



HELICOPTER EXAMINATION REPORT

WPR18LA252

Santa Ana, California

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1537 PDT

Guimbal Cabri G2; N401SH

Examination Participants

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Accident Summary

According to the flight instructor and student pilot, they returned to SNA after conducting some cross-country flight training. They initiated an autorotation to simulate an inflight loss of engine power from about 700 ft mean sea level (msl) and 60 kts and maintained 50 kts during the subsequent glide, which was uneventful. As they reached 150 ft msl the flight instructor prepared for a power recovery by opening the throttle slightly, with the intention of preventing the rotor RPM from entering the normal range before they flared the helicopter. Two seconds later, the flight instructor realized that she had not have enough power and advanced the throttle further. The flight instructor added that as the helicopter reached 40 ft msl the student pilot raised the collective pitch control to stop the descent, but did not complete the flare. While descending in a near flat attitude, the flight instructor rolled the throttle to its full power position to complete the power recovery, but the engine power did not rise as the instructor and student pilot had anticipated. The low rotor rpm horn engaged and the nose yawed to the left. The helicopter rolled to the left from an altitude of about 4 ft before coming to rest on its left side.

Postaccident photos furnished by the helicopter operator showed substantial damage to the main rotor blades. Additionally, the helicopter fuselage had separated from the skid attachment points.

The airplane came to rest on its left side on runway 20R at SNA. Photographs of the accident site displayed all major sections of the helicopter; however the helicopter rolled onto its left side but remained attached to the landing skids' forward and aft crossbars. All three main rotor blade tips were destroyed (see photograph 2).

Airframe Examination

The helicopter was examined in a hangar owned by a local fixed based operator at SNA by representatives of Guimbal Helicopters, with oversight from the FAA and NTSB Investigator-in-Charge. An initial walkaround inspection of the helicopter revealed that the lower left side fuselage and aft left skid crossbar exhibited some scraping. Further, each of the three main rotor

blades tips were destroyed and the blades exhibited some bending opposite the direction of rotation. An examination of the main rotor mast and hub did not show any abnormalities as the pitch change links were connected each of their respective main rotor hub brackets. The elastomeric bearings were normal in appearance did not exhibit any extrusion. The anti-torque pedals moved normally and were continuous to the tail rotor blades at the fenestron.

Throttle and Governor

According to the rotorcraft flight manual (RFM), an electric engine governor is used to control engine speed. When engaged, which occurs above 2,000 rpm (or 400 rpm NR) and disengages below these values, the governor rotates the twist grip throttle control. Additionally, the governor can be disengaged using the GOV switch located on the tip of the collective control arm, or by forcing the twist grip as a friction clutch in the governor motor enables the pilot to overtake the governor.

The governor was functionally tested in accordance with the maintenance manual. The governor functioned normally and could be overridden successfully by the twist grip as designed.

The collective twist grip was advanced to the full power position multiple times from the closed position. Greater resistance was felt when the twist grip was moved to the CLOSED position, but it did not preclude the throttle from closing. During each attempt, the collective twist grip, with the collective control arm in the down position, was rotated to the full left position; however, this required a re-grip of the throttle at an intermediate position. Once the collective control arm was pulled, the carburetor throttle started to open and the correlator cam engaged.

The throttle arm of the carburetor moved in conjunction with the throttle to the idle, intermediate, and full power positions. Please note, the intermediate position is selected when the twist grip has been rotated to the FULL OPEN position and the collective control is at the lower stop position.

ADDITIONAL INFORMATION

Flight Instructor Statement

In her written statement, the flight instructor reported that she and her student initiated an autorotation from about 700 ft mean sea level, using 60 kts to enter the autorotation and maintain 50 kts glide speed in a level attitude. She started to open throttle when they reached about 150 ft to prepare for a power recovery and subsequently added more power to with the intent of keep the rotor rpm from entering the green range before they entered the flare. At 40 ft her student flared the helicopter, but the helicopter attitude still looked flat, so the flight instructor added full power, the nose yawed to the left from about 4 ft above ground level and the helicopter impacted the ground.

According to the “Aborting autorotation practice” section of the RFM;

If power recovery is decided during autorotation:

1. *Roll-in throttle until governor engages,*
2. *Gradually raise collective pitch to stop autorotation and descent,*
3. *Control yaw during power recovery with pedals*

The power recovery procedure requires that the pilot roll-in throttle until the governor engages, which would advance the throttle arm at the carburetor to the FULL OPEN position. Further, the excerpt advises that the helicopter will yaw to the left when the power recovers.



