



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region
January 6, 2017

AIRFRAME AND ENGINE EXAM REPORT

WPR17FA047

This document contains 22 embedded photos.

A. ACCIDENT

Location: San Pedro, CA
Date: January 4, 2017
Aircraft: Robinson R22 Beta, Registration Number: N702JJ, Serial #: 3791
NTSB IIC: Howard Plagens

B. EXAMINATION PARTICIPANTS:

Howard Plagens
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C. SUMMARY

Examination of the recovered airframe and engine was conducted on January 6, 2017, at the facilities of the US Coast Guard Station Los Angeles. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

The hour meter read 5,000.3.

The left door was not installed for this flight. The left side of the cabin area sustained more damage than the right side; it was crushed up and in. Both windscreens were knocked out, and both seats were deformed down. First responder divers reported that the helicopter came to rest underwater on the skids in the upright position; both occupants were still strapped in their seats.



Photo 1 Right Side of Cabin



Photo 2 Left Side of Cabin



Photo 3 Instrument Panel

The tail boom separated between the number three and four bays of the tail cone. The lower portion of the vertical stabilizer was bent about 80 degrees counterclockwise.



Photo 4 Aft Tail Boom



Photo 5 Tail Rotor

The throttle, mixture, and carburetor heat controls were connected at both ends, but the structure collapsed around the controls; they would not move.

The throttle arm at the carburetor was in the 3/4 open position.

The mixture was in the full rich position.

The carburetor heat knob was full down in the full OFF position and unlocked.



Photo 6 Carburetor Heat Knob

The fuel selector valve was in the ON position.

The gascolator contained a clear fluid; the screen was 30% debris covered.



Photo 7 Gascolator Screen

The teeter stops were both smashed across the centers.

