



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

August 24, 2016

SUMMARY OF HELICOPTER EXAMINATION

(WPR15FA205)

This document contains 3 embedded photos.

A. ACCIDENT

Location:	Newberg, Oregon
Date:	July 1, 2015
Aircraft:	Schweizer 269C
NTSB Investigator-in-Charge	Thomas Little

B. EXAMINATION PARTICIPANTS

Thomas Little
Senior Aviation Accident Investigator
National Transportation Safety Board
Federal Way, Washington

Bruce Stephenson
Aviation Safety Inspector
Federal Aviation Administration
Hillsboro, Oregon

Steven Gleason
Lead Accident Investigator – Light Helicopters
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Air Safety Investigator
Lycoming Engines
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Tyler Sturdevant
Director of Operations
Precision
Newberg, Oregon

C. SUMMARY

On July 1, 2015, about 2215 Pacific daylight time, a Schweizer 269C helicopter, N2096W, was destroyed by impact forces and a postcrash fire as a result of a hard landing during an emergency autorotation near the Chelaham Airpark (17S), Newberg, Oregon. The certified flight instructor and student pilot received fatal injuries. The helicopter was owned and operated by Precision Flight Training Incorporated, of Newberg. Visual meteorological conditions prevailed at the time of the accident. The local instructional flight was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The operator reported the flight departed 17S about 2200.

It was revealed during the investigation that the flight was a night orientation flight for the student pilot in preparation for his private pilot certificate. Shortly after takeoff and after entering a left downwind for the departure airfield, the flight crew experienced a loss of control from about 500 feet above ground level, followed by impact with terrain. The resultant ground collision result in the a postcrash fire, which consumed the helicopter. Prior to the loss of control, ground-based witnesses hear the engine backfire, as well as a “squealing” sound.



Figure 1 - photo of accident site

D. DETAILS OF THE EXAMINATION

1.0 Accident Site Examination

The helicopter impacted an open field that was recently harvested on a magnetic heading of about 173 degrees, and came to rest on a magnetic heading of about 355 degrees. The first point of impact was located about 27 feet north of the main wreckage site. A section of the tail rotor drive shaft was located about 90 feet west of the main wreckage. All three main rotor blades (MRB) and the two tail rotor blade (TRB) were observed to have been generating minimal power at the time of impact. All MRB and TRB remained to their respective hubs, with all linkages in place and not observed separated. Minimal trailing edge damage to all rotor blades was observed. The drive pulley belts were not located during the onsite examination. One forward skid was located about 25 feet south of the main wreckage. The tail boom had separated and was located about 5 feet south of the main wreckage, oriented on a north/south direction. The main rotor assembly remained attached to the main rotor mast, with all linkages observed attached. The mast-to-transmission was observed separated.

2.0 Follow-up examination notes

A follow-up examination of the airframe and engine was conducted at the facilities of Nu Venture Air Services, Dallas, Oregon, on August 20, 2015. The results of the examination revealed the following:

2.0.1 Airframe examination notes

The following airframe examination notes were provided to the NTSB IIC by a Sikorsky Aircraft Corporation Lead Investigator for light helicopters, as a result of follow-up examination of the helicopter. The examination was overseen by representatives from the NTSB and the FAA.

Photos of the site provided by the Portland FSDO inspector indicate the aircraft was severely damaged by a post-crash fire. All parts / components appeared to be closely located to the main fuselage.

The frame tubing exhibited multiple fractures, kinks and bends. It also showed it had been exposed to the fire, with all paint burned away. Both forward cluster fittings that attach the cross beam were separated from the frame tubing. Other portions of the frame were separated by fractures of the tubing or welds.

The aft mast support strut was intact. The right support strut exhibited minor mid span bending, the left strut appeared straight. All exhibited exposure to fire.

The tail boom w

as separated from the fuselage, appeared intact with minor damage, no blade strikes were apparent. The forward bulkhead attachment lug was fractured in typical manner appearing as an overload separation, there was minor fire damage to the paint on the forward end and oily soot deposits further back. The Tail gear box adapter remained in the boom but several of the attach bolt holes were deformed. The tail stinger was separated at the adapter. Both tail boom support struts exhibited a compression buckle at mid span and separated attach fittings at the center attachment to the tail boom. The horizontal stabilizer forward attach fitting was fractured. The vertical stabilizer was crushed and bent aft with vegetation remaining in the folded sheet metal.

The landing gear and crossbeams were severely damaged. The aft crossbeam was largely intact, separated from the frame and exhibited significant bending and was fractured and separated at the right side cluster fitting, additionally the right outboard end was burned away. All the landing gear dampers were separated at one or both ends and several were burned.

The left skid was fractured and separated just forward of the forward skid strut. The right skid appears to have been intact but suffered melting and burning. The support struts were separated at the crossbeam attach areas, several suffered significant fire damage and burning.

The root ends of all three main rotor blades were still attached to the main rotor head the outer airfoil were cut to facilitate recovery. Blades were relatively intact. All three blades were relatively straight and exhibited minor impact damage. Two blades exhibited thermal damage with some of the aluminum airfoil consumed.

Both tail rotor blades (TRB) were intact, one remained attached to the hub via the strap pack. The opposite blade had separated thru a fracture at the inboard end of the hub spindle and fractured the strap pack also. There was tip damage to both blades and some airfoil compression with the separated blade tip cap gone. The pitch change (PC) links were attached although the separated blade link was badly bent. Both blades exhibited thermal damage to the paint, on the side facing down in the site photos. The fiberglass resin had started to deteriorate.

