



Sikorsky

A United Technologies Company

Sikorsky Aircraft Field Notes

NTSB REPORT NUMBER: WPR12FA191

OPERATOR: Canyon State Aero LLC

MODEL: 269C

AIRCRAFT: 68-0694

FAA registration: N380TL

Date of Accident: May 2, 2012

Location of Accident: Phoenix, AZ

Report Date: June 4, 2012

Prepared By:



Steven Gleason

Aircraft Safety Investigation Light Helicopters

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I. INTRODUCTION

The purpose of this report is to present factual observations on the condition of the accident aircraft prior to and after the accident in order to make a determination as to whether the aircraft condition played a role in the cause of the accident. All aspects of a safety investigation were explored to identify primary cause factors that may have contributed to this accident in an attempt to prevent the same accident from occurring again.

The National Transportation Safety Board (NTSB) was the cognizant investigating authority. Mr. Thomas Little was the Investigator-In-Charge. The NTSB conducted the accident as a "Field" investigation.

This report is based on teardown evaluations conducted at the owner's hangar on Falcon Field, AZ.

II. BACKGROUND

A. Mission

The flight was intended as a 14 CFR Part 91 aerial photography flight. The planned flight route was from Falcon Field (FFZ) to Deer Valley Airport (DVT) where the photographer was picked up, then to the intersection of 3rd and Osborne Streets for photos. No flight plan was filed with the FAA, nor was one required. Good weather prevailed for the day VFR flight.

B. Accident Site Description

The accident site is about four miles north of FFZ, in the 1800 block of East Roma. This is a residential subdivision.

C. Accident Sequence

The aircraft lifted off from DVT at approximately 1110 local time on May 2, 2012. The pilot reported that about two minutes before reaching the photo site he detected a vibration and a right yaw. After pilot reported hearing a "metallic clunking" sound he entered autorotation with a plan to land in the street, the aircraft impacted the roof of a house, slid off the roof and fell on a masonry wall between the houses. Pilot and passenger exited the aircraft. Emergency crew turned off the engine after they arrived. There was no fire.

III. EVALUATION

A. Aircraft Configuration

The aircraft was 269C built by Hughes Helicopter in 1978, serial number 68-0694. The cockpit was equipped with two seats. Single controls were installed for the pilot in the left seat. A single fuel tank was installed on the right aft cabin wall. Aircraft was standard with normal instruments, Garmin VHF radio and a transponder.

B. Weather

Weather at the time of the accident was day Visual Meteorological Conditions (VMC). Outside air temperature at 11:51am was reported as 88°F, wind was reported as from the south at about 10 mph.

C. Aircraft History

The aircraft was manufactured and delivered to the Indonesian Army, the original owner, on 6-24-1978. The aircraft was one of five that the owner purchased and imported. This aircraft was registered as N380TL. A DAR issued a Standard Airworthiness Certificate on 4-1-2009 at 685.35 flight hours.

At the time of the accident, according to the aircraft maintenance log and aircraft time meter (899.1), the aircraft had logged 1584.4 hours of total time.

D. Aircraft Maintenance

As noted in the maintenance logs, the aircraft was maintained by several mechanics in accordance with FAA Part 43 and the Schweizer Handbook of Maintenance Instructions (HMI).

The FAA Phoenix Flight Standards District Office (FSDO) performed a thorough review of all maintenance records for the aircraft, for the period from the airworthiness issuance to the date of accident. They had a number of questions concerning the entries and whether all applicable Airworthiness Directives (ADs) had been complied with. Several discrepancies were noted.

A 100-hour inspection was signed off the night before the accident flight. The entry indicated the inspection was done in accordance with the HMI, by S Woodrum, who the owner indicated was a partner in the business. HMI Appendix B 100-hour Inspection requires a torque check of the aft pinion nut.

A log book entry dated 3-9-12 at 1481.4 (100 hours previous to accident) indicated that a replacement H-frame was installed in conjunction with a 100/400-hour inspection, this would have exposed the pinion splines and required a torque of the aft pinion nut.

The aircraft was recovered to the owner's hangar on Falcon Field.

E. Aircraft Analysis

1. Airframe

The airframe was generally intact. The cabin Plexiglas and support bows were separated and broken from impact with the wall between the houses. The instrument panel was broken loose from the floor. The floor was partially separated from the seat deck and the left side of the seat deck was crushed and pushed upward. The steel main frame tubes were broken distorted and bent in numerous locations. The aft cabin wall was distorted aft on the left side. The MR mast support tube on the left side exhibited a mid span compression fold, the aft support tube fractured and was separated at the mast and the tailboom support fitting.

