

Introduction

We hope you enjoyed reading our June issue. In this issue, we have a report on A320 spoiler disconnection, an article on cockpit automation, and a note on bird strike with pictures of bird strike on a Boeing 767 showing the extensive damage birds can cause. We are sure you will enjoy reading these. We thank Technical Instructor Mr. Pramod Chaugale, for sending us the article "Watching and waning" discussing the impact of cockpit automation, Engineer Mahmood Jumaa for the bird strike pictures and FO Adnan Al-Najjar (A310/300 fleet) for his airline crew definitions.

Your feedback is very important. We welcome your feedback, suggestions and contributions to this newsletter in the form of articles, anecdotes, pictures, etc. which can be sent to the address given below.

A320 Spoiler Disconnection

Adopted from the edited brief of AAIB Aircraft Accident Report 2/95, by Prof.P.Ladkin, University of Bielefeld, Germany

In August 1993, an A320 taking off experienced an uncommanded roll to the right as it became airborne. Initially, the crew thought it to be due to cross wind, but the PF had to apply full left side stick to maintain heading. Suspecting a problem with his side stick, the PF then passed on the control to PM. PM also found that he had to use almost full left side stick to contain roll. As most warnings are inhibited below 1500 ft radio altitude, the ECAM did not show any indication until the flap was retracted at an AGL of 1700 ft. It then sounded a repetitive chime indicating a serious fault, displaying messages that flight control had reverted to alternate law and that some of the spoilers were inoperative.

The crew contacted the ATC, which asked them to take up a holding pattern 10nm away. As this involved a series of left turns, the crew was offered a holding pattern of radar monitored right turns. The first approach was made following ECAM instructions which called for Flaps 3 (22 deg. Slat and 20 deg. Flap) and a Vref+10Kt speed with a 20% increase over normal landing distance. Selection of Flaps 1 on the approach (18deg. slat and 0 deg. Flap - which is also the take off configuration) had minimal effect on roll control while Flaps 2 (22 deg. Slat and 15 deg. Flap) required full left side stick and the commander therefore called for a go-around.

The aircraft was reconfigured to Flap 1 and ATC was informed that a higher speed, Flaps 1 approach would be made. This proved successful and the aircraft landed 37 minutes after takeoff. As the aircraft was taxiing it was noted that several spoilers on the starboard wing were up.

As a result of bird strike damage the aircraft's right hand outboard flap had been replaced before this flight. The work was carried out by a maintenance organization contracted to do such work by the airline.

After the incident, an inspection revealed that the spoiler actuators for Nos 2, 3, 4, and 5 right hand spoilers were in the maintenance mode. These were then placed in operation mode, a duplicate inspection and function check were completed and the aircraft was released to service.

Subsequent AAIB (UK Aircraft Accident Investigation Branch of department of Transport) examination of the aircraft showed that operation of the elevators, ailerons, rudder, and flaps was unaffected by the position of the spoiler actuator mode. With all spoiler actuators in the normal flight mode, rapid full lateral deflection of the side stick resulted in ECAM indication of aileron movement fractionally before spoiler movement and all the flight control position symbols were colored green. If the spoiler actuators were moved to the maintenance position and the spoilers were manually raised to the deployed position, the ECAM system detected a fault after 3 seconds whether or not the side stick controller was moved laterally. If, however, the actuators were left in the maintenance mode and the spoilers fully lowered to their stowed positions, the ECAM system did not detect a fault

In this issue

A320 spoiler disconnection	1
Cockpit Automation - Boon or bane	2
Bird strike on Boeing 767	4
Airline Crew Definitions!?	4

NEWS LETTER TEAM

Capt. Shawki Al-Ablani
Dr.M.S.Rajamurthy

Contact:

Flight Safety & Quality
Assurance office, Operations
dept. P.O.Box.394,
Safat 13004 Kuwait

Phone: +965- 4725475

Fax: +965- 4749823

E mail:

kwioeku@kuwaitairways.com

Flight safety/ aircraft accident links

www.kac-opssafety.com
www.nts.gov
www.bea-fr.org/anglaise/index.htm
www.bst.gc.ca/en/index.asp
www.bfu-web.de
www.aaib.gov.uk/home/index.cfm
www.atsb.gov.au/



unless right roll was demanded for 3 seconds or more.