Photograph 1: Forward Quartering View of Helicopter



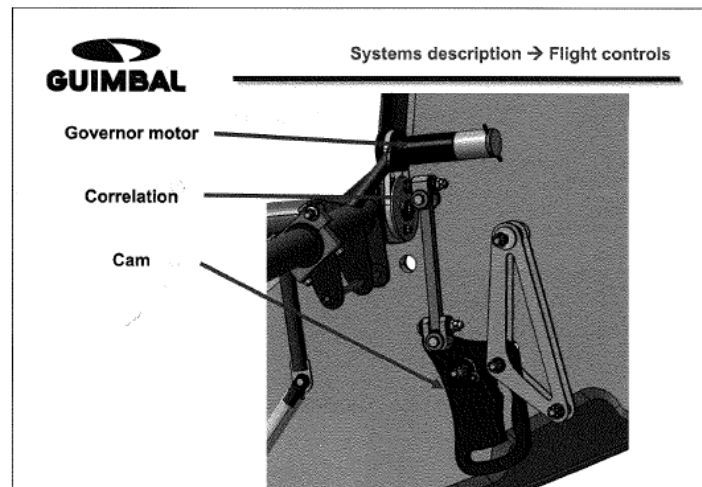
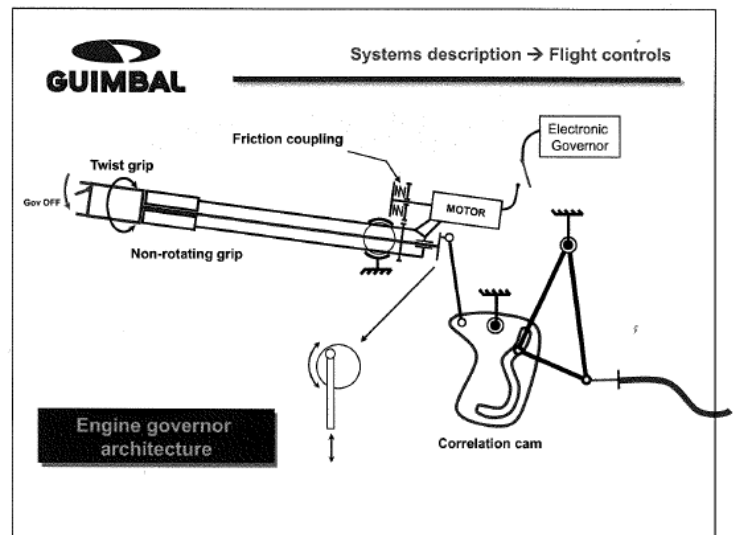
Photograph 2: Main Rotor Blade Tip Damage



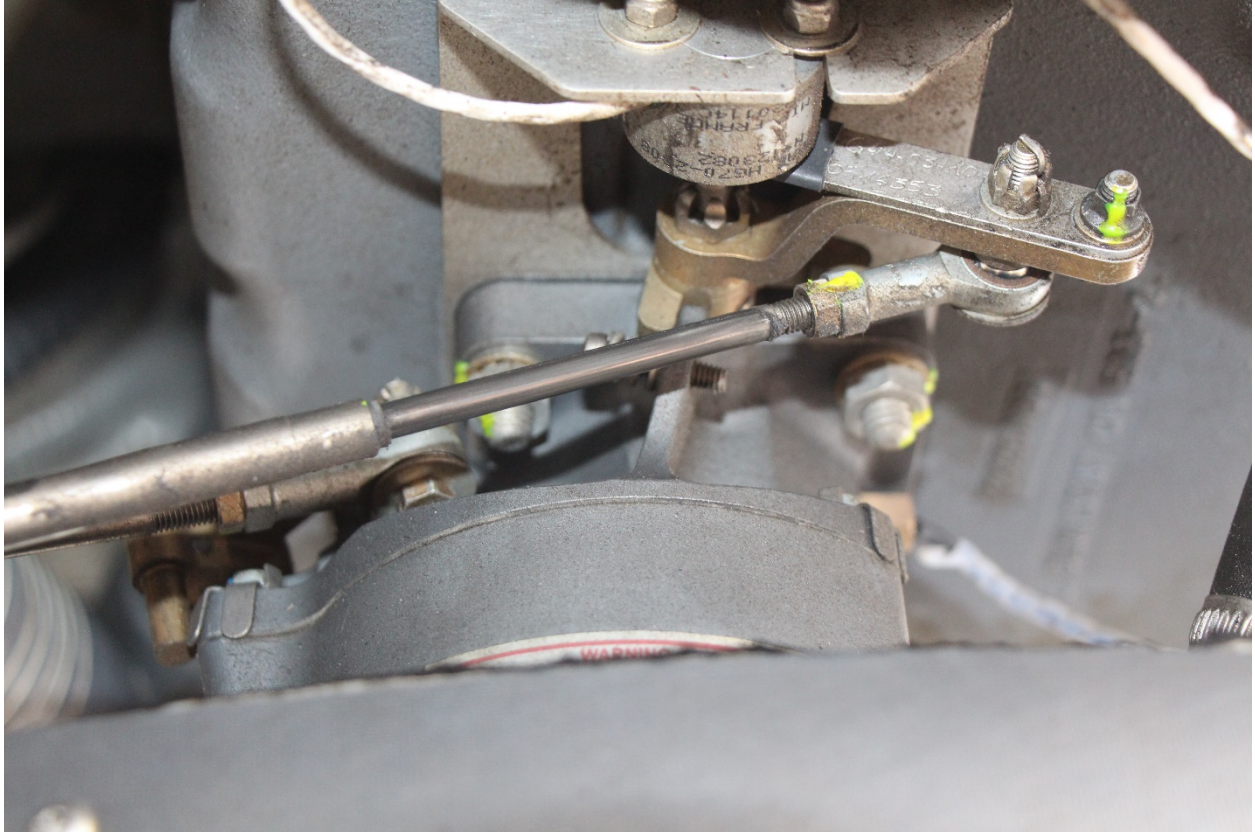
Photograph 3: Cockpit Before Center Console was Removed



Photograph 3: Center Console without Cover, Right Seat Collective Control, Correlator (top of photo), and Governor Adjustment (top of photo)



Photograph 4: Governor Assembly System Description Excerpt



Photograph 5: Throttle Arm Actuated to Full Power Position

