Aviation Investigation Final Report

Location:	THORNTON, Colorado	**Accident Number:**	FTW98FA392
Date & Time:	September 19, 1998, 13:14 Local	**Registration:**	N6028D
Aircraft:	Piper PA-20-180	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation		

Analysis

While in cruise flight at 1,200 feet agl, on a banner tow flight, 21.6 inches of one of the two bladed 38-inch propeller blades separated from the aircraft. The engine separated from three of the four engine mounts and swung around against the right side of the aircraft. The remaining propeller blade penetrated the cockpit but did not strike the pilot. The aircraft became uncontrollable and impacted in a field after striking trees in the back yard of a home. The propeller blade failed due to fatigue from corrosion pitting. The pilot received serious injuries.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The separation of a propeller blade due to corrosion initiated fatigue, followed by the separation of several of the engine's mounts, and the subsequent inability of the pilot to control the aircraft. A contributing factor was the trees.

Findings

Occurrence #1: PROPELLER FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings
1. (C) PROPELLER SYSTEM/ACCESSORIES,BLADE - FATIGUE
2. (C) PROPELLER SYSTEM/ACCESSORIES,BLADE - SEPARATION

Occurrence #2: ENGINE TEARAWAY
Phase of Operation: CRUISE

Findings
3. (C) ENGINE ASSEMBLY,MOUNT - SEPARATION

Occurrence #3: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Occurrence #4: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
4. (F) OBJECT - TREE(S)
5. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #5: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On September 19, 1998, at 1314 mountain daylight time, a Piper PA-20-180, N6028D, was destroyed during an emergency landing following a loss of power. The aircraft impacted in a field adjacent to a residential area in Thornton, Colorado. The commercial pilot sustained serious injuries. The flight was a banner tow operating under Title 14 CFR Part 91 and no flight plan was filed. Visual meteorological conditions prevailed. The flight originated from Aurora Air Park, Watkins, Colorado, at 1300.

According to the pilot, about 14 minutes after departure while in cruise flight at 1,200 feet above ground level (agl), the engine made a loud bang, seized, and it appeared that the engine moved to the right and part of the cowling came loose.

In an interview, the pilot said that following the failure, he had limited aileron control but no pitch or yaw control. He said he guided the aircraft to an open field in a residential area.

Witness marks at the crash site provided evidence the aircraft struck trees beside a house located at the top of a hill above where the aircraft came to rest. After striking the trees, the aircraft impacted the ground in an inverted attitude and skidded to a stop. There was no fire and the pilot was removed from the aircraft by emergency response personnel and transported to medical facilities.

PERSONNEL INFORMATION

The pilot held commercial pilot certificate number 324522522 issued February 3, 1984. He held ratings in airplane single and multiengine land and an instrument rating in airplanes.

According to Federal Aviation Administration (FAA) records, the pilot held a 2nd class medical certificate number EE0996624, issued March 31, 1997. There were no medical limitations.

The pilot stated he had approximately 1,500 hours total flight time and approximately 250 hours in the accident aircraft make and model.

AIRCRAFT INFORMATION

The accident aircraft was originally manufactured as a PA-22-150 in 1956 and converted to a PA-20-180 in 1995. On December 1, 1995, the aircraft was certificated under the provisions of Federal Aviation Regulation (FAR) 21.185 as a special purpose aerial advertising aircraft. The certification was for the sole purpose of this aircraft conducting aerial advertising.

According to information provided by the pilot, the airframe had a total time of 1,600 hours, 250 hours since overhaul of the engine, and 80 hours since the last inspection, which was conducted on November 1, 1997.

The engine was a Lycoming O-360-A3A, serial number L-8260-36A, and the propeller was a Sensenich part number 76EM8S5-0-60, serial number 13369K. The pilot could supply no history on the propeller.

WRECKAGE AND IMPACT INFORMATION

Following the loss of engine power described above, the pilot was able to make approximately a 180-degree turn before the aircraft impacted trees and the ground. According to witness marks, following impact with trees at the top of a 50-foot hill, the aircraft traveled approximately 130 feet in the air, impacted the ground in an inverted attitude and skidded 52 feet. The skid track was on a base course of 205 degrees and the aircraft came to rest on a heading of 264 degrees. The ground was soft, moist, and covered with marsh grass and cattails.

The engine separated from three of the four engine mounts and folded to the right side of the aircraft. One propeller blade was fractured approximately 16 inches from the hub and the outer portion was not located during the course of the investigation. The other blade of the two-blade propeller remained attached to the hub/engine and penetrated the right side of the aircraft, coming to rest between the pilot and the instrument panel. Penetration marks provided evidence the propeller was not turning at the time it penetrated the side of the aircraft and impact debris lodged against the firewall provided evidence the engine was loose from the mounts prior to impact with the trees and ground. The intact blade exhibited span wise white marks and scratches.

The right wing was intact and control continuity was present. The strut remained attached and was undamaged.

The left wing was crumpled accordion fashion from the tip towards the root and was compressed against the side of the fuselage. Control continuity was confirmed and the strut was folded upward.

The empennage was folded scorpion fashion over the top of the aircraft. The fold was approximately 18 inches forward of the leading edge of the vertical stabilizer, which penetrated the top of the baggage compartment, located at the back end of the cabin. Control continuity to the elevators and rudder was confirmed.

The cabin area remained intact and the seat belt was attached to its mounts. A shoulder harness was not installed.

The main landing gear remained attached to the aircraft fuselage and was undamaged. The tail wheel remained attached and was compressed upward into the bottom of the fuselage. The banner tow was attached aft of the tail wheel and was also compressed upward.

TESTS AND RESEARCH

On October 6, 1998, further examination of the airframe and engine was conducted at the facilities of Beegles Aircraft Services, Greeley, Colorado. Present for the examination were an airframe and power plants mechanic from Beegles, a representative of Lycoming Engines, a representative from the FAA, and the NTSB IIC. No preaccident failure or malfunction was found during the engine examination; however, 21.5 inches of one propeller blade was missing and the remaining portion of the propeller was sent to the NTSB Materials Laboratory for further examination. Their examination provided evidence the blade had fractured due to fatigue from corrosion pitting on the convex side of the blade. For details of both the engine examination and the blade examination, refer to the attached engine and laboratory reports.

Examination of the engine mounts provided evidence that three of the four mounts had pulled out of their respective firewall attachments in a forward and right direction. The fourth mount was partially fractured due to bending approximately 160 degrees at the forward edge of the mounting bolt area.

ADDITIONAL INFORMATION

Parties to the investigation were Lycoming Engines and the Federal Aviation Administration.

The aircraft was released to the owners' representative on October 6, 1998. The propeller was returned directly to the owner.

Pilot Information

Certificate:	Commercial	**Age:**	43,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:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	April 2, 1998
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1500 hours (Total, all aircraft), 250 hours (Total, this make and model), 1500 hours (Pilot In Command, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N6028D
Model/Series:	PA-20-180 PA-20-180	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	22-4681
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	November 1, 1997 Annual	**Certified Max Gross Wt.:**	2000 lbs
Time Since Last Inspection:	80 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1600 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-360-A3A
Registered Owner:	MICHAEL P. MALONEY	**Rated Power:**	180 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	AERO ADS	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BJC ,5671 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	12:45 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Scattered / 11000 ft AGL	**Visibility**	80 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	27°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	AURORA , CO (O1V)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	13:00 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	39.859146,-104.95919(est)

Administrative Information

Investigator In Charge (IIC):	Wiemeyer, Norman
Additional Participating Persons:	LARRY ROCKHOLD; DENVER , CO
Original Publish Date:	March 30, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46582