When left roll was demanded, all the indications were normal because the left side roll spoilers were deployed and there was no ECAM warning. However, when right roll was demanded, only the ailerons responded. If this demand was held for three seconds or more, an alert sounded and the ECAM displayed amber symbols for Nos. 2-5 right hand spoilers plus messages about reversion to alternate flight control laws. Other tests indicated that the right and left ailerons and Nos. 4 and 5 spoilers were visible from the corresponding pilot's seat.

AAIB investigation found the following causal factors for this serious incident.

- During the flap change compliance with the requirements of the maintenance manual was not achieved in a number of directly relevant areas.
- During the flap removal the spoilers were placed in maintenance mode and moved using an incomplete procedure, specifically the collars and flags were not fitted.
- The re-instatement and functional check of the spoilers after flap fitment were not carried out.
- A rigorously procedural approach to working practices and total compliance with the maintenance manual was not enforced by local line management.
- The purpose of the collars and the way in which the spoilers functioned was not fully understood by the engineers.
- This misunderstanding was due in part to familiarity with other aircraft and contributed to a lack of adequate briefing on the status of the spoilers during the shift handover.
- During the independent functional check of the flying controls the failure of spoilers 2 to 5 on the right wing to respond to right roll commands was not noticed by the pilots.
- The operator had not specified to its pilots an appropriate procedure for checking the flight controls.

As an outcome AAIB made safety recommendations to CAA, Airbus Industry and the operators. These are:-

CAA should

- formally remind engineers of their responsibility to ensure all work is carried using correct tool & procedures, and are not at liberty to deviate from the maintenance manual and must use all available channels to consult design authorities where problems arise; and if full compliance cannot be achieved engineer is not empowered to certify the work.
- review the requirements for the conduct of duplicate inspections and consider the practicability of requiring the engineer to conducting duplicate inspection to review the task as detailed in the maintenance manual so as to come to an independent assessment of the scope of duplicate inspection.
- review non-approved maintenance schedule tasks likely to be encountered several times during the service of the fleet
- In consultation with operators, review the procedures for advising engineers of technical information such as service bulletins, airworthiness directives and other manufacturer's publication.
- ensure that data quality on other aircraft equipped with the F800 digital flight data recorder is acceptable during all phases of flight, and that the mounting system is approved.

Airbus Industries should

- amend A320 maintenance manuals in the flap removal, flap re-fitting and spoiler de-activation chapters, to include specific, clear warnings of the need to re-instate and function the spoilers after de-activation. Similar amendments should be considered for A330 and A340.
- advise all operators of its flybywire aircraft of the requirement to hold full control deflection for the appropriate period during flight control checks to allow fault warning computers to inform flight crews of any defects detected, and publish in the A320 flight crew operating manuals the time taken for a fault warning to be triggered following the failure of a flight control surface to respond correctly to a computer demand.
- introduce an additional flag and attachment to clip over the hexagon of the maintenance device, to provide clear and independent visual indication of the need to reset the maintenance device, and to amend the maintenance manual procedures accordingly.
- amend the Flight Crew Operating Manuals:
 - * To make the contents of page 3.02.80 more conspicuous in the index of "ABNORMAL AND EMERGENCY PROCEDURES" and that the contents of this page should be duplicated in the QRH.
 - * To make the note to page 3.02.80 which explains the need to take account of multiple failures by multiplying the factors more conspicuous and that it should precede the table of increments.
 - * To include operating techniques for intentional FLAP1 and FLAP2 approaches in the "OPERATING TECHNIQUES" subsection of the "ABNORMAL and EMER PROCEDURES" of the FCOM 3.

