

SERIOUS INCIDENT

Aircraft Type and Registration:	DHC-8-402, G-JEDU	
No & Type of Engines:	2 Pratt & Whitney Canada PW150A turboprop engines	
Year of Manufacture:	2004 (Serial no: 4089)	
Date & Time (UTC):	16 July 2018 at 0700 hrs	
Location:	During takeoff from Düsseldorf Airport, Germany	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 4	Passengers - 77
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None reported	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	42 years	
Commander's Flying Experience:	7,953 hours (of which 592 were on type) Last 90 days - 218 hours Last 28 days - 67 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

The co-pilot inadvertently raised the flaps instead of the landing gear after takeoff from Düsseldorf Airport. The commander was not immediately aware of this because the sun was in his eyes and the aircraft handling appeared normal. The operator has not taken any additional safety action following this occurrence.

History of the flight

During the initial climb from Runway 05R at Düsseldorf Airport the commander called for the landing gear to be raised and the co-pilot inadvertently raised the flaps instead. The commander reported that he did not notice the flaps being selected because the sun was shining into the cockpit, making the primary flight display difficult to see. Furthermore, particularly because he had used "normal takeoff power"¹ for departure, rather than a reduced¹ power setting, the performance of the aircraft masked the effects of the flap retraction.

Footnote

¹ Takeoff can be performed using a reduced power setting for reasons such as fuel economy, reduced departure noise and increased engine life.

The commander stated that he may have heard the co-pilot mention “flaps” at the time but because this occurred immediately after another standard operational call relating to flight guidance mode selection, he thought he had misheard. The takeoff sequence was otherwise completed normally.

Commander’s comment

The commander indicated that he was not immediately aware of the early flap retraction. He characterised this as a “skill based error” and noted that it could lead the aircraft to stall.

Information from operator

Standard operating procedures (SOPs)

The SOPs for landing gear retraction during takeoff were described in Table 9.2 of the Operations Manual, the relevant excerpt of which is as follows:

Event	PF	PM
Positive rate of climb		Observes positive rate on altimeter and VSI “Positive Climb”
	Confirms positive rate of climb: “Gear up”	Selects gear up: “Gear up – Lights Out”

The SOPs for flap retraction were contained in Table 9.3 ‘Initial Climb procedure’, the relevant excerpt of which is as follows:

Event	PF	PM
Acceleration altitude		“Acceleration Altitude”
	Checks speed > V_{FRI} “Flap zero”	Confirms speed > V_{FRI} Selects Flap Zero. “Flap Zero selected”
	“Autopilot engage” “Bleeds On/MIN” or Bleeds On/Norm”	Engages AP, “Autopilot engaged” Selects Bleeds selected/confirmed On/MIN or On/Norm “Bleeds White” or “Bleeds Amber” (on ED)
	“Set Climb Power 900”	Sets Cond Levers to 900 rpm, “Climb Power Set” When flaps are zero calls “Flaps Zero”

Operator's comment

The operator commented that it categorised this type of event as low risk on the DHC-8-402. It stated that it had experienced a number of these events previously and determined that distraction was often a factor. However, it believed that the frequency of such events was now at a tolerable level. The operator indicated that it was reluctant to address the matter further because it believed that highlighting inadvertent flap selection to crew could lead to other similar events.

Other occurrences

NTSB accident report involving N135PT

The NTSB reported on an accident involving a Learjet 35A in 2003². The report concluded that the co-pilot's inadvertent retraction of the flaps during low altitude manoeuvring caused the aircraft to stall and impact a residential home. The two occupants of the aircraft were fatally injured.

The report stated:

'After aborting the first attempt to land, under visual flight rules, the flightcrew performed a circling maneuver to attempt a second landing. According to the Gates Learjet Flight Training Manual, Circling Approaches section,

"...Many accidents have occurred while circling... It is extremely easy to become distracted in the abnormal or unusual traffic pattern situation."

AAIB serious incident report involving G-CFAF

The AAIB reported on a serious incident in which an inadvertent flap retraction in an Avro 146-RJ100 occurred after takeoff from Birmingham Airport in 2006³. The report stated that occurrences of mis-selection on the flight deck were a recurring problem, which may have been under-reported by operators. The under-reporting was suggested to be most likely because mis-selections tend to be quickly recognised and rectified before they lead to a more serious reportable incident. Therefore, the AAIB made the following Safety Recommendation:

Safety Recommendation 2006-002

It is recommended that the Civil Aviation Authority encourage operators to monitor possible mis-selections of gear and flap levers through established flight data monitoring programs in an attempt to identify the scale and severity of the problem.

