



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

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SUMMARY OF AIRFRAME AND ENGINE EXAMINATION

WPR12FA191

This document contains 0 embedded photos.

A. ACCIDENT

Location:	Phoenix, Arizona
Date:	May 2, 2012
Aircraft:	Hughes 269C
NTSB Investigator-in-Charge	Thomas Little

B. EXAMINATION PARTICIPANTS

Thomas Little
Air Safety Investigator
National Transportation Safety Board
Federal Way, Washington

Jack Ogle
Aviation Safety Inspector
Federal Aviation Administration
Scottsdale, Arizona

Steven Gleason
Lead Accident Investigator
Light Helicopter
Sikorsky Aircraft Corporation
Horseheads, New York

Michael Binder
Aviation Safety Manager
Sikorsky Aircraft Corporation
Horseheads, New York

Mark Platt
Air Safety Investigator
Lycoming Engines
Williamsport, Pennsylvania

Jan Sanberg
Canyon State Aero, LLC
Mesa, Arizona

Adrian Booth
Senior Accident Investigator
The Boeing Company
Mesa, Arizona

C. SUMMARY

Examination of the airframe and engine was conducted on May 25, 2012, at the facilities of Canyon State Aero, Mesa, Arizona, by representatives from the Federal Aviation Administration, Sikorsky Aircraft Corporation, The Boeing Company, Lycoming Engines, and Canyon State Aero, under the supervision of the National Transportation Safety Board investigator-in-charge. Preliminary observations revealed that pre-existing material issues were noted with the helicopter, identified as excessive wear on the aft pinion splines and internally on the 269A5430 Drive Spline. The pinion was fractured at the aft threads, which resulted in the loss of tail rotor thrust.

D. DETAILS OF THE EXAMINATION

1.0 Accident Sequence

The helicopter departed the Deer Valley Airport (DVT) on a 14 CFR Part 91 aerial photography flight. The pilot reported that about 2 minutes prior to reaching the photo site he detected a vibration and a right yaw condition, followed by hearing a “metallic clunking” sound. The pilot stated that he then entered an autorotation with the intention of landing on the cul-de-sac street. However, during its descent the helicopter impacted the roof of a house, slid off the roof and fell onto a masonry wall between the house initially impacted and the home next door. The pilot and passenger exited the helicopter. Emergency crews secured the aircraft upon arrival, and there was no post-crash fire.

2.0 Airframe

The airframe remained generally intact. The steel main frame tubes were broken, distorted and bent in various locations. The aft cabin wall was distorted aft on the left side. The main rotor mast support tube on the left side of the aircraft exhibited a mid-span compression fold. The aft support tube fractured and was separated at the mast and the taiboom support fitting.

The right landing gear was observed entirely separated from the helicopter. The left side landing gear dampers remained attached to the aircraft, and the strut was attached to the skid tube. Both landing gear skid tubes were fractured at the forward strut attach points. The forward cross beam was fractured near its mid point, while the aft cross beam was intact but bent down near the right side cluster fitting.

The tailboom was intact but observed separated at the forward bulkhead by a compression fracture. The tailboom tube appeared straight, with minor denting on the top near the forward end. The horizontal stabilizer was intact and remained attached, with minor denting noted. The vertical fin was crushed from contact to the bottom and was bent to the right. The left side support strut was intact and exhibited marking to the underside. The right side support strut was separated forward of mid-span by a folding fracture. Both support tubes exhibited scratches and markings on the bottom, consistent with asphalt shingle material.

Impact damage was consistent with a high vertical velocity wings-level, nose-low impact attitude with the roof of the house, followed by a nose over into the yard and impact with the wall.

3.0 Main Rotor Blades

All 3 main rotor blades remained attached to the main rotor head and basically intact.

4.0 Tail Rotor Blades

The green dot tail rotor blade was fractured at the outer end of the hub spline. The blade was retained on the tail rotor strap pack and connected to the pitch change link. There were fractures and distortion

of the fiberglass airfoil inboard of the leading edge abrasion strip, the spar was bent from impact forces on the outboard side, and the aft portion of the tip cap was missing.

