

1. Applicability

Eurocopter France AS350B, BA, B1, B2, B3, D, AS355E and EC120B

2. Purpose

On December 19, 2004, the Federal Aviation Administration issued Special Airworthiness Information Bulletin (SAIB) SW-04-35, which alerts owners and operators that the pilot can encounter a phenomenon known as Servo Transparency, Servo Reversibility, or Jack Stall. The text of the FAA SAIB is quoted in its entirety.

3. Background

“To clarify this concept, we will refer to the phenomenon as Servo Transparency. The SAIB references Eurocopter Service Letters #1648-29-03 for Astar family, and #1649-29-03 for Colibri family (EC120B). Pilots and operators may misunderstand this phenomenon. This aircraft phenomenon occurs smoothly, and can be managed properly if the pilot anticipates it during an abrupt or high load manoeuvre such as a high positive g-turn or pull-up. The factors that affect Servo Transparency are high airspeed, high collective pitch, high gross-weight, high “G” loads and high-density altitude. The maximum force that the servo actuators can produce is constant and is a function of hydraulic pressure and of the servo characteristics.

The system is designed to exceed the requirements of the flight limitations in the approved flight manual. With excessive manoeuvring and under a combination of the above listed factors, the aerodynamic forces can increase beyond the opposing hydraulic servo forces and Servo Transparency can occur. An improperly serviced/maintained hydraulic system can also affect the onset of Servo Transparency. Servo Transparency begins when the aerodynamic forces exceed the hydraulic forces and is then transmitted back to the pilot’s cyclic and collective controls. On clockwise turning main rotor systems, the right servo receives the highest load when manoeuvring, so Servo Transparency results in uncommanded right and cyclic motion accompanied by down collective movement.

The pilot control force to counter this aerodynamically induced phenomena is relatively high and could give an unaware pilot the impression that the controls are jammed. If the pilot does not reduce the manoeuvre, the aircraft will roll right and pitch-up. The amplitude of the induced control feedback loads is proportional to the severity of the manoeuvre, but the phenomenon normally lasts less than 2 seconds. The SAIB makes the following recommendations.

4. Recommendation

- Pilots should review Chapter 14, Aeronautical Decision Making Rotorcraft Flying Handbook FAA-H-8083-21
- Pilots should ensure the proper servicing of the Hydraulic system before each flight.
- The pilot should follow (not fight) the control movement. Allow the collective pitch to decrease (monitoring Rotor RPM, especially at very low collective pitch settings) to reduce the overall load. You should be aware that as the load is reduced, hydraulic assistance will be restored and force being applied to the controls could result in undesired opposite control movement. Follow the aircraft limitations in accordance with the Aircraft Flight Manual.
- The pilot should understand that Servo Transparency is a natural phenomenon for any flyable helicopter. BASIC AIRMANSHP should prevent encountering this phenomenon by avoiding combinations of high speed, high gross weight, high-density altitude, and aggressive manoeuvres, which exceed the aircraft's, approved flight limitations.

5. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address: AirworthinessBulletin@casa.gov.au

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