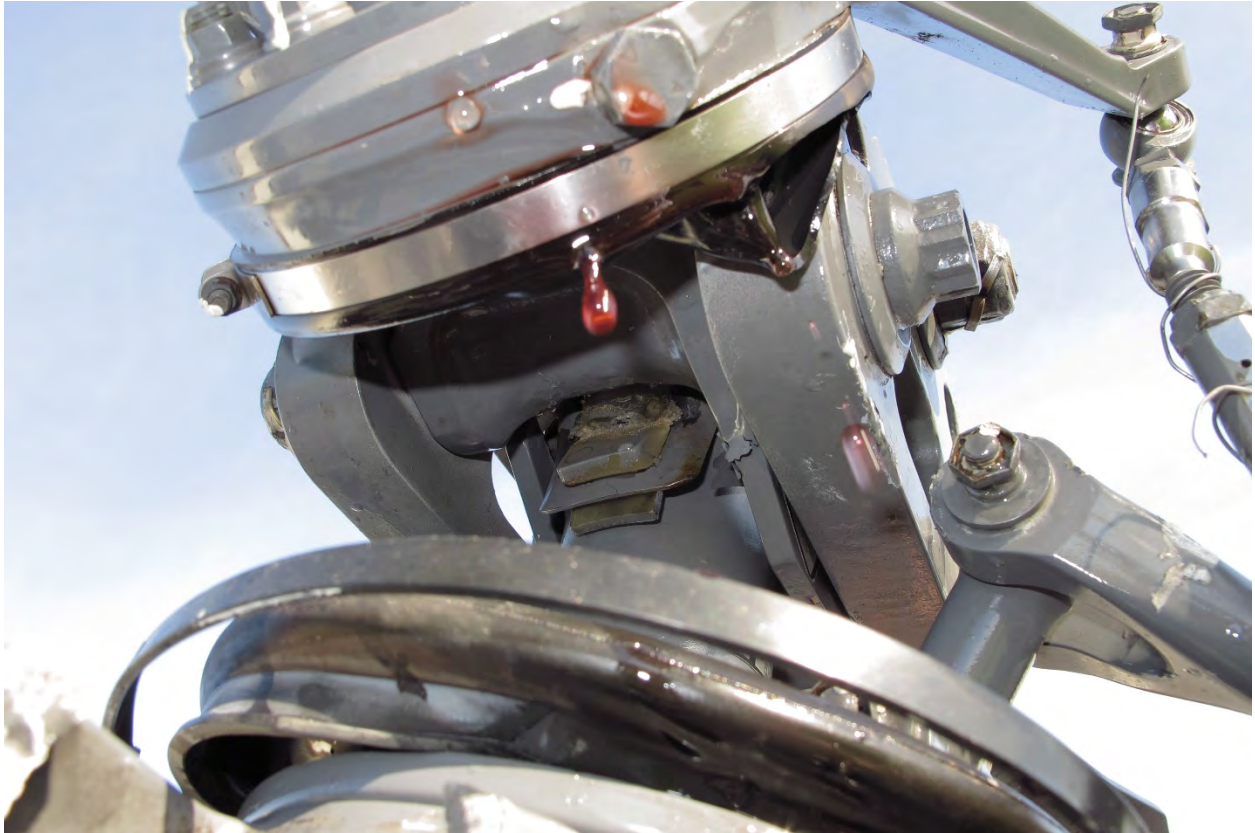


Photo 8 One of the Teeter Stops (Robinson Photo)

Investigators established continuity for the collective and cyclic up to the top of fuselage. There was one disconnect in right push pull tube.

The antitorque pedals were disconnected below the floor. There was also a disconnect at the forward end of the tail cone.

The tail rotor gearbox and main rotor gearbox rotated.

The intermediate flex plate was twisted but connected.

The overrunning clutch operated properly.

Both drive belts were in the helicopter, but were off the sheaves.



Photo 9 Drive Belts

One ear of the swash plate for the main rotor flight controls was broken off. The pitch link remained attached to the main rotor blade.



Photo 10 One Side of Hub



Photo 11 Main Rotor Hub

Investigators drained the fuel tanks. There was clear discoloration in the bottom of the buckets with blue fluid on top, and investigators estimated that there were 5 gallons of the blue fluid that looked and smelled like aviation 100-octane low lead fuel.



Photo 12 Drained Liquid from Fuel Tanks

Both the fore and aft cross tubes of the landing gear bowed up at the ends.

The air filter was clean.

All warning lights filaments were tight.

Investigators tested the carburetor temperature probe for continuity and function; they observed a 100-ohm resistance. They removed the thermocouple, applied heat, and the resistance value increased. They established electrical continuity from the wires to cockpit indicator.

2.0 Engine Examination

There were no holes in the crankcase or cylinders that indicated a catastrophic failure of the engine. The tail pipe coloration was light gray with no oil residue. There were no rotational signatures between the cooling fan and scroll or the upper sheaf and the airframe.

Investigators left the engine in place, and removed the valve covers. They manually rotated the crankshaft by turning the fan wheel. The crankshaft rotated freely, and the valves moved approximately the same amount of lift in firing order. The gears in the accessory case turned freely. Investigators obtained thumb compression on all cylinders in firing order.

A borescope inspection revealed no mechanical deformation on the valves, cylinder walls, or internal cylinder head.



Photo 13 Left Side of Engine (Right Side of Helicopter)



Photo 14 Right Side of Engine (Left Side of Helicopter)

Investigators removed the spark plugs; all center electrodes were elliptical except the top plugs for cylinders one and three, which were circular. All electrodes were clean with no mechanical deformation. The spark plug electrodes were gray, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart.



Photo 15 Spark Plugs

Both magnetos were secure at their respective pads with their mounts in place. Investigators removed them, and the drives were intact. Investigators manually rotated the magnetos, and both magnetos produced spark at all posts. Investigators could not establish engine to magneto timing. The E-gap appeared to be within manufacturer's specifications.



Photo 16 Magnetos

The oil suction screen was clean and free of visible contaminants.



Photo 17 Oil Suction Screen

The carburetor was secure at its mount, and all lines were secure. Investigators disassembled the carburetor; the screen was clean, and the bowl contained a clear fluid. The metal floats were secure and intact, and exhibited no hydraulic crush damage. There were no obstructions to air passages.



Photo 18 Carburetor



Photo 19 Carburetor Screen

The carburetor heat slider on the airbox in was in a midrange position, but the airbox and control wire housing was deformed.



Photo 20 Robinson Photo of Air Box

3.0 Main Rotor Blades Examination

Both main rotor blades bent down at the hub, and then bent upward about 2 feet out. One blade separated at that point along a jagged angle. The other main rotor blade coned upward at that point, retained its full length, but had a tear at midspan from the trailing edge to the back of the spar.



Photo 21 Main Rotor Blades

4.0 Tail Rotor Blades Examination

Both blades remained attached to the hub. One blade was bent inboard about 50 degrees, and split along the inboard half of the trailing edge.



Photo 22 Tail Rotor