It also made recommendations to CAA on DFDRs fitted on A320, acceptable data quality, serviceability of installation, and ensure that organizations undertaking replay, repair, and maintenance of DFDRs have formal procedures.

Cockpit Automation – Boon or Bane?!

Based on Dr. Patrick R. Veillett's article "Watching and waning" in the Feb. 2006 issue of Business and commercial Aviation

Cockpit automation was aimed at reducing manual workload, relieve crew from routine operations, enhance the management of their aircraft and reduce human errors. It promised more precise navigation which would result in increasing the capacity of the national airspace system.



Once these were implemented and the automated cockpits entered line operations, instructors and check airmen found some unanticipated side effects. Instead of reducing errors, at times automation created much larger errors. In the terminal environment, workload in an automated cockpit actually seemed higher than in the older dial gauge cockpits. The tendency for both pilots to go "heads down" while in busy terminal airspace was a problem that couldn't be overlooked.

Finally, flight crew managers were worried that the manual flying skills of the automated flight crews had deteriorated due to over-reliance on their computers. Pilots would have less "stick-and-rudder" proficiency as these skills were needed to manually resume direct control of the aircraft.

Recently, the British Airline Pilots Association (BALPA) voiced concern that "Airline pilots increasingly lack 'basic flying skills' and may be unable to cope with an in-flight emergency such as sudden mechanical failure." The union warned that pilots are becoming too reliant on automated systems and are not being encouraged or trained to fly manually.

The impact of cockpit automation is exemplified by the following two observations. One instructor at a major airline felt that the FMS must have a gravitational pull because it can easily get both pilot's heads-down in a heartbeat with the slightest problem. A simulator instructor found that in simulator sessions when automation was failed during an approach and the crew was instructed to proceed direct to the VOR and hold, nearly two-thirds of the crew weren't able to do it.

To study these effects, a study was launched involving NASA researchers, academics from Universities, flight crews. The study considered recording crucial parameters during the experiment and analyzing the same rather than relying purely on subjective observations. The data set included all the aircraft parameters – speed, altitude, heading, glide slope & localizer deviations as well as pilot control inputs. These were recorded during a variety of normal, abnormal and emergency maneuvers during four-hour simulator sessions. Two groups of pilots participated in the study – **control group** composed of pilots who flew a common twin-jet airliner equipped with conventional dial instruments; and **experimental group** composed of pilots who flew the same aircraft but newer models with first generation EFIS and FMS.

The results of the study showed the following:

The pilots exposed to glass cockpits for few years, showed some erosion of flying skills when they had to manually fly maneuvers

- During normal maneuvers such as turns to headings and two-engine ILS approach without flight director, glass cockpit group showed greater deviations than those flying with conventional instruments. However, the deviations were within test standards.
- Post simulator interviews revealed that the control group tended to trust the raw data more than the flight director. On the contrary, the Experimental group's view was that flight director was quite tight and they always relied on it whether they manually flew or let the autopilot do the flying. So when flight director disappeared, they took quite sometime to adapt to the new situation.
- When the flight crew flew a simultaneous ILS maneuver(in which the flight director is required), experimental group flew tighter to the localizer and glide slope than their conventional instrument crews, both when using the autopilot and manually flying with the flight director.

The difference in manual control skills became more significant during abnormal maneuvers such as slam-dunks. When given close crossing restrictions, control group were more adept and maneuvered the aircraft in a smoother manner. The experimental group tended to go "heads down" and tried to solve the crossing restriction on the FMS.

Often in the real world situation approach is changed at the last minute. When this situation was used in the simulator experiment, control group were able to transit easily to a parallel runway's localizer, while the experimental group had a difficult time, with the PM going heads-down to program the new approach into the FMS. The box was not user friendly for the task. In this case, the workload of the experimental group was higher as the FMS needed additional attention.

