SERIOUS INCIDENT

Aircraft Type and Registration:	Airbus A300B4-605R, G-MAJS
No & Type of Engines:	2 General Electric CO CF6-80C2A5 turbofan engines
Year of Manufacture:	1991
Date & Time (UTC):	26 July 2011 at 1035 hrs
Location:	London Gatwick Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 12 Passengers - 335
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	49 years
Commander's Flying Experience:	12,074 hours (of which 8,680 were on type) Last 90 days - 147 hours Last 28 days - 74 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

The co-pilot inadvertently retracted the slats and flaps after takeoff instead of raising the landing gear. The aircraft continued to climb but the stall warning system operated twice before the aircraft accelerated to the normal climb speed. A slat technical issue after engine start had required the co-pilot to operate the slats/flap lever several times to clear the fault. These actions, coupled with a mental rehearsal of the procedure that the pilots would need to action should the fault recur on takeoff, had mentally predisposed the co-pilot to operate the slats and flaps lever after takeoff despite his intention to operate the landing gear lever.

History of the flight

The aircraft was on a scheduled flight from London Gatwick Airport to Chania Airport, Crete. The aircraft and pilots were on their first flight of the day. The flight preparation proceeded normally until, when the co-pilot selected the slats/flaps lever to 15/15 after engine start, SLAT SYS 1 AND 2 FAULT appeared on the Electronic Centralized Aircraft Monitor. The pilots carried out a system reset in accordance with the Quick Reference Handbook (QRH) and, when this was not successful, contacted the operator's engineers by radio for assistance. The engineers advised the pilots that the system might require several resets to clear the fault. This process involved tripping and resetting the relevant circuit breakers and then moving the

slats/flaps lever to check if the slats operated. During this process, the commander was liaising with the engineers and operating the circuit breakers while the co-pilot was in contact with ATC and operated the slats/flaps lever under the commander's direction.

Eventually the fault cleared and the slats and flaps travelled to the desired position (15/15). The co-pilot had cycled the slats/flaps lever between 0/0 and 15/15 approximately six times to achieve this. The commander confirmed with the engineers that the aircraft should now be serviceable for the intended flight, the flight plan was still valid and sufficient fuel remained for the flight. He consulted with the co-pilot to ensure that he was content to continue the flight. The pilots discussed the possibility of the fault recurring on takeoff and reviewed the appropriate procedure, the first item of which was to cycle the slats/flaps lever. The start-up procedure was completed and the pilots taxied the aircraft to Runway 08R without further incident.

The takeoff commenced at 1033 UTC and was normal until shortly after the aircraft became airborne. The co-pilot called "Positive climb" and the commander, who was the pilot flying, called "Gear up". At this point, the co-pilot moved the slats/flaps lever to 0/0. The Captain noticed unexpected displays on the ASI on the primary flight display and initially suspected that there was a problem with the airspeed indication. He crosschecked the airspeed with the standby airspeed indicator and confirmed that the aircraft was at the pitch attitude and power setting required by the 'Unreliable Airspeed' procedure. He then noticed that the landing gear selector was still down so he repeated the "Gear up" call. The co-pilot informed the commander that he had inadvertently retracted the slats and then selected the landing gear lever up. The stall warning system activated twice during the following 10 seconds and on both occasions the commander reduced the aircraft pitch attitude in response to the warning; the aircraft maintained a positive rate of climb throughout. The aircraft accelerated to the normal climb speed and the flight proceeded without further incident.

Flight crew comment

The co-pilot stated that, in addition to operating the slats/flaps lever during the fault finding process, the pilots had reviewed the actions to be taken in the event of a slat malfunction on takeoff, which would include operating the slats/flaps lever, and that these events had probably pre-disposed him to operate the slats/flaps lever after takeoff. The commander stated that he was surprised that the slats had retracted completely as he would have expected the alpha-lock system[1] to prevent slat retraction.

Recorded information

The co-pilot operated the slat/flap lever about eight seconds after takeoff and the slats and flaps started to retract. At this point the true angle of attack (TAOA) was 5.6° and the aircraft was climbing through 280 ft agl. During the following three seconds, the TAOA increased to approximately 8° and, apart from a three-second interlude, remained above 7.5° for the following 18 seconds during which time the slats and flaps fully retracted. The stall warning system operated twice during this period. The airspeed decayed from 176 KCAS to 166 KCAS during the 12 second period after the slats/flaps lever was first moved but increased thereafter. Relevant aircraft parameters are shown in Figure 1.

Footnote

[1] This system is described below under the heading *'Slat alpha-lock protection'*.

