



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
General Aviation Accident

April 27-28, 2017

ENGINE AND AIRFRAME EXAMINATION

WPR17FA085

This document contains 5 embedded photos.

A. ACCIDENT

Location: Eugene, OR
Date: April 7, 2017
Aircraft: Piper PA-46-310P, Registration Number: N123SB, Serial #: 46-8508023
NTSB IIC: Maja Smith

B. EXAMINATION PARTICIPANTS:

Maja Smith
Air Safety Investigator
National Transportation Safety Board

Kate Benhoff
Air Safety Investigator
National Transportation Safety Board

Charles Little
Air Safety Investigator
Textron Aviation

Chris Lang
Air Safety Investigator
Continental Motors Inc.

Eric Ramseyer
Inspector
Federal Aviation Administration

C. SUMMARY

Examination of the recovered airframe was conducted on April 27-28, 2017 at the facilities of Plain Parts in Sacramento, California.

D. DETAILS OF THE INVESTIGATION

1.0 Engine Examination

The engine was covered in soil and grass and crankcase exhibited impact damages.



Photo 1 - Engine

All six cylinders remained attached to their respective mountings and all rocker box covers remained intact and subsequently removed.

The top sparkplugs were removed, and a lighted borescope inspection was performed. All valves and piston domes appeared normal. Top sparkplugs were inspected and appeared to have “normal” wear and coloration except for cylinders 2 and 6 which were contaminated with engine oil.



Photo 2 – Top spark plugs

Both magnetos were separated from their respective mounts and subsequently tested. The magnetos produced spark at the twelve leads during hand rotation the drive.

Both vacuum pumps remained attached to the engine. The right vacuum pump exhibited damage consistent with the impact. Both pumps were removed and disassembled. Plastic drive couplings were intact. The rotor in the right pump was shattered as a result of the impact. A half of the rotor in the left pump was intact and carbon veins were undamaged; the other half was shattered. The pump cavity in both pumps was smooth.



Photo 3 – Right and left vacuum pump plastic drive couplings

The fuel pump remained attached to its respective installation point. The fuel pump was removed and disassembled, and internal components were visually inspected; all of the internal components displayed normal operation signatures. There were no anomalies noted with the fuel pump.

The starter adapter remained attached to its installation point and was damaged by impact. The starter and the starter mounting flange were broken off.

The forward alternator remained attached to its respective installation. The alternator drive was capable of rotating freely; there were no anomalies noted with the alternator. The rear belt driven alternator was separated from the engine.

Mechanical continuity was established throughout the engine and valve train when it was rotated using a hand tool attached where it was attached to; the accessory and timing gears rotated normally.

The fuel manifold valve remained attached to its respective installation point and was undamaged. The manifold valve was removed and disassembled. The components displayed normal operating signatures and the screen was clear of contaminants.

All the fuel nozzles remained installed in their respective cylinders and were undamaged. The nozzles were removed, and it was noted that all the nozzles were clear of blockages. There were no anomalies noted with the fuel nozzles.

The exhaust system sustained damage consistent with impact damage and the outflow pipes were crushed. Besides the dirt from the ground impact, no other blockages were noted within the exhaust system.

The induction system sustained minor damage consistent with impact damage. There were no signs of intake leaks noted. There were no anomalies noted with the induction system.

The two-blade propeller was found detached from the crankshaft displayed damage consistent with impact damage. Both propeller blades displayed chordwise scratches, significant blade polishing, and significant bending and twisting deformation. There were no anomalies noted with the propeller.



Photo 4 - Propeller

No evidence of pre impact mechanical anomalies or malfunction was observed with the engine.

2.0 Airframe Examination



Photo 5 - Airframe

Examination of the airframe revealed that the roof of the fuselage was cut off by rescue personnel. The aft cabin door handle remained in the latched position and exhibited no signs of forced separation. The emergency exit window sustained impact damage and deformation consistent with the window being in the frame at the time of impact.

Pilot's Side Cockpit Documentation

Aft circuit breaker panel – all in except:

“24 V Aux”, “Turn Coordinator”, “Invert”, and “Vent Defroster

Forward circuit breaker panel – all in except:

“Manifold Pressure Fuel Flow”, “GPS”, “AV Master”

“Engine Gauges” circuit breaker was broken

Digital watch – No information

HSI – Gauge pushed out of panel with 2 flags visible

Horizontal needle on bottom of gauge

Vertical needle to the right

Heading 160°

Airspeed – 0

Attitude Indicator – Nose level, left wing low 20°

Encoding Altimeter – 34,515' with Kollsman window unreadable

TIT – 0

Vacuum Pump Suction Gauge – 2 psi

INOP button pushed on right side

Left side glass broken and button missing

Weather Digital Gauge – No information

Turn Coordinator – Glass broken, wings level, ball slightly left

HSI – Destroyed by impact, glass/face broken

Heading 140°

Needle course left by 1 dot

VSI – 0

Manifold Pressure/Fuel Flow (split gauge) – MP 29”, FF below 0 crossed into MP numbers

Pressurization Head – broken

Pressurization – 8,000’, cabin altitude 2,000’

