Aviation Investigation Final Report

Location:	ISLE OF WIGHT, Virginia	**Accident Number:**	NYC99LA172
Date & Time:	July 11, 1999, 14:30 Local	**Registration:**	N4595Z
Aircraft:	Piper PA-22-108	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot stated that the airplane began to vibrate slightly while in cruise flight, and he decided to return to the airport. The engine then began to shake violently, and the pilot performed a forced landing. The airplane landed short, nosed over, and came to rest inverted. Examination of the wreckage revealed that the left rear cylinder on the engine had separated from it's mounting flange. The engine had accumulated about 13 hours since overhaul, when all four cylinders were replaced on the engine with chromed cylinders purchased from an outside source, then overhauled by the engine overhaul facility. During the metallurgical examination of the failed cylinder, a fatigue origin was found near the bottom of the fin radius, between the tenth and eleventh fins from the inboard end of the cylinder barrel. Severe corrosion attack was also observed on the fin immediately adjacent to the fatigue origin location. Corrosion damage was also noted in the radius, including a corrosion pit from which the crack arrest features appeared to emanate. The corrosion pit was filled with a non-conductive substance.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The improper visual inspection of overhauled engine components by maintenance personnel.

Findings

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

Findings
1. ENGINE ASSEMBLY,CYLINDER - CORRODED
2. ENGINE ASSEMBLY,CYLINDER - FATIGUE
3. ENGINE ASSEMBLY,CYLINDER - FAILURE,TOTAL
4. MAINTENANCE,OVERHAUL - IMPROPER - OTHER MAINTENANCE PERSONNEL

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

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING

Factual Information

On July 11, 1999, about 1430 Eastern Daylight Time, a Piper PA-22-108, N4595Z, was substantially damaged during a forced landing near Isle of Wight, Virginia. The certificated private pilot was not injured. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight conducted under 14 CFR Part 91.

The pilot stated that the airplane began to vibrate slightly while in cruise flight, at about 1,800 feet above the ground. The pilot also noticed a decrease of 100 rpm on the engine tachometer, and decided to return to the Hampton Roads Airport (PVG), Portsmouth, Virginia. As the airplane continued toward PVG, the engine began to shake violently, and the engine rpm decreased rapidly. The pilot selected a freshly cut peanut field, reduced engine power, and started a descent to a forced landing. After realizing the airplane would not make it to the selected field, the pilot attempted to add power, but the engine did not respond. The airplane then landed short, struck corn stalks, nosed over, and came to rest inverted.

Examination of the wreckage by a Federal Aviation Administration Inspector revealed that the left rear cylinder on the engine had separated from it's mounting flange. Damage to the engine crankcase was local to the vicinity of the failed cylinder. The engine turned smoothly by hand, and the remaining three cylinders were not damaged.

The Inspector further revealed that the engine had accumulated about 13 hours since it was overhauled during the month of January 1999, by the facility where the pilot worked. All four cylinders were replaced on the engine with chromed cylinders purchased from an outside source, then overhauled by the engine overhaul facility. The total time and cycles of the engine and cylinders, prior to the overhaul, could not be determined.

The pilot additionally stated to the FAA Inspector that he had been trying to locate a mysterious oil leak on the side of the engine of the failed cylinder.

The failed cylinder was forwarded to the NTSB Materials Lab in Washington, D.C. on August 4, 1999. According to the NTSB Materials Lab Factual Report, the cylinder was separated through the eight and eleventh fins outboard of the attachment flange, along a fracture plane that spiraled slightly around the cylinder. A fatigue origin was found approximately at the bottom of the radius between the tenth and eleventh fins, from the inboard end of the cylinder barrel. Severe corrosion attack was also observed on the fin immediately adjacent to the origin location. Corrosion damage was also noted in the radius, including a corrosion pit from which the crack arrest features appeared to emanate. The corrosion pit was filled with a non-conductive substance. Energy-dispersive spectroscopy of the material revealed large amounts of titanium, a common material in many paints. A large amount of oxide on the surface of the fracture, which resists cleansing, prohibited observation

of fatigue striations on the surface.

Pilot Information

Certificate:	Private	**Age:**	26,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	June 9, 1998
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	415 hours (Total, all aircraft), 350 hours (Total, this make and model), 25 hours (Last 90 days, all aircraft), 15 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N4595Z
Model/Series:	PA-22-108 PA-22-108	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	22-8105
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	January 30, 1999 Annual	**Certified Max Gross Wt.:**	1650 lbs
Time Since Last Inspection:	13 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2486 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-320
Registered Owner:	PHILLIP D. WRIGHT	**Rated Power:**	150 Horsepower
Operator:		**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:	PHF ,43 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	17:50 Local	**Direction from Accident Site:**	70°
Lowest Cloud Condition:	Scattered / 2000 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	Broken / 12000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	24°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	HAMPTON ROADS , VA (PVG)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	14:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Demko, Stephen
Additional Participating Persons:	MANUEL M CARVALHO; RICHMOND , VA
Original Publish Date:	June 22, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46965