BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

www.bea.aero

@BEA_Aero

INVESTIGATION REPORT

Accident to Guimbal - Cabri - G2 registered F-HOLA

on 7 June 2019
at Grenoble Le Versoud (Isère)

Time	10:00[1]
Operator	Hélisair
Type of flight	Introductory flight
Persons onboard	Instructor and student
Consequences and damage	Helicopter substantially damaged

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in March 2020. As accurate as the translation may be, the original text in French is the work of reference.

[1] Unless otherwise stated, all times given in this report are in local time.

Separation of collective stick from its base, loss of control, collision with ground, in training

1 - HISTORY OF THE FLIGHT

Note: The following information is mainly based on statements and a video.

The instructor, who was seated in the left seat and was accompanied by a student, flew the helicopter in forward level flight from the parking area to FATO[2] 04 at Grenoble Le Versoud aerodrome for an introductory flight. While slowing down to enter hover, on the approach to the FATO, before take-off, the collective stick suddenly separated from its base. The helicopter yawed to the left and upwards. The instructor, who had only partial control[3] of the helicopter via the cyclic control and the rudder pedals, tried to counter the rotation and keep the helicopter level. The rotor rpm decreased and the helicopter descended. Its tail boom followed by the skids collided with the ground. The helicopter slid and came to rest in the grass at the right edge of the runway. The uninjured instructor and student evacuated the helicopter.

[2] Final Approach and Take Off area.

[3] The instructor initially attempted to grasp the collective stick located to his right between the two seats with his left hand, but was unable to do so.

2 - ADDITIONAL INFORMATION

2.1 Meteorological conditions

The meteorological conditions at the accident site were as follows:

- wind 10 kt from the north-east;
- CAVOK.

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

2.2 Crew experience

The instructor, who held a CPL (H) helicopter commercial pilot licence and an FI (H) helicopter instructor rating, had completed about 6,500 flight hours, including 1,200 hours on type.

(4) Two hours of theoretical training and two flight hours with an instructor.

The student had just completed the two-hour theoretical training as part of a helicopter pilot introductory course(4). This was the first flight of the practical training.

2.3 Helicopter examination

The damage to the helicopter resulted from the collision with the ground. No anomalies were found on the engine or the components transmitting power to the main rotor or the fenestron. The left-seat collective stick had come out of its base. There was no sign of wear or anomalies on the collective base or end of the collective stick.

An examination of the position of the fenestron blade pitch control showed that, at the time of the collision, the instructor was applying a full right pedal input.

2.4 Read-out of a video recording

The video, which was filmed by a witness present at the aerodrome, showed all the phases of the flight from the helicopter's take-off and forward flight to FATO 04 until the collision with the ground. The loss of control occurred while the helicopter was slowing down as it approached FATO 04. The aircraft was in near-hover and descending slightly. Suddenly, the helicopter banked to the left, entered a nose-down attitude and simultaneously yawed about 45° to the left. The helicopter rose up a few metres and made two full rotations around the yaw axis before descending and hitting the ground.

2.5 System for assembling the dual collective control

2.5.1 Description

The dual collective control consists of a stick and a base in which the stick is attached. The stick is assembled by pushing back the locking sleeve on the base and inserting the stick into this base.

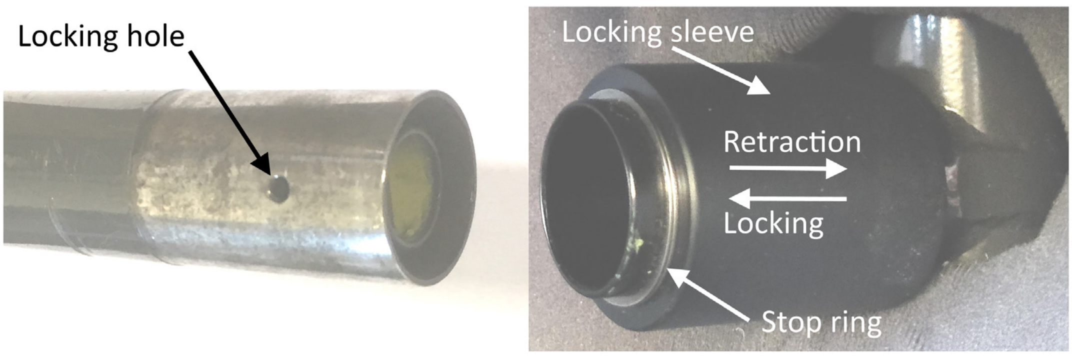

Figure 1: stick (left) and base with locking sleeve (right)

(5) Located at 90°.

The stick is locked into place by four balls located in the base, which fit into the four holes[5] located at the end of the stick. During assembly, it may be necessary to rotate the stick to align the balls and the holes and allow the locking sleeve to return to its initial locking position.

A silver-coloured metal ring is fitted to the collective base and limits the travel of the locking sleeve. When the locking sleeve is in contact with the silver ring, it is in the locked position (whether the stick has been fitted or not).