Footnote

² NTSB report [N135PT](#) (accident number NYC03FA173) [accessed 12 Feb 2019].

³ AAIB bulletin [4/2006](#), report [G-CFAF](#) [accessed 12 Feb 2019]

On 10 May 2006 the CAA published Follow-up Action on Occurrence Report (FACTOR) F15/2006 stating:

'The CAA accepts this recommendation. The CAA, through the UK FDM Operator's Group will alert them to the circumstances of this incident and encourage them to monitor possible mis-selections of gear and flap levers through their established FDM programmes. In addition, the CAA will ask the group for data concerning such mis-selections in an attempt to identify the scale and severity of the problem. The next meeting is scheduled for 6 June 2006.'

Occurrences reported by another operator

A different operator to the one involved in this serious incident reported a number of inadvertent flap retractions after takeoff on a different aircraft type between February 2016 and June 2018⁴. That operator expressed concern about the risks associated with the aircraft being in a low energy state near to the ground, including the possibility that crew members could become confused leading to a loss of situational awareness. That operator stated initially that it wasn't clear how much performance margin would remain in the event of a loss of thrust in one engine, or a requirement to increase the climb angle to avoid an obstacle. Therefore, it carried out a safety study on flap mis-selection after takeoff, with assistance from the manufacturer.

The manufacturer concluded that:

'...the takeoff performance calculations used by the operator, when properly computed and applied, combined with the protections above, would allow the aircraft to climb safely should there be a repeat of this type of event even when combined with other adverse factors, such as obstacle or terrain avoidance.'

The operator took the following safety actions:

1. Provided training and guidance to support crews in handling the aircraft in a low energy state at low altitude in simulator checks.
2. Incorporated 'active monitoring', focussing on switch selections and lever movements, into recurrent checks.
3. Amended its SOPs for flap and landing gear selection to establish a pause prior to selection of the lever.
4. Addressed the issue of distraction through active monitoring training, and enhanced briefing techniques focussing on 'how' the aircraft will be operated.
5. Raised awareness amongst pilots through two articles in its flight safety bulletin.

Footnote

⁴ AAIB bulletins: [8/2016](#), reports [G-EZFA](#) and [G-EZTZ](#); [9/2017](#), report [G-EZEW](#) (and G-EZWM); [1/2019](#), report [G-EZOZ](#) [accessed 12 Feb 2019].

The resulting SOPs for landing gear and flaps selection (item 3 above) became a two-stage process ‘so that the [pilot monitoring (PM)] cognitively confirms the proper lever has been selected’ and ‘allows [pilot flying (PF)] to intervene if he or she notices an incorrect selection is about to be made’.

An excerpt of the modified SOPs for flaps selection stated:

‘To reduce inadvertent FLAPS selection, the PM places their hand on the FLAPS lever calls “FLAPS”... PM selects the commanded position and calls the Flaps position by checking the blue number on the ECAM Flaps indicator to confirm the correct selection has been made.’

The SOPs for landing gear selection were similar.

In two of the events involving that operator, the pilots suggested that they may have been somehow primed to make the “action slip” – in one case because the commander had been thinking about an earlier mis-selection event by another crew while waiting for the instruction to raise the flaps, and in the other because the pilot monitoring (PM) had just finished training which focussed on avoiding this type of mis-selection shortly before the incident flight.

Although it was not possible to determine the reason for the inadvertent selections, the operator reviewed the safety action it had taken following the previous events and concluded that the training provided to manage the aircraft in a low energy state at low altitude had been effective in that incident. The commander in that case reflected that she would employ a longer pause in future to double check the correct lever selection and allow the PM to intervene should they see the wrong lever had been selected.

Conclusion

The Pilot Monitoring retracted the flaps instead of the landing gear after takeoff. This may have occurred because both actions are expected during this phase of flight. Takeoff into the sun may have caused the Pilot Flying some difficulty in noticing the slip.

The operator had previously found distraction to be a factor in such occurrences and believed that they were occurring less frequently than in the past. However, its standard operating procedures for flap and landing gear retraction involved the one stage selection and movement of a lever by the Pilot Monitoring in response to a call by the Pilot Flying.

Retraction of the flap instead of the landing gear is a human error and is not unique to this operator, aircraft type or stage of flight. Previous occurrences have resulted in action by operators to amend relevant procedures, and the UK CAA accepted the earlier AAIB Safety Recommendation 2006-002 to encourage operators to monitor landing gear and flap mis-selections.