The right side landing gear was totally separated. The left side landing gear dampers remained attached and the aft strut was attached to the skid tube. The forward end of the skid and strut were separated. Both landing gear skid tubes were fractured at the forward strut attach points. The forward cross beam was fractured near its mid point. The aft cross beam was intact but bent down near the right side cluster fitting.

The tailboom was intact but separated at the forward bulkhead by a compression fracture in the right side support tube. The tailboom tube appeared straight with minor denting on the top near the forward end. The center attach fitting was intact and the tail gear box adapter was secure with no apparent damage. The boom had been previously repaired with a strap doubler. The horizontal stabilizer was intact and attached, exhibiting minor denting. The vertical fin was crushed from contact to the bottom and was bent to the right. The left side support strut was intact exhibiting marking to the bottom side. The right side support strut was separated forward of mid span by a folding fracture. Both support tubes exhibited scratches and marking on the bottom assumed to be from the asphalt shingles

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

2. Rotor Blades

Main Rotor Blades

The all three main rotor blades (MRB) were still attached to the main rotor head and were primarily intact.

- a) **Red Blade:** The Red MRB was intact and attached to the rotorhead. Damper attachment lugs were intact and damper attached. The upper pitch change bearing was fractured in the threads. The blade was folded upward just outside the root doublers.
- b) **Blue Blade:** The Blue MRB remained attached to the main rotor head, and was intact. Both damper attachment lugs were intact. The damper was separated with the elastomeric inner pulled free from the barrel. The blade was relatively straight with trailing edge kinks and buckles.
- c) **Yellow Blade:** The Yellow MRB remained attached to the rotor head and was intact. There was large section of damage near the tip to the airfoil behind the spar remainder of blade exhibited trailing edge kinks and distortion. Both damper attachment lugs were intact with the damper intact and attached.

3. Tail Rotor Blades

- a) **Green dot Blade:** The tail rotor blade (TRB) was fractured at the outer end of the hub spindle. The blade was retained on the tail rotor strap pack and still connected to the pitch change link (PCL). There were fractures and distortion of the fiberglass airfoil inboard of the leading edge abrasion strip, the spar was bent from impact on the outboard side and the aft portion of the tip cap was missing.
- b) **Blue dot Blade:** The Blue TRB was 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 PCL was attached and appeared straight.

4. Rotor Heads

Main Rotor Head

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

- a) **Pitch Housings:** All three pitch housings remained intact.
- b) **Dampers:** Two of the dampers were intact. The Blue damper inner elastomeric and attach rod were pulled out of the barrel.
- c) **Pitch Change Rods (PCRs):** The Red PCR was fractured at the upper rod end threaded area. The Red PCR was bent at the lower rod end. The Blue and Yellow PCRs were intact and remained attached at both ends.
- d) **Pitch Change Horns:** All three pitch change horns appeared intact.
- e) **Droop Stops:** All three droop stops were broken out on the outer ends indicating significant up flapping.

Tail Rotor Head

The tail rotor assembly remained attached to the TGB output shaft. Both PCLs were intact. The swashplate rotated freely and moved in and out on the shaft when activated by the control rod and bellcrank.

5. Transmissions and Driveshafts

- a) **Tail Rotor Gearbox (TGB):** The TGB remained in the tail tailboom adapter. The tail rotor drive shaft was rotated, and resulted in rotation of the tail rotor head. This indicated continuity existed from the drive shaft fracture at the MGB to the TGB output. The chip detector was not examined.
- b) **Tail Rotor Driveshafts (TRDS):** The TRDS was fractured approximately 6 inches behind the MGB attach spline, there was a minor torsional indication. The TRDS was bent at the forward tail boom bulkhead with very minor indications of rotation. The forward portion of the TRDS came off 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, and there was minor wear on the aluminum bumper and the nut, indicating they had been in contact during operation for a short time.



- c) **Main Gearbox (MGB):** The main gearbox remained attached to the airframe. When the gear box 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 found to be fractured and separated through the threads of the aft thread area. The fractured portion 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, pressed into the pinion's hollow interior just forward of the fracture. The 269A5430 driving spline moved aft in the TRDS far enough that it disengaged from the internal splines of the TRDS. The aft edge (inboard) of the spline teeth in the TRDS were damaged by rotation against the forward end of the fittings spline teeth which exhibited significant damage.

