Aviation Investigation Final Report

Location:	Dallas, Texas	**Accident Number:**	CEN17LA033
Date & Time:	October 29, 2016, 15:40 Local	**Registration:**	N25YR
Aircraft:	North American TB 25N	**Aircraft Damage:**	Substantial
Defining Event:	Part(s) separation from AC	**Injuries:**	9 None
Flight Conducted Under:	Part 91: General aviation - Air race/show		

Analysis

The airline transport pilot reported that the twin-engine, historic airplane was flying about 155 mph and 1,000 ft above ground level. Upon entering the left downwind leg of the airport traffic pattern, the pilot extended the landing gear. While the gear was in transit, the crew felt a jolt, as if a bird had impacted the front of the airplane. The pilot made a normal landing, parked the airplane, and noted damage to the left horizontal stabilizer and elevator.

A crew from another airplane reported to the pilot that they observed an object depart the accident airplane during landing gear extension. A postaccident examination revealed that the left inboard landing gear door separated in flight and impacted the engine nacelle, left horizontal stabilizer, and elevator. The landing gear door was later found in a residential neighborhood about one mile north of the airport. The gear door was equipped with two arresting cables that were intended to prevent the door from hyperextending. The arresting cables were not installed in the correct position, and the investigation could not determine how long the arresting cables had been incorrectly installed. The landing gear door connecting rod was bent and fractured into two pieces at the safety wire drill hole. The fractured connecting rod was consistent with an overstress failure in bending. If the arresting cables had been installed correctly, it is likely that the landing gear door would not have separated from the airplane when the connecting rod failed.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The overstress failure of the landing gear connecting rod and the improper installation of the arresting cables, which allowed the landing gear door to depart in flight and impact the airplane.

Findings

Aircraft	Landing gear door retract sec - Failure
Aircraft	Landing gear door retract sec - Incorrect service/maintenance

Factual Information

History of Flight

Maneuvering	Part(s) separation from AC (Defining event)

On October 29, 2016, about 1540 central daylight time, a North American TB-25N airplane, N25YR, was damaged when the left inboard landing gear door separated in flight. The airline transport rated pilot, airline transport rated co-pilot, and seven passengers were not injured. The airplane sustained substantial damage. The airplane was registered to American Airpower Heritage Fly Museum and operated by the Central Texas Wing of the Commemorative Air Force (CAF) under the provisions of 14 Code of Federal Regulations Part 91 as an airshow flight. The local flight departed from the Dallas Executive Airport (RBD), Dallas, Texas, about 1500 and landed at RBD about 1545.

The pilot reported that the airplane was flying about 155 mph and 1,000 ft above ground level, when the airplane entered the traffic pattern. The landing gear was lowered on the downwind leg and when the gear was in transit the crew felt a jolt as if a bird had impacted the front of the airplane. The pilot noted that the main gear extended normally, but the nose gear was slow to indicate a down and locked position. He then felt a flight shudder from the airplane and a few seconds later the nose gear down indication was confirmed. He checked the flight controls for functionality with no abnormalities noted. He made a normal landing and parked the airplane.

The crew from another airplane reported to the pilot that they observed an object depart the accident airplane as the landing gear was extended in the traffic pattern. Witnesses on the ground reported observing the same event.

According to the responding Federal Aviation Administration (FAA) inspector, the left inboard landing gear door separated in flight and impacted the nacelle and then the left horizontal stabilizer and elevator. The airplane made an uneventful landing at RBD where damage was observed to the left horizontal stabilizer and elevator. The landing gear door was found in a residential neighborhood about 1 mile north of RBD.

