Aviation Investigation Final Report

Location:	Flagstaff, Arizona	**Accident Number:**	WPR11LA313
Date & Time:	June 26, 2011, 09:30 Local	**Registration:**	N9246M
Aircraft:	Piper PA 46-350P	**Aircraft Damage:**	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	**Injuries:**	3 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

After touchdown, the airplane veered to the left when the nose gear was lowered to the runway. The pilot attempted to maintain directional control; however, the airplane continued to veer to the left and departed the runway. Examination of the airplane revealed that the nose landing gear had collapsed, and the engine mount was fractured at one of the two attachment feet for the nose landing gear actuator. Metallurgical examination of the fractured attachment foot revealed that it had failed as a result of fatigue cracking that initiated at the intersection of two welds that joined two of the engine mount's support tubes to the right attachment foot. The fatigue cracking progressed along the toe of the weld that joined the forward support tube to the attachment foot. The location of the fatigue fracture was consistent with bending loads caused by a force directed aft by the nose gear actuator.

About 9 years prior to the accident, the airframe manufacturer issued a service bulletin requiring an inspection of the engine mount attachment feet at the first regularly scheduled maintenance event after the engine mount reached 290 hours time-in-service and thereafter every 100 hours. If cracks were observed, a new engine mount must be installed. The service bulletin also states that, despite the replacement of the engine mount, the inspections should continue. As part of the inspection procedure, the paint is removed from and around the attachment feet. After the inspection is complete, the area is covered with a corrosion prevention compound. The airframe manufacturer considers performance of the service bulletin mandatory. On April 8, 2010, the National Transportation Safety Board (NTSB) issued Safety Recommendation A-10-44, which asked the Federal Aviation Administration (FAA) to require repetitive inspections of the engine mount feet. On December 22, 2011, based on the FAA's response that the safety risk is not sufficient to warrant issuance of an airworthiness directive to require the repetitive inspections, the NTSB classified the recommendation Closed-Unacceptable Action.

Review of the airframe maintenance records indicated the airplane's total time at its most recent inspection was about 2,238 hours, and no entries were found indicating replacement of the engine mount or compliance with the manufacturer's issued service bulletin. Additionally, paint was observed on and around the attachment feet, which indicates that the inspection had never been performed.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Fatigue failure of an engine mount attachment foot, which resulted in collapse of the nose landing gear during landing. Contributing to the accident was the failure of the owner/operator to adhere to the manufacturer's suggested engine mount inspection schedule.

Findings

Aircraft	Nose/tail landing gear - Failure
Personnel issues	Scheduled/routine inspection - Not specified
Aircraft	Mounts - Fatigue/wear/corrosion

Factual Information

History of Flight

Landing-landing roll	Sys/Comp malf/fail (non-power) (Defining event)
Landing-landing roll	Landing gear collapse
Landing-landing roll	Runway excursion

On June 26, 2011, about 0930 mountain standard time, a Piper PA-46-350P, N9246M, sustained substantial damage when the nose wheel landing gear collapsed during landing roll at the Flagstaff Pulliam Airport (FLG), Flagstaff, Arizona. The airplane was registered to N9246M LLC, Las Vegas, Nevada, and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The airline transport rated pilot and two passengers were not injured. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight. The cross-country flight originated from Las Vegas, Nevada, about 0810 with an intended destination of FLG.

In a written statement to the National Transportation Safety Board investigator-in-charge, the pilot reported that following a normal landing on runway 21, the nose began to lower. As the nose wheel landing gear touched the runway surface, the airplane suddenly swerved to the left. Despite her control inputs, the airplane exited the left side of the runway, and the nose wheel landing gear collapsed. Subsequently, the airplane came to rest nose low about 150 feet left of the runway surface.

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed that the engine firewall was bent. Further examination of the nose gear revealed that the attachment components between the nose landing gear actuator and the engine mount were fractured.

The engine mount assembly was sent to the NTSB Materials Laboratory, Washington, DC, for further examination.

