



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	JOLIET, IL	<b>Accident Number:</b>	CHI95LA097
<b>Date &amp; Time:</b>	03/01/1995, 1730 CST	<b>Registration:</b>	N1978J
<b>Aircraft:</b>	PIPER PA-32RT	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	2 None

**Flight Conducted Under:** Part 91: General Aviation - Personal

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## Analysis

ACCORDING TO THE PILOT, APPROXIMATELY TEN MINUTES INTO THE FLIGHT, THE ENGINE BEGAN TO RUN ROUGH. THE PILOT STATED HE BEGAN TO TROUBLESHOOT AND EVERYTHING APPEARED NORMAL EXCEPT THE FUEL FLOW WAS LOW. AT THIS TIME HE ADVANCED THE THROTTLE, SWITCHED FUEL TANKS, AND TURNED THE FUEL BOOST PUMP ON. THE PILOT STATED HE THEN HEARD A 'BANG' FROM THE ENGINE AND ALL ENGINE POWER WAS LOST. THE PILOT MADE A FORCED LANDING ON AN ACCESS ROAD ADJACENT TO A HIGHWAY. POSTACCIDENT EXAMINATION REVEALED THE NUMBER FOUR CYLINDER HAD SEPARATED FROM THE CRANKCASE. FRACTURES OF THE CYLINDER HOLD DOWN STUDS SHOWED NO CLEAR EVIDENCE OF FATIGUE CRACKING. FRACTURES ARE REPRESENTATIVE OF OVERSTRESS SEPARATIONS. FRETTING DAMAGE WAS OBSERVED ON THE MATING CYLINDER FLANGE, CRANKCASE BOSS, AND METAL FOLDS ON THE CYLINDER FLANGE/HOLE WALL CORNERS.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the failure of the number four cylinder due to a loose cylinder hold down stud. A factor in the accident was the embankment.

## Findings

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Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF  
Phase of Operation: CLIMB - TO CRUISE

### Findings

1. (C) ENGINE ASSEMBLY,CYLINDER - FAILURE,TOTAL
2. (C) ENGINE ASSEMBLY,CYLINDER - LOOSE

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Occurrence #2: FORCED LANDING  
Phase of Operation: DESCENT - EMERGENCY

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Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER  
Phase of Operation: LANDING

### Findings

3. (F) TERRAIN CONDITION - DROP-OFF/DESCENDING EMBANKMENT

## Factual Information

On March 1, 1995, at 1730 central standard time, a Piper PA-R, N1978J, registered to Lowe Automotive, St. Louis, Missouri, was substantially damaged following a loss of engine power and subsequent off-airport forced landing near Joliet, Illinois. The private pilot and one passenger reported minor injuries. The 14 CFR Part 91 flight originated in West Chicago, Illinois, at 1710 with an intended destination of Bloomington, Illinois. An IFR flight plan was filed and visual meteorological conditions prevailed at the time.

According to the pilot, approximately ten minutes after departing DuPage County Airport, West Chicago, Illinois, the engine began to run rough. The pilot stated he began to troubleshoot and "everything appeared good except [the] fuel flow was low." At this time, he advanced the throttle, switched fuel tanks, and turned the fuel boost pump on. The pilot stated he then heard a "bang" from the engine and all engine power was lost. The pilot made a forced landing on an access road adjacent to a highway. While landing, the airplane hit an embankment before coming to rest.

Postaccident examination revealed the number four cylinder was separated from the crankcase but still attached to the exhaust stack and ignition wires. The base of the cylinder was substantially damaged but there was no obvious damage to the inside walls of the cylinder. The bottom skirt of the number four piston was also substantially damaged.

The lower left cylinder hold down stud was found completely out of the crankcase, but still in the hole of the cylinder base flange with the nut attached. Another stud, which was found at the accident site, was fractured nearly flush with the underside of the assembled nut. Both studs were sent to the NTSB Materials Laboratory, Washington, D.C., for further examination.

Examination revealed the threads of the intact stud were damaged between the underside of the nut to a position corresponding to the plane of the crankcase cylinder boss when the stud is assembled to the crankcase. The Metallurgist Factual Report stated "the thread damage was as if the thread crowns had been flattened by the cylinder flange moving against this area." Examination of the other stud disclosed features indicative of an overstress separation with no evidence of preexisting cracking.

A second postaccident examination of the cylinder and crankcase was done by an NTSB Metallurgist at DuPage Airport where the airplane was being stored. Examination showed no clear evidence of fatigue cracking. All fractures appeared to be representative of overstress separations. No welding repair to the crankcase was observed. Fretting damage was observed on the mating cylinder flange, crankcase boss, and metal folds on the cylinder flange/hole wall corners. (See attached Metallurgist Factual Report)

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	34, Male
<b>Airplane Rating(s):</b>	Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 3 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	06/11/1993
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	823 hours (Total, all aircraft), 415 hours (Total, this make and model), 724 hours (Pilot In Command, all aircraft), 38 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	PIPER	<b>Registration:</b>	N1978J
<b>Model/Series:</b>	PA-32RT PA-32RT	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	32R-7885223
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	6
<b>Date/Type of Last Inspection:</b>	09/09/1994, Annual	<b>Certified Max Gross Wt.:</b>	3600 lbs
<b>Time Since Last Inspection:</b>	72 Hours	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	1450 Hours	<b>Engine Manufacturer:</b>	LYCOMING
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	IO-540-K1G5D
<b>Registered Owner:</b>	LOWE AUTOMOTIVE	<b>Rated Power:</b>	300 hp
<b>Operator:</b>	LOWE AUTOMOTIVE	<b>Operating Certificate(s) Held:</b>	

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	, 0 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	0000	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear / 0 ft agl	Visibility	15 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	Light and Variable /	Turbulence Type Forecast/Actual:	/
Wind Direction:	Variable	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	-4° C
Precipitation and Obscuration:			
Departure Point:	WEST CHICAGO, IL (DPA)	Type of Flight Plan Filed:	IFR
Destination:	BLOOMINGTON, IL (BMI)	Type of Clearance:	IFR
Departure Time:	1710 CST	Type of Airspace:	Class E

## Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	1 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	

## Administrative Information

Investigator In Charge (IIC):	CHRISTINE M CORSONES	Report Date:	06/29/1995
Additional Participating Persons:	DONALD W BRIGHAM; WEST CHICAGO, IL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinquiry@ntsb.gov">pubinquiry@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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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. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).