2.5.2 Assembly procedure and pre-flight check (flight manual)

Section 8 of the flight manual, ''*Handling and Servicing*'' (page 8-2), describes the dual control installation, particularly the collective control.

''*Dual controls are designed for quick and easy plug-and-play:*
- Collective stick is secured by a locking sleeve [...]
Installation: install the controls until they are secured. For the collective, maintain the locking sleeve pushed while plugging the stick. Rotate the stick until the sleeve locks.
Caution*: make sure that the controls are locked after they are put in place.''*
Section 4 of the flight manual, ''Normal Procedures'' (page 4-6), indicates in respect of the pre-flight checks for the cockpit section:
''Removable controls (if installed).. Check''

2.5.3 Testing of assembly system of helicopter's dual collective control

The assembly and disassembly of the dual collective control were tested in accordance with the procedure described in the manual and demonstrated nominal operation of the assembly system; no anomalies were detected.

The whole collective base, including the locking sleeve, is black, except for the stop ring.

If the locking sleeve has not been pushed back, the stick can only be inserted to a limited extent.

If the locking sleeve has been pushed back and the stick inserted without rotating it, non-locking can be detected by the rotation of the stick and the position of the locking sleeve, which is not flush against the ring and displays a gap of two to three millimetres (see figure 2 below). Nevertheless, the uniformity of colour of the assembly (collective base/sleeve) is not conducive to visual detection of an assembly anomaly.

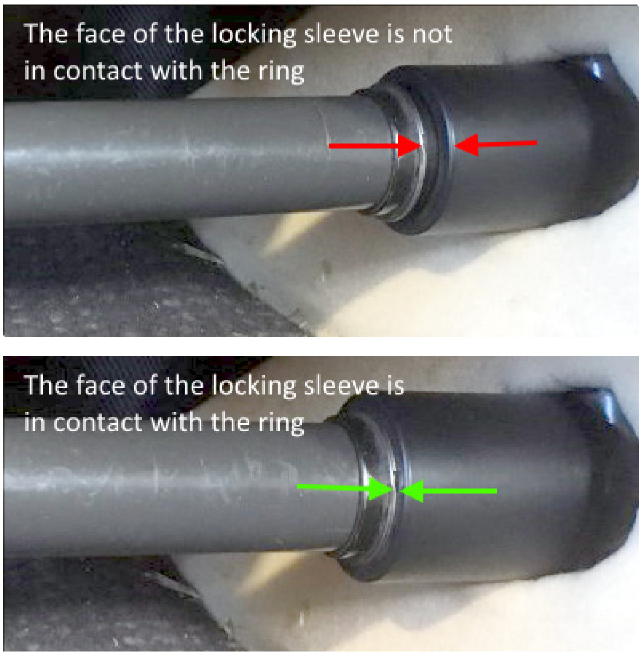

Figure 2: assembly of collective stick, not locked in (top), locked in (bottom)

2.6 Other information

On the flight preceding the accident flight, the dual controls (cyclic and collective) were removed from the left-seat side by a student pilot who was going to perform a supervised solo flight. At the end of the flight, he had refitted them; his instructor visually checked the assembly, but failed to detect the anomaly.

During the pre-flight inspection, the instructor indicated that he had visually checked the installation of the dual controls and then, after start-up, had carried out the control deflection test without noting any anomaly.

3 - CONCLUSIONS

***The conclusions are established solely on the basis of the information that came to the knowledge of the BEA during the investigation. They are in no way intended to apportion blame or liability*.**

Scenario

The separation of the collective stick from its base, on the left-seat side occupied by the instructor, while slowing down to enter hover, led to the loss of control of the helicopter in flight.

Contributing factors

The following factors contributed to the collective stick coming out of its base on the left-seat side:

- ❒ An incomplete inspection of the assembly when the dual controls were reinstalled after the previous flight.
- ❒ An inadequate visual check during the pre-flight checks.
- ❒ The uniformity of colour of the assembly (base/sleeve), which hampers visual detection of an assembly anomaly.

4 - SAFETY MEASURES TAKEN SINCE THE ACCIDENT

4.1 By the operator

Since the accident, the operator has issued a reminder to pilots:

- of procedures for verifying moving and removable components;
- of the flight manual procedures;
- and has also issued a service memo stating that:
  - The dual controls shall only be fitted by the instructor involved in the flight. The private pilot from the previous flight may remove the dual controls inside the helicopter, but not reassemble them at the end of the flight.
  - Introductory flights shall be conducted with the pilot in the pilot-in-command seat and the beneficiary in the left seat.

4.2 By the manufacturer

Following the accident, the helicopter manufacturer issued a service bulletin (SB 19-015 A) to operators on 6 December 2019. Its purpose is to ensure that markings (see Figure 3) are placed on the left-seat collective control so that it is possible to visually detect incorrect assembly. This bulletin supplements the assembly procedure described in the flight manual.

Figure 3: markings on the left-seat collective pitch control after embodiment of the SB