An NTSB metallurgist reported that the engine mount was of a welded tubular construction. The aft end of the nose landing gear actuator was bolted between two attachment feet (left and right) at the aft end of the engine mount structure. Each attachment foot was painted black, machined from a single solid piece, and welded to three support tubes. The right attachment foot was fractured in the circumferential direction inboard of the support tubes. A longitudinal fracture that extended from the circumferential fracture to the outboard end of the attachment foot was also observed.

The right attachment foot was cut from the rest of the engine mount so that the fractures could be examined using an optical microscope. The longitudinal fracture was inclined at 45

degrees to the inner and outer surfaces of the tube, consistent with a ductile overstress fracture. The circumferential fracture, viewed looking generally outboard along the attachment foot, exhibited multiple cracks with smooth features and curved crack arrest marks, consistent with fatigue. The largest of these cracks initiated at the “T-shaped” intersection of two of the support tube welds. The fatigue cracks then continued to propagate along the toe of the weld that joins the forward support tubes to the attachment foot.

A factual report describing the detailed examination of the engine mount components is available in the public docket.

Service Bulletin / Engine Mount Design Information:

Piper Aircraft Inc. Service Bulletin 1103D mandates an inspection of the left and right attachment feet for PA-46-350P Mirage serial numbers between 4622001 and 4622200 as follows:

“Upon reaching 290 hours time in service on the currently installed engine mount, initial inspection to coincide with the next regularly scheduled maintenance event.

Thereafter, compliance to be accomplished on a recurring basis, at a frequency interval not to exceed one hundred (100) hours time in service.”

As part of the inspection procedure, the paint is removed prior to fluorescent penetrant inspection. After inspection, the area where the paint was removed is to be coated with a corrosion prevention compound consisting of a layer of Dinitrol/Ardrox AV8 and a layer of Dinitrol/Ardrox AV30.

If a crack is found during the inspection, a new engine mount, part number 89137-042, is to be installed. However, the service bulletin notes that installing a new engine mount does not relieve the recurring inspection requirement.

Beginning in April 2002, Piper issued a series of mandatory Service Bulletins (SB 1103, with subsequent revisions A, B, C and D) for PA-46-350P models, requiring inspections for cracks in the engine mounts in the areas of the nose landing gear actuator attachment feet. Inspections were to take place at the next regularly scheduled maintenance event, and at each 100 hours time in service or annual inspection, whichever occurred first.

Review of supplied copies of airframe and engine logbooks, which were from July 20, 2007 (airframe total time of 1,965 hours) through November 4, 2010 (airframe total time of 2,237.6 hours), revealed no entries that pertained to compliance with SB1103 revisions A, B, C, or D.

Pilot Information

Certificate:	Airline transport	**Age:**	48,Female
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):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	August 25, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	September 4, 2009
Flight Time:	3846 hours (Total, all aircraft), 64 hours (Total, this make and model), 2797 hours (Pilot In Command, all aircraft), 9 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N9246M
Model/Series:	PA 46-350P	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4622149
Landing Gear Type:	Retractable -	**Seats:**	6
Date/Type of Last Inspection:	November 4, 2010 Annual	**Certified Max Gross Wt.:**	4300 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2238 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	TIO-540 SER
Registered Owner:	9246M LLC	**Rated Power:**	310 Horsepower
Operator:	Karen Slakey	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FLG,7014 ft msl	**Distance from Accident Site:**	
Observation Time:	09:57 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / 32 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	26°C / -8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Las Vegas, NV (VGT)	**Type of Flight Plan Filed:**	Unknown
Destination:	Flagstaff, AZ (FLG)	**Type of Clearance:**	VFR
Departure Time:	08:10 Local	**Type of Airspace:**	

Airport Information

Airport:	Flagstaff Pulliam Airport FLG	**Runway Surface Type:**	Asphalt
Airport Elevation:	7014 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	21	**IFR Approach:**	None
Runway Length/Width:	8800 ft / 150 ft	**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	35.140277,-111.669166(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Jacob A Hansen; Federal Aviation Administration; Scottsdale, AZ Michael McClure; Piper Aircraft; Vero Beach, FL
Original Publish Date:	November 7, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=80878