The blue dot tail rotor blade was observed intact from the root to the tipcap; the tipcap was intact. There was an area of damage to the airfoil near the inboard end of the abrasion strip. The pitch change link remained attached and appeared straight.

5.0 Rotor Heads

The main rotor head (MRH) was intact and attached to the main drive shaft.

The tail rotor head (TRH)/tail rotor assembly remained attached to the tail rotor gearbox (TGB) output shaft. Both pitch change links were observed intact. The swashplate rotated freely and moved in and out on the shaft when activated by the control rod and bellcrank.

6.0 Transmission and Drive Shafts

6.1 Tail Rotor Gearbox (TGB)

The TGB remained in the tail boom adapter. The tail rotor drive shaft was rotated, and resulted in rotation of the tail rotor head. This indicated that continuity existed from the drive shaft fracture at the MGB to the TGB output. The chip detector was not examined.

6.2 Tail Rotor Drive Shaft (TRDS)

The TRDS was fractured about 6 inches behind the MGB attach spline; a minor torsional indication was observed. The TRDS was bent at the forward tail boom bulkhead with minor indications of rotation. The forward portion of the TRDS was extracted with no tools required and included the aft pinion nut, a portion of the pinion, and the driving spline.

The TRDS appeared intact and straight, back to the TGB attach spline. The aft bump stop was damaged and compressed from impact with the 269A6029 retention nut. Minor wear was observed on the aluminum bumper and the nut.

6.2 Main Gearbox (MGB)

The main gearbox remained attached to the airframe. When the gearbox input was rotated the MR drive and rotor head turned appropriately. The upper pulley overrunning clutch rotated and engaged appropriately when turned by hand. The input pinion was observed to have been fractured and separated through the threads of the aft thread area. The fractured pinion remained in the aft pinion nut and was secured by a cotter pin. The phenolic spacer was not secured by the cotter pin, was present but out of position, and observed pressed into the pinion's hollow interior just forward of the fracture. The 269A5430 driving spline moved aft in the TRDS far enough to disengage from the internal splines of the TRDS.

7.0 Engine

The engine was intact and observed to have sustained minimal damage due to impact forces. The engine mounts and engine basket tubing was remained attached, however, some visible damage was observed. The lower section of the engine, inclusive of the intake and exhaust manifolds, fuel servo control, throttle linkage, impeller assembly, impeller shroud, and the Bendix gear and housing, experienced minimal visual damage as a result of impact forces to the undercarriage of the helicopter.

A Lycoming Engines representative was present during the examination. Only an external examination of the engine was performed. Due to local law enforcement personnel reporting that the engine remained running at the accident, and secured only after first responders had arrived, a more detailed examination of the engine was not performed by the Lycoming representative.

8.0 Maintenance Records

At the time of the accident the helicopter had accumulated 1,584 hours of total airframe time (TTAF), and a Hobbs meter reading of 899 hours. The most recent 100-hour inspection was conducted on May 1, 2002. The previous inspection, which was performed on March 29, 2012, encompassed 25, 50, 100, 200, and 400 hour inspections at a TTAF time of 1,481.4 hours, and a Hobbs time of 796.4 hours. The last annual inspection was completed on May 6, 2011, at a TTAF time of 981.6 hours. Subsequent to each inspection being completed, maintenance test flights were signed off as satisfactory. A records review conducted by a Federal Aviation Administration (FAA) airworthiness inspector assigned to the Scottsdale Flight Standards District Office (FSDO), Scottsdale, Arizona, revealed that maintenance on the helicopter appeared to be in accordance with the manufacturer's publications. There were some minor maintenance discrepancies noted during the inspection, however, none were considered causal to the accident.

9.0 Weight and Balance

A weight and balance review was made using an estimate of the helicopter's weight for its configuration at the time of the accident. Allowing for minor deviations in weight and configuration, the aircraft was being operated in accordance with the published weight and balance limitations. The helicopter's weight and balance was not considered to be causal to the accident.