

IMMEDIATE LANDING AFTER UNCOMMANDED CONTROL INPUTS

The aim in the Netherlands is to reduce the risk of accidents and incidents as much as possible. If accidents or near-accidents nevertheless occur, a thorough investigation into the causes of the problem, irrespective of who is to blame for it, may help to prevent similar problems from occurring in the future. It is important to ensure that the investigation is carried out independently from the parties involved. This is why the Dutch Safety Board itself selects the issues it wishes to investigate, mindful of citizens' position of dependence with respect to public authorities and businesses. The Board recognizes a number of situations where (international) obligations require that the Board must perform an investigation.¹

GENERAL INFORMATION

Identification number:	2011001
Classification:	Incident
Date, time ² of occurrence:	21 January 2011, 14.23 hours
Location of occurrence:	Rotterdam The Hague Airport
Aircraft registration:	PH-ULP
Aircraft model:	Eurocopter EC-135 T2
Type of aircraft:	Helicopter
Type of flight:	Helicopter Emergency Medical Service (HEMS)
Phase of operation:	Take-off
Damage to aircraft:	None
Cockpit crew:	Pilot and HEMS crewmember
Number of Passengers:	One
Injuries:	None
Other damage:	None
Lighting conditions:	Daylight

SUMMARY

During take-off from Rotterdam The Hague Airport, the pilot noticed uncommanded movements of the helicopter. He made a 'pan-call', decided to turn around, and landed the helicopter safely at

¹ The purpose of the Dutch Safety Board's work is to prevent future accidents and incidents or to limit their after-effects. It is no part of the Board's remit to try to establish the blame, responsibility or liability attaching to any party. Information gathered during the course of an investigation – including statements given to the Board, information that the Board has compiled, results of technical research and analyses and drafted documents (including the published report)- cannot be used as evidence in criminal, disciplinary or civil law proceedings.

² All times in this report are local times, unless otherwise specified.

runway 24. No material damage or personal injuries were suffered. Investigation revealed the uncommanded control inputs came from the hydraulic control system.

FACTUAL INFORMATION

The flight

During the hover, the pilot noticed a sudden downward movement of the helicopter. He assumed the friction of the collective³ was too low and increased it. During take-off a flight control problem was established, which occurred at an altitude of approximately 100 feet. The pilot noticed a nother quick movement downwards, two or three times. It disappeared for a while, but the movement of the helicopter returned. The pilot made a 'pan-call' to air traffic control and decided to land the helicopter. He made a 270 degree turn and intended to land the helicopter on the taxiway, parallel to runway 24. After making the turn, he saw emergency services, heading for runway 24, on the taxiway where he intended to land. Therefore, the pilot decided to land on runway 24 instead of the taxiway, and performed a Double Engine Emergency Shutdown followed by an Egress Procedure. The total flight time was only two minutes, wherein a hover, taxi, take-off, 270 degrees turn and a safe running landing were performed.

The crew

The pilot had a valid Airline Transport Pilot Licence (ATPL (H)).

Total number of flight hours	2000
Number of hours on type	150

Table 1: flying experience pilot

The helicopter

The PH-ULP is a Eurocopter EC-135 T2, built in 2004 and based at Rotterdam The Hague Airport. The certificate of airworthiness was valid until 24 September 2011.



Figure 1: PH-ULP Source [Frank Vorwerk / www.htdi-int.com](http://www.htdi-int.com)

The weather

The Dutch Safety Board received information from the Royal Netherlands Meteorological Institute (KNMI) after the incident. At the moment of the occurrence, the visibility was 8 kilometres with clouds at 1000 feet, with no precipitation. The wind direction was approximately 270 degrees with a speed of 2 knots. The temperature was 3 degrees Celsius.

³ The collective is a control lever that controls vertical movement of the helicopter by selecting the blade angle of the rotor blades simultaneously and the corresponding power.

INVESTIGATION AND ANALYSIS

Experts of the helicopter maintenance organization and the helicopter manufacturer conducted the technical investigation. A Dutch Safety Board investigator attended the investigation.

Technical Investigation

The technical logbook of the PH-ULP helicopter did not show any anomalies. All inspections and maintenance were performed correctly and in time. The helicopter had a total flight time of 1960 hours.

Hydraulic control system

The helicopter is equipped with a hydraulic control system and a Stability Augmentation System (SAS).⁴ The main rotor is controlled via Electro Hydraulic Actuators (EHA). The pilot's inputs as well as the inputs from the SAS are transferred to the main rotor via the EHA's .

During the investigation, one failing EHA was found. Investigation revealed that the failed actuator in combination with the SAS caused uncontrolled pitch inputs that caused the downward movements of the helicopter.