Fuel Flow Digital Gauge – No information

Electric Tachometer – No information

Fuel Quantity – Glass broken, R: 0, L: needle missing

Oil Pressure/CHP/Oil Temp Gauge (multiple gauge) – all needles missing

Gear Indicator Lights – damaged

Gear Selector Handle – bent 40° to the right with position ½” off full retracted position

Emergency Gear Extension – Stowed position

Bale – Damaged

Fuel Selector Handle – Right fuel tank

Control Columns

Pilot’s Side Control Yoke – Impact damage, control wheel broken at control column

Left handle remained attached with Autopilot, Trim, and mic buttons present

Right handle broken

Copilot’s Control Yoke – Remained intact to control column

Electric Switches: all exhibited various degrees of damage and were out of cockpit

Left Magneto – Off

Vent/Defog – Off

Battery Master – On

Alternator – Off

Rec. Blower – Low

Air Conditioner – Off

Center Avionics Stack

Autopilot – selected on Nav 1

Ground Clearance – Off

Audio Panel - Destroyed

#1 (top) GNS 430 –Face damaged, no information

#2 (bottom) GNS 430 – no information

Garmin GTX 327 (transponder) – No information
King KFC 150 (autopilot) – No information
Altitude Select – No information
Ammeter – 10 Amps
Flaps Indicator – Slide bent and out of ramp
Flaps Selector – 0 (retracted)
Non-standard aftermarket removeable dock – empty
Slave – position
Clockwise/Counter-clockwise adjust – neutral
GI Insight Engine Monitor – Damaged, no face, no card in slot
Ice light – Off
Propeller Deice – 0 Amps

Copilot's Side Cockpit Documentation:

Airspeed – 180
Attitude Indicator - 3° down, wings 10° right wing low
Altimeter – 2,500', Kollsman 29.5" Hg
Turn Coordinator – Left wing slightly low, ball center, race broken
Directional Gyro - 320°
VSI - +2,200'

Center Console

Throttle Friction/Throttle/Propeller/Mixture – full forward
Elevator Trim – aft of neutral (nose up)
Rudder/Nose Trim – right
Alternate Air – bent to the left, appears in position between On and Off

Seat Belts

The pilot's lap belt remained latched together, but the webbing was cut at both the outboard and inboard belt sections. The copilot's lap belt remained latched together. The outboard webbing was cut during recovery while the inboard webbing remained attached to the structure. There was no evidence that either shoulder harness was used.

On the two, rear facing seats, the lap belts remained attached to the seats and the latches were not found latched together. The inertia reel springs for the shoulder harness retraction units were found, but the webbing and latches were missing.

The inboard lap belt for the left aft passenger seat remained attached to the structure. The outboard lap belt attachment was cut during recovery and the webbing and latch were not present. The right aft passenger seat inboard lap belt remained attached to the structure. The outboard lap belt appeared to have failed at the fitting attachment, which exhibited fraying. The webbing exhibited stretching and curling which is consistent with tension overload. Both aft passenger seat shoulder harnesses were found retracted with no evidence of stretching.

The hydraulic flap actuator measured about 2.5", which translates to a flap setting of about 10°. The fuel selector valve was observed in the right tank position. The hydraulic pressure gauge reading was observed about 200 psi, on the low scale.

Flight control continuity was established in the forward cockpit section. The aileron cables remained attached to the horns to the wing root. All aileron cables were cut during recovery and one right wing root aileron cable exhibited patterns of being cut under tension. The rudder, elevator, and trim cables appeared cut after of the pressure bulkhead.

In the empennage, the rudder, elevator, and trim cables exhibited separation signatures consistent with being cut under tension. The rudder cables connected to the rudder sector control, which was out of position due to impact forces. The rear elevator sector and horizontal push/pull rod attached to quadrant pulley section and both control cables are attached to sectors forward to bulkhead where they were cut.

The right-wing aileron cables remained attached to the sector control, which was detached from the rear spar due to impact. One cable was observed to have been cut under tension. The left-wing aileron cables remained attached to the sector control and one cable was cut under tension.

The right main landing gear was observed in the extended and locked position, with the strut measuring about 9 ¾". The left main landing gear hydraulic shaft measured about 9 ¾", which is consistent with the gear being in the extended and locked position. The nose landing gear and main landing gear lower strut separated from the upper strut.

The vertical stabilizer separated from the rear empennage due to impact damage. The rudder remained attached to the vertical stabilizer. The rudder and vertical surfaces were mostly intact.

The left aileron detached from the wing into two pieces due to impact damage. The outboard piece measured about 24" and the inboard piece measured about 65". The left flap separated into 2 pieces, also. The outboard section remained attached to the wing (about 75") and the inboard section separated about midspan (about 65"). The right aileron separated from the wing and exhibited upwards bending toward the outboard with impact damage at the counterweight. The right flap separated into 2 pieces. The outboard piece, measuring about 92", remained attached to the wing and the inboard flap piece, measuring about 48", separated due to impact.

The pitot tube separated from the bottom side of the left wing due to ground impact.