



Aviation Investigation Final Report

Location:	NORFOLK, Virginia	Accident Number:	BF094LA038
Date & Time:	February 7, 1994, 16:00 Local	Registration:	N38780
Aircraft:	PIPER PA-32R-300	Aircraft Damage:	Substantial
Defining Event:		Injuries:	6 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

THE FLIGHT WAS CRUISING AT 7500' WHEN THE ENGINE STARTED TO RUN ROUGH 12.2 NAUTICAL MILES FROM NORFOLK AIRPORT. THE PILOT STATED THAT HE DID NOT CHANGE THE PROPELLER SETTING UNTIL HE WAS OVERHEAD THE AIRPORT. THEREAFTER THERE WAS A LOUD EXPLOSION AND THE OIL ACCESS DOOR BLEW OPEN AND PIECES OF THE ENGINE EXITED THE AIRPLANE. DURING THE FORCED LANDING ON RUNWAY 23 THE AIRPLANE TOUCHED DOWN ON THE GRASSY AREA. EXAMINATION REVEALED THE NO. 2 CYLINDER ASSEMBLY, PISTON AND CONNECTING ROD SEPARATED FROM THE CRANKCASE AT THE CYLINDER HOLD-DOWN STUD AREA. FOR METALLURGICAL EXAMINATION THE HOLD-DOWN STUDS ALONG WITH THE CRANKCASE WERE SENT TO THE NTSB LAB IN WASHINGTON, DC. THE EXAMINATION DISCLOSED FATIGUE CRACKS AND THERE WAS EVIDENCE OF WELDING THROUGH THE CRANKCASE. THE WELDING AREAS WERE SOFTER THAN THE AREAS THAT WERE NOT WELDED.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: FATIGUE FAILURE OF THE ENGINE MOUNTING BOLT WHICH RESULTED IN LOSS OF ENGINE POWER AND SUBSEQUENT ON GROUND COLLISION WITH THE TERRAIN.

Findings

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

Findings

1. (C) ENGINE INSTALLATION,MOUNTING BOLT - FATIGUE

Occurrence #2: FORCED LANDING

Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: HARD LANDING

Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings

2. TERRAIN CONDITION - GRASS

Occurrence #4: GEAR COLLAPSED

Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings

3. LANDING GEAR - OVERLOAD

Factual Information

On Monday, February 7, 1994, at 1600 eastern standard time, a Piper PA-32R-300, N38780, collided with the ground following a power-off forced landing at Norfolk International Airport, Norfolk, Virginia. The certificated flight instructor, and his five passengers were not injured while the airplane sustained substantial damage. The airplane was being operated under 14 CFR 91. The flight originated in Greenville, North Carolina. The intended destination was Hartford, Connecticut. Visual meteorological conditions prevailed and a flight plan was not filed.

The pilot stated that he and his five passengers were at a cruising altitude of 7500 feet MSL when, "the engine changed vibration and ran somewhat rough." He stated that he took the controls from the student and declared an emergency with Norfolk Approach as he was 12.2 nautical miles from Norfolk Airport. The pilot stated that he advised Norfolk Approach that he would try to maintain his current altitude and try to correct the problem.

The pilot stated that enroute to the airport he did not change any of the power settings until he was directly overhead the airport. He stated that he increased the propeller rpm slowly, and shortly thereafter he heard a loud explosion coming from under the left side of the engine cowling. He stated that the oil access door blew open, and pieces of the engine exited the aircraft. The pilot stated that he shut the engine down by turning off the magnetos and made a forced landing at Norfolk Airport. During the forced landing on runway 23, the airplane touched down west of the runway in a grassy area.

The airplane was examined at the accident site by the FAA. The examination revealed oil on the windshield of the airplane, and the number 2 cylinder along with its respective piston and connecting rod had exited the engine through the engine cowling. The engine was removed from the airplane and shipped to Piedmont Aviation Services Inc., of Winston-Salem, North Carolina, for examination. The examination confirmed the number 2 cylinder was missing from the crankcase and the attaching studs and thru bolts were fractured. The breakaway torque was checked on all cylinder studs and thru bolts which were not affected by the cylinder separation. The values for each are listed on the attached two tables.

The remaining hold down stud bolts along with the crankcase were sent to the NTSB Lab in Washington, DC, for metallurgical examination. The examination revealed that the separation of the six hold down studs and two through bolts for the number two cylinder were the result of fatigue cracks that emanated along multiple sites at the root of the threads. Metallographic section through the pad for one of the hold down studs for the number 2 cylinder revealed that extensive weld repair had been performed through the entire thickness of the case at this location. Hardness measurements on the section cut from the engine case showed that the welded areas were much softer than the areas that were not welded.

The investigation revealed that the engine had over 3834 hours of total time, including 343 hours since major overhaul. The last annual inspection was completed on September 20, 1993, and the airplane had accumulated over 160 hours since the last inspection.

Pilot Information

Certificate:	Commercial; Flight instructor	Age:	23, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane single-engine	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	September 12, 1993
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	
Flight Time:	305 hours (Total, all aircraft), 24 hours (Total, this make and model), 182 hours (Pilot In Command, all aircraft), 26 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	Registration:	N38780
Model/Series:	PA-32R-300 PA-32R-300	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	32R-7780471
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	January 3, 1994 Annual	Certified Max Gross Wt.:	3600 lbs
Time Since Last Inspection:	50 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	3791 Hrs	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	IO-540-K1G5D
Registered Owner:	VINCENT A GUARDIONE	Rated Power:	300 Horsepower
Operator:	GUARDIONE VINCENT & MICHAEL	Operating Certificate(s) Held:	None
Operator Does Business As:		Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	ORF ,27 ft msl	Distance from Accident Site:	
Observation Time:	16:15 Local	Direction from Accident Site:	
Lowest Cloud Condition:	25000 ft AGL	Visibility	20 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	110°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	12°C / -5°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	KENANSVILLE (DPL)	Type of Flight Plan Filed:	None
Destination:	HARTFORD (HFD)	Type of Clearance:	None
Departure Time:	15:30 Local	Type of Airspace:	Class D

Airport Information

Airport:	NORFOLK INTERNATIONAL ORF	Runway Surface Type:	Asphalt
Airport Elevation:	27 ft msl	Runway Surface Condition:	Dry
Runway Used:	23	IFR Approach:	None
Runway Length/Width:	9000 ft / 150 ft	VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	5 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	6 None	Latitude, Longitude:	36.909854,-76.329895(est)

Administrative Information

Investigator In Charge (IIC): Johnson, Beverley

Additional Participating Persons: TOM DUDDY; WILLIAMSPORT , PA
ED HALL; RICHMOND , VA

Original Publish Date: April 5, 1995

Last Revision Date:

Investigation Class: [Class](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=8888>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).