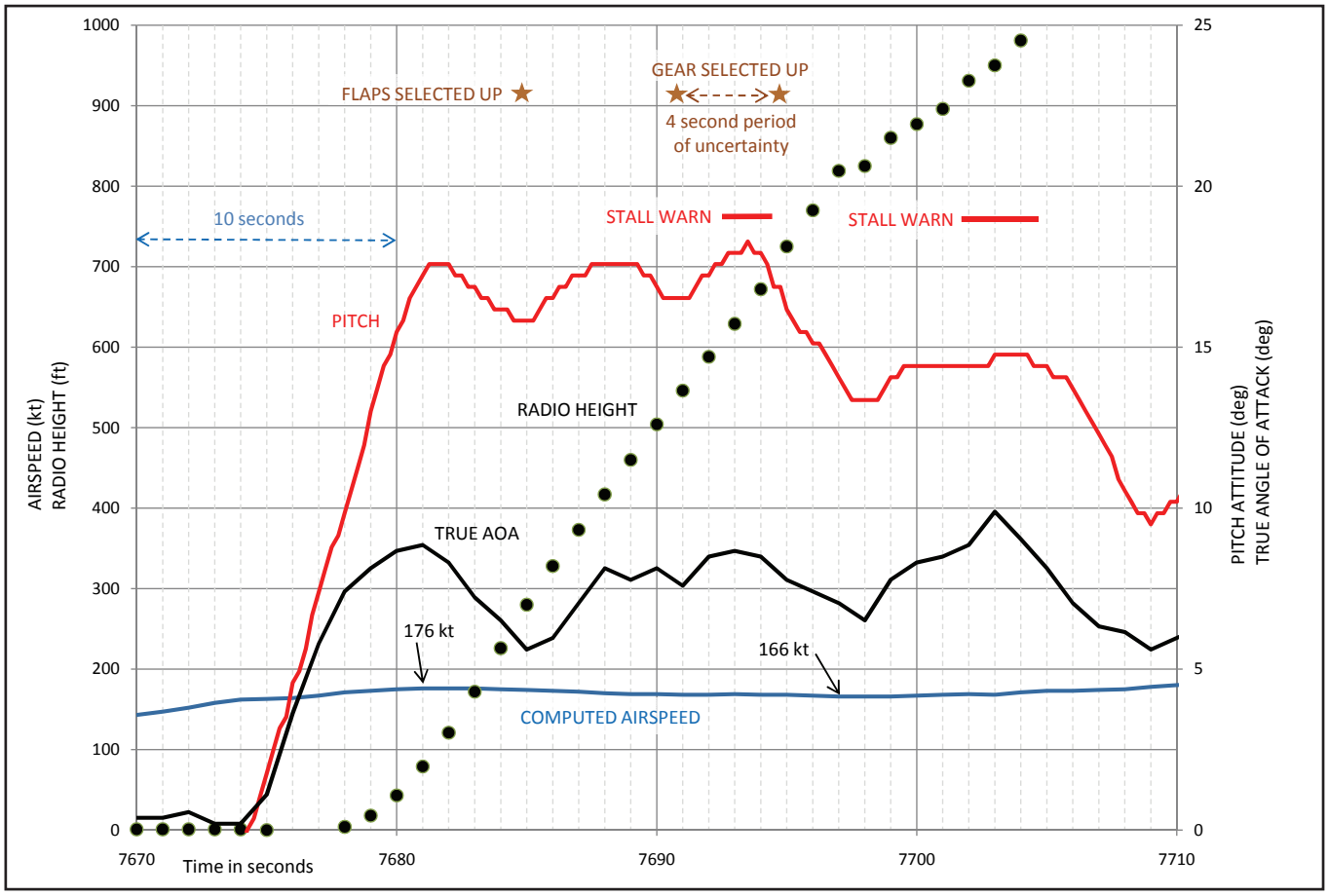

Figure 1

Flight parameters

Slats/flaps lever

A single slats/flaps lever, located on the right side of the centre console, controls the slats and flaps. There are five selectable positions: 0/0, 15/0, 15/15, 15/20 and 30/40 each with lever detents. The detent settings relate to the angle of surface deployment with the slats quoted first. To move the lever from any particular position the lever must lifted out of the detent. A blocking baulk is installed at detent 15/0 to obstruct movement of the lever straight through this position.

Slat alpha-lock protection

The aircraft was equipped with slat alpha-lock protection, described in the Flight Crew Operations Manual (FCOM) as follows:

> *'If the slats are selected to the 0/0 position while the angle of attack (AOA) is higher than 7.5°, the slat retraction is limited to 15°.'*

The FCOM states that the slats will retract when the AOA is below 7.5°. The manufacturer elaborated, stating:

> *'If the AOA is lower than 7.5° when the slats/flaps control lever is set to 0/0, the slats will retract and continue to retract even if the AOA becomes higher than 7.5°. The alpha-lock function is designed to prevent slats retraction at high AOA, not to stop retraction when it has started.'*

In the incident flight, the slat system appears to have worked as designed.

Human factors

The following is quoted from Green R.J., Muir H., James M., Gradwell D., Green R.L., (1996) *Human Factors for Pilots:*

> *'Ideally, any pilot exercising a skill, such as lowering the undercarriage would make the decision to do so, and then monitor his own behaviour in order to ensure that the correct skill was exercised. This may normally be so, but if the central decision maker is busy on another activity (i.e. the pilot is preoccupied) he may make the correct initial decision, inadvertently exercise the wrong skill, but fail to monitor his activity and remain completely unaware of the mistake that he has made. This mechanism of error is very common on flight decks, and examples abound of inadvertent control operations such as raising flaps instead of undercarriage immediately after takeoff…'*

Analysis

The pilots encountered a slats fault which the QRH procedure failed to clear. The commander liaised with the ground engineers who, based on previous experience, informed him that several resets might be required to cure the problem. This proved correct. The co-pilot made all the selections on the slats/flaps lever during this process. The selections he made were different from the selections normally made in flight in that he was selecting 0/0 directly from 15/15 whereas in flight, he would normally move it from 15/15 to 15/0 and subsequently, when airspeed had increased, move the lever from 15/0 to 0/0. By repeatedly operating the lever in this manner, the co-pilot had developed and exercised a new motor skill to operate the slats/flap lever directly between 15/15 and 0/0 and thereby negated the effectiveness of the blocking baulk.

Conclusion

On the ground before the incident, the co-pilot had developed and exercised a motor skill to operate the slats/flap lever between 15/15 and 0/0 in one movement. The distraction of the slat problem and the preoccupation with the possibility of a slat malfunction on departure had mentally predisposed him to exercise the wrong motor skill and to retract the slats and flaps despite his intention to operate the landing gear lever.