The main rotor head (MRH) was intact and attached to the drive shaft. The swashplate was intact. The rotating scissors links were intact. The rotor head turned freely in the mast bearing. The color coding of the components did not match the color code on the MR hub. And the PC link with blue dots was attached to the Yellow pitch housing, although this mismatching did not affect the functionality.

The tail rotor fork and teetering bolt were intact. The assembly teetered properly. The fork was equipped with the elastomeric bearings. The pitch control unit was intact, rotated freely and slid in and out on the pinion. It was attached to the pitch links. The control bell crank was engaged in the pitch control housing and attached to the tail gear box (TGB) and the control rod. The inboard rubber boot was consumed by fire.

The TGB remained attached to the tail boom with indications elongation of several of the attachment bolt holes. The TGB was rotated and exhibited continuity from the input to the TGB output. The chip detector was not examined.

The tail rotor drive shaft was separated at the forward end, from the MGB pinion drive spline. The retention nut exhibited damage to the flange. MGB drive adapter splines were intact. The forward TRDS splines were intact and the cup contained grease. The forward end of the TRDS exhibited no torsional buckling with some minor tearing and flattening, and was fractured and separated at the point it passes through the forward bulkhead. The aft spline joint at the TGB was intact and remained assembled and exhibited continuity of drive through the TGB.

The main gearbox housing was consumed by fire. The pinion and pinion shaft bearings survived. The ring gear and support survived and were engaged on the lower drive splines of the MR drive shaft. All gear teeth were intact with no indications of breakage. The lower portion of the mast was consumed by fire.

The belt drive assembly was largely gone, consumed by the fire. The lower pulley was intact although thermally damaged, with both bearings in proper location and complete except for seals. The linear actuator was in the fully engaged position. The idler pulley tensioning cable was separated mid span and after exam with a magnifying glass it exhibited clean fresh cut marks which occurred during recovery operations. The upper pulley internal wheel was consumed by fire the outer ring remained. The over running clutch in the upper pulley functioned properly engaging counterclockwise (looking forward) and rotating freely clockwise when mounted on the pinion. The engine coupling shaft (short shaft) was found in the lower pulley which was shown in the site photos being separated from the engine. The shaft was removed from the pulley and found to be intact and appeared straight. The aft splined end appeared intact with no obvious damage to teeth, the rubber grease retention boot was melted. The forward splines exhibited severe damage to the extent they were not visibly discernable, the rubber boot was not present although the snap ring and safety wire retention hardware was on the shaft. The engine mounted spline adapter exhibited an external strike with minor deformation. The rubber grease boot retention clamp was in place. The engine mounted adapter splines were present with little damage, although there was a hard metallic deposit in the spline groove for about a third of the circumference, about a quarter of an inch long, positioned about mid-point longitudinally in the spline. The forward end of the pulley hollow shaft exhibited a deformation from internal contact with the drive shaft, bending the outer wall outboard.

Several parts were retained by the NTSB IIC to be sent to the NTSB Materials Laboratory, located in Washington, D.C. The engine driveshaft, the engine mounted drive adapter and a bag of sample grease and debris from the Impeller.

The aircraft was equipped with the optional 60 gallon fuel system, which is made up of an additional fuel tank mounted on the left aft of the cabin wall and plumbing connected to the

standard right side mounted tank. The tanks were penetrated and exhibited significant burning. Throttle and Mixture cables were not able to be examined. No investigation of rotation, timing or compression was made due to the extensive thermal damage.

The majority of the flight control system which is aluminum and magnesium, was consumed in the post-crash fire. Control continuity was established for the MR swashplate input control rods to the pitch housings. The input rods ended in melted aluminum at about the same point that the mast was consumed. The steel TR pedal torque tube survived the fire with the TR pedal arms incurring varying thermal damage.

TR control continuity was established from the TR Blades through the TGB mounted bell crank and control rod in the tail boom to forward bulkhead, where the rod was fractured.

The electric cyclic trim system was not located and presumed to be consumed in the postcrash fire.

2.0.2 Engine examination notes

The following engine examination notes were provided to the NTSB IIC by a Lycoming Engine Air Safety Investigator, as a result of a follow-up examination of the helicopter. The examination was overseen by representatives from the NTSB and the FAA.

The engine was examined on 8/20/2015 at the facilities of Nu Venture Air Services, LLC, Dallas, Oregon. The engine was separated from the airframe and sitting upside down on a tarp for the examination.

The number 1 and 3 cylinder heads and oil sump were consumed by fire. The rear accessory case was deformed and partially consumed by fire. The engine case was deformed by heat. Both magnetos were partially consumed by fire and deformed. The fuel servo was also consumed by fire. The starter ring gear support center was broken apart. The attached fan blades were broken off. And the edge of the fan blade disk showed signs of rotation at impact.

The engine to airframe drive coupler shaft splines were found sheared off and ground down on the engine side. The engine drive adapter splines contained the sheared off spline from the shaft and also had damaged splines.

No evidence was found of a catastrophic in flight engine failure.



Figure 2 - photo 1 of engine



Figure 3 - photo 2 of engine

3.0 Aircraft Information – General

The helicopter, N2096W, serial number S1865, was manufactured in 2004. It was powered by a Lycoming HIO-360-D1A reciprocating engine, serial number RL-7497-51A, rated at 220 horsepower.

A review of the maintenance records revealed that the engine had accumulated a total time of 3,729.2 hours, 21.9 hours since its most recent inspection, which was performed on June 22, 2015, and 849.8 hours since its last overhaul. Additionally, the most recent 100-hour inspection was performed on June 2, 2015, at an airframe total time of 3757.5 hours. It was also noted that the engine lower coupling drive shaft, part number 269A5559, serial number S345, was installed on this date with a total time of 5,199 hours.