Pilot Information

Certificate:	Airline transport; Flight engineer; Flight instructor	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Glider	**Restraint Used:**	4-point
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 1 Without waivers/limitations	**Last FAA Medical Exam:**	October 7, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	22000 hours (Total, all aircraft), 150 hours (Total, this make and model), 19000 hours (Pilot In Command, all aircraft), 220 hours (Last 90 days, all aircraft), 75 hours (Last 30 days, all aircraft)		

Co-pilot Information

Certificate:	Airline transport; Flight engineer; Flight instructor	**Age:**	68,Male
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	March 8, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	North American	**Registration:**	N25YR
Model/Series:	TB 25N	**Aircraft Category:**	Airplane
Year of Manufacture:	1943	**Amateur Built:**	
Airworthiness Certificate:	Limited (Special)	**Serial Number:**	43-27868
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	February 12, 2016 Condition	**Certified Max Gross Wt.:**	24000 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	5231.7 Hrs as of last inspection	**Engine Manufacturer:**	Curtiss-Wright
ELT:	Not installed	**Engine Model/Series:**	Cyclone
Registered Owner:	AMERICAN AIRPOWER HERITAGE FLY MUSEU	**Rated Power:**	1700 Horsepower
Operator:	Commemoative Air Force	**Operating Certificate(s) Held:**	None

A review of the maintenance logbooks revealed that a Phase B inspection, as a part of the continuous inspection program, was completed on February 12, 2016. There were no logbooks entries pertaining to the landing gear door and the operator stated they did not have any discrepancies with the associated components.

According to the airplane's operating manual, the maximum gear extended speed is 170 mph.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KRBD,658 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	56°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	28°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	DALLAS, TX (RBD)	**Type of Flight Plan Filed:**	None
Destination:	DALLAS, TX (RBD)	**Type of Clearance:**	None
Departure Time:	15:00 Local	**Type of Airspace:**	Class C

The automated weather station located at RBD recorded wind from 170 degrees at 7 knots, gusting to 16 knots, 10 miles visibility, clear sky, temperature 82 degrees F, dew point 57 degrees F, and altimeter setting 30.05 inches of mercury.

Airport Information

Airport:	DALLAS EXECUTIVE RBD	**Runway Surface Type:**	Concrete
Airport Elevation:	659 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	13	**IFR Approach:**	None
Runway Length/Width:	6451 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	7 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	9 None	**Latitude, Longitude:**	32.689723,-96.853614(est)

Tests and Research

The landing gear door connecting rod assembly was found fractured into two pieces and was sent to the NTSB Materials Laboratory, Washington, DC, for examination. The examination revealed that one end of the connecting rod was outfitted with a spherical bearing rod end and the other end was outfitted with a clevis rod end. The clevis end was bent along the shank. The bend axis was perpendicular to the clevis hinge. The spherical bearing rod end was fractured in the threaded portion of the shank in the same plane as a drill hole for safety wire. There were no features indicative of a preexisting crack. Microscopic examination of the fracture surface revealed tear lines radiating away from the safety wire drill hole on the outer bend side of the fracture. The features observed on the connecting rod assembly were consistent with an overstress failure in bending.

Additional Information

The CAF Director of Maintenance reported that the landing gear door connecting rod was bent and fractured into two pieces at the safety wire hole. The gear door is equipped with two arresting cables that are intended to prevent the door from hyperextending. He also reported that the arresting cables were not installed in the correct position. The investigation could not determine how long the arresting cables has been incorrectly installed.

The CAF Director of Maintenance issued an internal safety bulletin to warn the other B-25 crew of the safety issue. The bulletin noted that the inner gear door attachment rod bolt failed upon gear extension which allowed the door to fly open breaking both hinges and grounding straps. The door then struck the left horizontal stabilizer on the leading edge then passed under the horizontal and struck the elevator where it tore the fabric and bent one rib. The bulletin recommended to remove the safety wire and inner landing gear door bolts and inspect the mechanical gear door linkage for signs of stress. The door connecting rods must both push the doors open and then pull them closed. Once closed, the doors are held in position in tension by these connecting rods. Carefully inspect the shorter inner adjustment bolt for any signs of bending especially near the top attachment point.

Administrative Information

Investigator In Charge (IIC):	Lindberg, Joshua
Additional Participating Persons:	Steve Sheridan; Federal Aviation Administration; Irving, TX
Original Publish Date:	September 6, 2017
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=94328