6. Propulsion

Engine: The engine was examined externally only. There were indications of impact damage to the shroud panels and the intake and exhaust pipes. Due to pilot and witness statements that the engine was operating, no further exam was made.

Fuel System: The main fuel tank remained intact. There was fuel visibly present in the tank. Samples of the fuel were not taken.

7. Flight Control Systems –Mechanical

The majority of the flight control system was intact. The pilot's cyclic stick was fractured and separated just above the socket. The collective lever was distorted and the friction guide was bent twice in an outboard direction. Mixer assembly and vertical tubes remained intact and attached to the main gearbox. Continuity was verified from the cockpit to the MR swashplate in the pitch, roll, and collective channels. Continuity was verified from the cockpit to the tailboom break in yaw, control rod exhibited a "D" shaped fracture at forward bulkhead location. The tail rotor control cables were intact from pedal quadrant to the frame mounted quadrant forward of the tailboom attachment, the cables were slack due to the frame distortion. No pre-existing anomalies were noted.

8. Flight Instrumentation

The instrument panel was intact, with no broken glass, but was separated from the forward floor. Impact forces were not severe enough to enable capture of any indications.

F. Survivability

This impact was survivable. Impact forces appeared to be within design impact criteria and human G-load tolerance.

Both doors had been removed from the aircraft for the aerial photography flight.

IV. OBSERVATIONS

1. Pre-existing material issues were noted with the aircraft: excessive wear on the aft pinion splines and internally on the 269A5430 Driving Spline (the forward end of the TRDS). The pinion was fractured at the aft threads, resulting in loss of TR thrust.
2. The engine was producing power until it was shut down by emergency personnel.
3. The aircraft impacted the house roof with low forward and high vertical speed in an upright, nose-low attitude, striking the right landing gear and the vertical stabilizer, then pitched nose-down and slid off the roof, contacting the ground and a masonry fence.
4. The impact was survivable. The pilot was injured by impact forces and the passenger was reported to have sustained only minor scratches.

APPENDICES

APPENDIX I:

GLOSSARY: ACRONYMS AND ABBREVIATIONS

AGL	Above Ground Level (absolute altitude, in feet)
ARFF	Airport Rescue Fire-Fighting
ASOS	Automated Surface Observation System
CAVU	Ceiling and Visibility Unrestricted
ELT	Emergency Locator Transmitter
FAA	Federal Aviation Administration
GPS	Global Positioning System
HSI	Horizontal Situation Indicator
IGB	Intermediate Gearbox
IFR	Instrument Flight Rules
IIC	Investigator in Charge
IMC	Instrument Meteorological Conditions
LH	Left Hand
M&P	Material and Processes
MGB	Main Gearbox
MLG	Main Landing Gear
MRB	Main Rotor Blade
MRH	Main Rotor Head
MSL	Mean Sea Level (barometric altitude, in feet)
N _R	Rotor (Main) Speed
NDI	Non-Destructive Inspection
NTSB	National Transportation Safety Board
PAC	Pilot at the Controls
PCR	Pitch Change Rod
PIC	Pilot in Command
PNAC	Pilot Not at the Controls
RH	Right Hand
SAC	Sikorsky Aircraft Corporation
SIC	Second in Command
TBD	To Be Determined
TBO	Time Between Overhaul
TGB	Tail Gearbox
TRDS	Tail Rotor Drive Shaft

APPENDIX II:

NTSB Personnel and other Parties to the Investigation

Thomas Little, WPR Regional OfficeInvestigator-in-Charge

Other Parties to the Investigation:

Jack Ogle, ASI Ops..... FAA ASI, FAA FSDO Scottsdale AZ
Jan Sandberg Owner, Canyon State Aero, Mesa AZ
Mark Platt Lycoming Engines, Van Nuys CA
Adrian Booth Boeing ASI, Mesa AZ
Steven Gleason..... Sikorsky Aircraft
Michael Binder..... Sikorsky Aircraft

APPENDIX III

Parts to be sent to NTSB Lab

1. 269A5103-9, Main Transmission Pinion serial number 1174915 manufactured by Hughes Tool Company. (Aft portion only, including fracture and less threaded portion.)
2. 269A5103-9, Threaded aft portion of the above pinion that remained in the nut.
3. 269A5449-5, Aft Pinion Nut, with fractured portion of pinion and cotter pin.
4. 269A5441, Plug-Pinion Aft Seal.
5. 269A5430-1 Driving Spline – Forward, serial number 0646