Aviation Investigation Final Report

Location:	Soldier Bar, Idaho	**Accident Number:**	SEA03LA113
Date & Time:	June 17, 2003, 09:30 Local	**Registration:**	N7372Q
Aircraft:	Cessna 206	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

After a smooth landing and rollout, the pilot noticed the attitude of the airplane changing as the nose pitched down. Subsequently, the nose gear collapsed and the aircraft slid to a stop in an upright position. The aircraft sustained substantial damage to the fuselage structure where the nose gear drag link connects to the casting. There was also damage to the lower front cowling and the propeller blades as a result of impacting the runway surface. The nose gear yoke and nose gear strut assemblies were sent to the NTSB Materials Laboratory Division for examination. The examination revealed that the nose gear failed in overstress, consistent with the nose gear yoke moving to the aft and to the right relative to the nose gear strut. It was reported that incorrect nose gear yoke attachment bolts and nuts were installed incorrectly and that one of the bolts was fractured, consistent with overstress in shear. It was also reported that a wedge-shaped spacer was not installed between the nose gear strut and the nose gear yoke, which would affect the loading of the four yoke attachment bolts. Also noted was the presence of various cracks around the attachment bolt through holes. The fracture surfaces were consistent with fatigue.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The overload failure of the nose landing gear assembly during the landing roll, due to an improper maintenance installation. A factor was the rough/uneven terrain condition.

Findings

Occurrence #1: GEAR COLLAPSED
Phase of Operation: LANDING - ROLL

Findings
1. (C) LANDING GEAR,NOSE GEAR ASSEMBLY - OVERLOAD
2. (C) MAINTENANCE,INSTALLATION - IMPROPER - OTHER MAINTENANCE PERSONNEL
3. (F) TERRAIN CONDITION - ROUGH/UNEVEN

Factual Information

On June 17, 2003, approximately 0930 mountain daylight time, a Cessna 206 single-engine airplane, N7372Q, sustained substantial damage after the nose gear collapsed during landing roll at the Soldier Bar United States Forest Service Airstrip, located 45 nautical miles west of Salmon, Idaho. The airplane was registered to Wilderness Aircraft II LLC, of McCall, Idaho, and operated by McCall Aviation, of McCall, Idaho. The commercial pilot and another company pilot, who was undergoing training, were not injured. Visual meteorological conditions prevailed for the 14 CFR Part 91 company instructional flight, and a flight plan was not filed. The flight departed the McCall Municipal Airport at 0900.

In a telephone interview with the NTSB investigator-in-charge, the pilot reported that after a smooth landing and during the landing rollout, he noticed the attitude of the airplane changing as the nose of the aircraft pitched down and his view of the horizon changed. The pilot stated that he then realized that the nose gear had collapsed, and subsequently the airplane slid to a stop in an upright position. There was no post-crash fire and both pilots exited the airplane without injury. The pilot reported the occurrence to the Federal Aviation Administration (FAA). After repairs were made and an FAA ferry permit was issued, the aircraft was flown back to the company's base of operations in McCall without incident.

An FAA inspector, who traveled to the company's headquarters, reported that the airplane had sustained substantial damage to the fuselage structure where the nose landing gear drag link connects to a casting. There was also damage to the lower front cowling and the propeller blades as a result of impacting the runway surface.

The nose gear yoke and nose gear strut assemblies were sent to the NTSB Materials Laboratory Division, Washington, D.C., for examination (see Attachment #1). A Senior Metallurgist reported that multiple fractures were observed in the nose gear linkage pieces, each consistent with overstress fracture. The four nose gear yoke attachment bolts were assembled with the threaded end down and with two spacers under the head. The Cessna 206 parts catalog specifies that the bolts of a correctly assembled nose gear are installed with the threaded end up with one washer under the head. It was also noted that the Cessna catalog specifies AN5-17A bolts for the forward two bolts and AN5-21A bolts for the aft two bolts for the heavy duty nose gear. The three bolts which were intact were consistent with the AN5-17 bolt, and none consistent with the AN5-21 bolt. It was observed that one of the attachment bolts was fractured, consistent with overstress fracture in shear. It was reported that a nut thread remnant observed on one of the yoke attachment bolts had a microstructure of ferrite and pearlite consistent with low-carbon steel. According to the Cessna 206 parts catalog, the nut is specified as a NAS679A5 nut, a corrosion-resistant steel. Wear marks were observed on the upper side of the nose gear yoke, which corresponded to the lower surface of the nose strut. The Cessna 206 parts catalog specifies that a correctly assembled nose gear has a

wedge-shaped spacer with a rectangular footprint located between the lower end of the nose strut and the upper surface of the nose yoke. No evidence of a wear mark corresponding to this shape was found on the upper side of the yoke. It was further noted that cracks were observed in the nose gear yoke around the forward attachment bolt through holes. On the lower surface of the left forward hole, a crack was observed at the forward side of the hole. On the lower surface of the right forward hole, four cracks were observed at the forward side of the hole, and a crack was observed at the aft side of the hole. At the upper surface of the left forward hole, one crack was observed at the forward side of the hole and one crack was observed at the aft side of the hole. One of the cracks in the nose gear yoke around the right forward attachment bolt through hole was gaped open. The fracture surfaces were consistent with fatigue.

Pilot Information

Certificate:	Commercial	**Age:**	36,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	May 29, 2003
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 6, 2003
Flight Time:	1900 hours (Total, all aircraft), 500 hours (Total, this make and model), 1750 hours (Pilot In Command, all aircraft), 30 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Check pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	48,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	March 12, 2003
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	July 25, 2002
Flight Time:	12000 hours (Total, all aircraft), 7400 hours (Total, this make and model), 11730 hours (Pilot In Command, all aircraft), 95 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N7372Q
Model/Series:	206	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	U20602186
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 15, 2003 Continuous airworthiness	**Certified Max Gross Wt.:**	3800 lbs
Time Since Last Inspection:	48 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	8791.4 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	TSIO-520GCM
Registered Owner:	Wilderness Aircraft II LLC	**Rated Power:**	310 Horsepower
Operator:	McCall Aviation	**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	M2LA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/ None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	McCall, ID (MKL)	**Type of Flight Plan Filed:**	None
Destination:	Soldier Bar, ID (85U)	**Type of Clearance:**	None
Departure Time:	09:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Soldier Bar USFS 85U	**Runway Surface Type:**	Dirt
Airport Elevation:	4190 ft msl	**Runway Surface Condition:**	Dry;Rough
Runway Used:	07	**IFR Approach:**	None
Runway Length/Width:	1650 ft / 15 ft	**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	45.099723,-114.80194

Administrative Information

Investigator In Charge (IIC):	Little, Thomas
Additional Participating Persons:	Terry Bateman; Federal Aviation Administration; Boise, ID
Original Publish Date:	June 30, 2004
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=57288