



# National Transportation Safety Board Aviation Accident Final Report

<b>Location:</b>	Conroe, TX	<b>Accident Number:</b>	CEN12TA122
<b>Date &amp; Time:</b>	01/03/2012, 2145 CST	<b>Registration:</b>	N54872
<b>Aircraft:</b>	CESSNA 172P	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Collision during takeoff/land	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Public Aircraft		

## Analysis

The airplane was at 1,600 feet mean sea level with the engine power set at 2,300 rpm. When the airplane was about 6 miles from the airport, the pilot heard a loud “boom” and the engine lost all power. The pilot did not have sufficient altitude to glide to the airport, so he landed the airplane on a street. When the airplane was on final approach to land, it collided with power lines. The pilot was able to land the airplane, but was forced to swerve to the right to avoid oncoming traffic. The right wing struck a utility pole, which resulted in substantial damage.

A postaccident engine examination revealed that when the crankshaft was turned, there was no movement of the intake or exhaust valves or magneto gears. The rear crank gear bolt was loose and the gear dowel pin was sheared, which would cause the camshaft and rear accessory gears to stop turning. Metallurgical examination revealed beach markings at the aft end of the crankshaft approximately in plane with the aft face of the crankshaft where it mated to the crankshaft gear. There was fretting damage on the crankshaft gear, wear on the dowel pins, and wear on the lock washer, indicative of movement as a result of insufficient clamping force from the attachment bolt at the time of installation. The engine had accrued 752 hours since it was overhauled in August 2007.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Failure of the rear crankshaft gear dowel pin due to improper installation, which resulted in a total loss of engine power.

## Findings

<b>Aircraft</b>	Recip eng rear section - Failure (Cause)
<b>Personnel issues</b>	Incomplete action - Maintenance personnel (Cause)
<b>Environmental issues</b>	Wire - Contributed to outcome Pole - Contributed to outcome

## Factual Information

On January 3, 2012, about 2145 central standards time, the pilot of a Cessna 172P, N54872, made a forced landing on a street in Conroe, Texas, after the engine lost power. The pilot, the sole occupant on board, was not injured. The public use airplane was substantially damaged. The airplane was registered to and operated by the Civil Air Patrol (CAP), Maxwell AFB, Alabama, as CAP flight 4272. Dark night visual meteorological conditions (VMC) prevailed at the time of the accident, and a company flight plan had been filed. The flight originated from the West Houston Airport (KIWS), Houston, Texas, approximately 2120, and was en route to Lone Star Executive Airport (KCXO), Conroe, Texas.

According to the pilot's statement, engine power was set at 2300 rpm (revolutions per minute) and the airplane was at 1,600 feet msl (mean sea level). When the airplane was about 6 miles from the destination airport, the pilot heard a loud "boom" and the engine lost all power. The pilot did not have sufficient altitude to glide to the airport and landed on Highway 105 and North 6th Street in Conroe, Texas. When the airplane was on final approach, it collided with power lines. The pilot was able to land the airplane, but was forced to swerve to the right to avoid oncoming traffic. The airplane struck a curb and spun around. The right wing struck a utility pole, resulting in substantial damage.

On January 24, the engine was disassembled and examined under the direction of a Federal Aviation Administration (FAA) inspector at the facilities of Fritz Aviation in Fredericksburg, Texas. CAP records indicate the engine had accrued 752 hours since it was overhauled in August 2007. When the crankshaft was turned, no movement of the intake or exhaust valves or magneto gears was observed. Upon removal of the rear accessory case, it was discovered that the rear crank gear bolt was loose and the gear dowel pin (part number STD 1065) was sheared. According to the FAA inspector, there was a line on the dowel pin, similar to a pre-existing crack. According to the attending mechanic's report, the sheared dowel pin would cause the camshaft and rear accessory gears to stop turning.

The crankshaft gear, attachment bolt, and crankshaft dowel pin were submitted to the National Transportation Safety Board's Materials Laboratory for examination. According their report, the dowel pin was fractured from the aft end of the crankshaft approximately in plane with the aft face of the crankshaft where it mated to the crankshaft gear. Magnified optical examination of the dowel pin fracture revealed a relatively flat transverse fracture with beach markings indicative of fatigue progression initiating at two locations on opposing sides on the outer diameter of the dowel pin. The fatigue region emanating from the origin area (primary origin area) was substantially larger than that emanating from the upper side. The cylinder faces of the dowel pin appeared relatively smooth and reflective consistent with wear of the original surfaces. The wear was present around most of the dowel pin periphery. The dowel pin's diameter was reduced an estimated 0.005 inch by wear adjacent to the fatigue origin leaving a visible step. The crankshaft gear exhibited fretting damage on the forward face consistent with relative motion at the gear-to-crankshaft interface. The lock washer on the aft side of the crankshaft gear showed wear damage corresponding to contact with the underside of the attachment bolt head.

## History of Flight

Enroute-climb to cruise	Loss of engine power (total)
Emergency descent	Off-field or emergency landing
Landing	Collision during takeoff/land (Defining event)

## Pilot Information

Certificate:	Private	Age:	22, Female
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last Medical Exam:	11/10/2011
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	108 hours (Total, all aircraft), 83 hours (Total, this make and model), 66 hours (Pilot In Command, all aircraft), 39 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Manufacturer:	CESSNA	Registration:	N54872
Model/Series:	172P	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	17275074
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	06/28/2011, Annual	Certified Max Gross Wt.:	2550 lbs
Time Since Last Inspection:	89 Hours	Engines:	1 Reciprocating
Airframe Total Time:	4757 Hours	Engine Manufacturer:	Lycoming
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	O-360-A4M
Registered Owner:	CIVIL AIR PATROL, INC.	Rated Power:	180 hp
Operator:	CIVIL AIR PATROL, INC.	Air Carrier Operating Certificate:	None

## Meteorological Information and Flight Plan

Observation Facility, Elevation:	KCXO	Observation Time:	2153 CST
Distance from Accident Site:		Condition of Light:	Night/Dark
Direction from Accident Site:		Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	0° C / -3° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	Calm	Visibility (RVR):	
Altimeter Setting:	30.61 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Precipitation		
Departure Point:	HOUSTON, TX (KIWS)	Type of Flight Plan Filed:	Company VFR
Destination:	Conroe, TX (KCXO)	Type of Clearance:	None
Departure Time:	2120 CST	Type of Airspace:	Class D

## Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None		

## Administrative Information

Investigator In Charge (IIC):	Arnold W Scott	Adopted Date:	04/20/2012
Additional Participating Persons:	DEL SCOTT; FAA FLIGHT STANDARDS DISTRICT OFFICE; HOUSTON, TX BRIAN FRICKER; FAA FLIGHT STANDARDS DISTRICT OFFICE; SAN ANTONIO, TX		
Publish Date:	04/20/2012		
Investigation Docket:	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=82616">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=82616</a>		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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.