gouges in the pavement consistent with propeller strike marks were also evident. The right outer wing panel, right inboard wing panel and the majority of the right side of the fuselage were consumed by fire.

Examination of the airplane's landing gear system by National Transportation Safety Board investigators revealed that the left main landing gear, and nose landing gear were undamaged. The right main landing gear assembly, however, had been exposed to fire and its landing gear actuator, actuator link, release link, overcentering guide assembly, downlock hook, upper and lower drag legs, and downlock plate were burnt and partially melted.

Further examination of the right main landing gear revealed that the downlock plate was bent and its upper and lower drag legs were in the retracted position.

Comparison of the right main landing gear assembly to the undamaged left main landing gear assembly revealed, that the downlock plates were of different configurations and both had been installed with their beveled surfaces facing aft.

During examination of an exemplar airplane, it was discovered, however, that this installation differed with the exemplar and a review of the manufacturer's engineering drawings showed that the accident airplane's downlock plates should have been installed with their beveled surfaces facing forward.

TESTS AND RESEARCH

Materials Laboratory Examination

Examination of the main landing gear components by the Safety Board's Materials Laboratory revealed that, the throat of the right main downlock hook where the downlock plate was trapped during operation, was generally intact and had retained its approximate original shape.

Cleaning of the downlock hook revealed horizontal contact marks extending across the lower portion of the face, and "raised lips" (deformation), at the inboard and outboard edges. The face markings and deformations were consistent with forceful sliding contact with the downlock plate.

Measurements made with the downlock plates installed as found on the accident airplane revealed, that the mutual contact area between the downlock plate and the throat of the downlock hook was less than 0.05 inch.

When the lock plates were installed in accordance with the manufacturer's engineering drawings, the engagement area between the downlock plate and the downlock hook increased to about 0.25 inch, which was approximately the full depth of the downlock hook throat.

Maintenance Records Examination

Examination of the accident airplane's maintenance records revealed that the landing gear and actuator assemblies had accumulated 38.7 hours of operation at the time of the accident. They had been purchased from an FAA approved repair station and installed on the accident airplane by the operator in accordance with the manufacturers approved maintenance program.

According to the repair station's records, all of the overhauled components had been inspected and assembled in accordance with the manufacturer's component maintenance manual (CMM).

Manufacturer's Guidance

Review of the manufacturer's CMM revealed that, no guidance regarding downlock plate orientation during installation was included.

ADDITIONAL INFORMATION

Corrective Actions

On December 16, 2006, the repair station advised the Safety Board that they notified their customers that main landing gear downlock plates may have been incorrectly installed at their facility and inspected all landing gear assemblies that were in their possession.

On November 1, 2007, the airplane manufacturer revised their component maintenance manual to, "ensure that the lock plate is installed with the beveled edge down," and to ensure "the end of the lock plate makes contact with the back of the downlock hook."

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	31, 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 2 Without Waivers/Limitations	Last FAA Medical Exam:	03/01/2006
Occupational Pilot:		Last Flight Review or Equivalent:	11/01/2005
Flight Time:	7140 hours (Total, all aircraft), 900 hours (Total, this make and model), 4315 hours (Pilot In Command, all aircraft), 218 hours (Last 90 days, all aircraft), 67 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	49, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Single-engine	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	08/01/2006
Occupational Pilot:		Last Flight Review or Equivalent:	02/01/2006
Flight Time:	1100 hours (Total, all aircraft), 59 hours (Total, this make and model), 1034 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 15 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N528WG
Model/Series:	BE-200	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Experimental	Serial Number:	BB-151
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	03/01/2006, Continuous Airworthiness	Certified Max Gross Wt.:	12500 lbs
Time Since Last Inspection:	40 Hours	Engines:	2 Turbo Prop
Airframe Total Time:	11077 Hours as of last inspection	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed, not activated	Engine Model/Series:	PT6A-41
Registered Owner:	Tigress Air III, LLC	Rated Power:	850 hp
Operator:	Airtec Inc.	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	NHK, 39 ft msl	Distance from Accident Site:	8 Nautical Miles
Observation Time:	1200 EDT	Direction from Accident Site:	90°
Lowest Cloud Condition:	Scattered / 1500 ft agl	Visibility	7 Miles
Lowest Ceiling:	Broken / 3000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	6 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	260°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.62 inches Hg	Temperature/Dew Point:	21° C / 14° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Leonardtown, MD (2W6)	Type of Flight Plan Filed:	None
Destination:	Leonardtown, MD (2W6)	Type of Clearance:	None
Departure Time:	1115 EDT	Type of Airspace:	

Airport Information

Airport:	St. Mary's County Regional (2W6)	Runway Surface Type:	Asphalt
Airport Elevation:	142 ft	Runway Surface Condition:	Dry
Runway Used:	29	IFR Approach:	None
Runway Length/Width:	4150 ft / 75 ft	VFR Approach/Landing:	Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	38.315278, -76.550000

Administrative Information

Investigator In Charge (IIC):	Todd G Gunther	Report Date:	04/30/2008
Additional Participating Persons:	Keith Clark; FAA/FSDO; Dulles, VA Paul E Yoos; Hawker Beechcraft Corporation; Wichita, KS Steven J Bildman; Airtec Inc.; California, MD		
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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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](#).