Standard Procedure

The procedure, as published in the Aircraft Flight Manual (AFM) in case of oscillation in pitch and/or roll axis or actuator runaway, and in case of a failing SAS, is to disengage the SAS, after which, the flight may continue manually (See Appendix A: Emergency Checklist).

Crew actions

The helicopter made short uncommanded downward movements, without noticeable pitch changes. The pilot did not recognize this movement as an oscillation in pitch and/or roll axis and concluded that there was no applicable emergency procedure for this situation. Therefore, he decided to land immediately. This decision was easy and obvious to make, because the distance to the airport was very short.

Actions after the incident

Following the incident, the operator amended the training program. The differences between vibrations and oscillations in control and power are explained during classroom and simulator sessions.

The manufacturer published a Service Information Notice (SIN) (see Appendix B: Service Information Notice) to inform pilots that the stabilizing systems should be deactivated in case of oscillation in pitch and / or roll axis / abnormal aircraft behaviour / actuator runaway or uncommanded control inputs.

The conditions mentioned in the SIN and the emergency checklist do not match. The manufacturer announced that the Aircraft flight Manual will be harmonised with the text of the SIN. The operator is in the process of modifying the emergency checklist in accordance with the SIN.

⁴ Stability Augmentation System: System that reduces pilot workload by improving basic aircraft control harmony and decreasing disturbances.

CONCLUSIONS

The sudden downward movements of the helicopter were caused by a malfunction in one of the Electro Hydraulic Actuators.

The pilot chose to land as soon as possible at runway 24, because there was no applicable emergency procedure for the experienced abnormal aircraft behaviour.

A Service Information Notification is published to inform crews that the stabilizing systems should be deactivated in case of abnormal aircraft behaviour.

The report is published in the Dutch and English languages. In the event of conflict in interpretation, the Dutch text will be deemed binding.

APPENDIX A: EMERGENCY CHECKLIST

Emergency Checklist EC135 T2 (+)

ACTUATOR RUNAWAY

Indications/conditions

Oscillation in pitch and/or roll axis.

Actuator runaway.

Actions

SAS DISENGAGE
PITCH DAMPER REENGAGE
YAW REENGAGE
PITCH & ROL LEAVE DISENGAGED
AIRSPEED REDUCE ≤ 120 KIAS

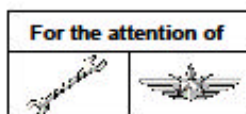
Considerations

None

SAFETY INFORMATION NOTICE

SUBJECT: AUTO FLIGHT SYSTEM

Notes on the deactivation of the auto stabilizing systems



AFFECTED HELICOPTERS	Model(s)	
	Civil	Military
EC135	T1, T2, T2+, P1, P2, P2+, 635 T1, 635 T2+, 635 P2+	-

Eurocopter has been informed about some cases of inadvertent flight movements. Eurocopter points out that the stabilizing systems should be deactivated in case of oscillation in pitch and/or roll axis / abnormal aircraft behaviour / actuator runaway or uncommanded control inputs (see also Supplement FMS 9.2-5 and 9.2-48).

Deactivate stabilizing systems

By pressing pushbutton SAS/AP CUT (1) on the cyclic stick grip of the pilot or the copilot all stabilizing systems will be deactivated and the associated error messages (CAUTIONS) appear on the CDS /CAD. The stabilizing systems consist of:

- when VFR-approved: YAW SAS PITCH&ROLL SAS
- when DPFIR-approved: YAW SAS PITCH&ROLL SAS PITCH DAMPER
- when SPIFR-approved: YAW SAS PITCH&ROLL SAS PITCH DAMPER AUTOPILOT (AUTOTRIM)

Reactivate stabilizing systems

By pressing 4-way switch P&R/P-D/Y RST (2) on the cyclic stick grip of the pilot or the copilot particular stabilizing systems can be reactivated as follows:

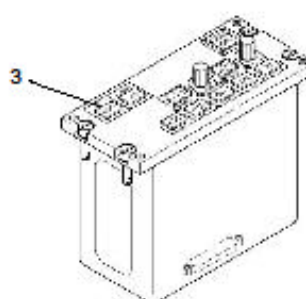
4-way switch P&R/P-D/Y RST	RH	YAW SAS	activated
	LH	PITCH&ROLL SAS	activated
	Forward	PITCH DAMPER	activated (if installed)

After one stabilizing system has been activated, the associated error message extinguishes on the CDS /CAD.

The function AUTOTRIM of the autopilot system can be reactivated by pressing pushbutton AP (3) on the autopilot control unit.

P&R // Y RST or
P&R/P-D/Y RST

SAS DCPL or
SAS/AP CUT



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