The emergency maneuvers clearly broadened the differences in the hand flying skills between the two groups

- When the crew was given V1 cut and to maneuver without the flight director, the control group performed it expertly as they were used to rely on raw data. The experimental group who are used to flight director as per the SOP, on the contrary, had to scan data and their hand flying subsequently suffered.
- The single-engine ILS maneuver again showed that the conventional instrument group did admirably. Interestingly, among these, those who matched v-bars had rougher performance than those who used them as mere guidance and their skill to track localizer and glide slope. The experimental group with the flight director taken away fumbled and some flew so badly that it was embarrassing. However, when they flew with flight director available, most of the pilots nailed the needles almost dead center all the way down.

The results of simulator experiments were reviewed by airline training and standard captains, pilot union reps, NASA scientists, a peer panel from NTSB and a unit of National Academy of Sciences. It was generally agreed that there was an erosion of manual flying skills among the automated cockpit crews. A closer look at the data revealed that glass cockpit pilots who managed automation better had better manual flying skills.

Pilots need to maintain their flying skills and be able to maneuver the aircraft manually within the standards set forth in the FAA's practical test standards. To that end, pilots of automated aircraft should occasionally turn the boxes off and hand-fly the machine to maintain their stick-and-rudder skills.



Bird strike on a B767

Pictures courtesy - www.aa777.com

In the April 2006 issue, we had discussed on the bird strike threats and the operational effects of bird strike. During this year, so far KAC has experienced as many as nine bird strikes of which six have occurred in and around Kuwait. The damage due these strikes have been minimal. The severest was the cracking of windshield on an Airbus A300.

On April 2, 2001, an American Airlines Boeing 767 on a scheduled flight from Paris (CDG) to Miami International airport, Florida (MIA) had to return to Paris due to multiple bird strikes at 12,000 ft causing cabin-depressurization. The following pictures shows the extent of damage caused by a flock of birds. One bird actually went through the nose and right into the cockpit! In pieces though. There was no loss of either engine. The plane was later ferried back to U.S. and underwent extensive repairs. The damaged portions are highlighted by white circles. The red smears seen in the photographs are the blood stains.



Through this, the bird entered the cockpit



Damage on the front fuselage starboard side



Damage on the front fuselage port side



Damage on starboard wing



Damage on port wing leading edge



Damage on port wing—near root

Airline Crew Definitions!?

Contributed by FO Adnan Al-Najjar(A310/300 fleet)

Captain: Believes himself to be the sole charge of the aircraft, an assumption secretly disputed by every other crew member. His primary role is to sign anything put in front of him and is to blame for anything that goes wrong-whether it was his fault or not.

First officer: Second in command, does almost all the work but yet gets none of the credit and half pay! His main duties include listening to the Captain talking about life, family, money, religion, politics and generally stuff that should never be discussed in the first place; with a big smile on his face.

Chief Cabin: In-charge of the cabin crew. On long flights spends most of the time filling out forms, trying to fix the entertainment system and drinks 1000 cups of tea! If cabin crew are miserable then you have him to blame.

Cabin Crew: They serve food and drinks, cleanup the mess, check passenger well being, deal with emergencies, restart hearts and do it with a smile all day long ... well some of them and get poor salary for their services

Ground Staff: Not the deck crew's best friends. Never seem to be around when you need them, and when they are, they have bad news about passengers, the load, the nuclear waste in hold 5 .. And they always seem to blame someone else.

The Confidential Aviation Hazard Reporting System (CAHRS) provides a means of reporting hazards and risks in the aviation system before there is loss of life, injury or damage. It is open to anyone who wishes to submit a hazard report or safety deficiencies confidentially and non-punitively. Reports help to identify deficiencies and provide safety enhancement in areas of aviation. CAHRS forms can be collected at different location of KAC (i.e. Flight Dispatch) Premises. Completed forms can be dropped in FS&QA allocated box at Flight Dispatch or e-mailed to kwioe@kuwaitairways.com or faxed to 00965-4749823 or mail to Flight Safety and Quality Assurance office, Operations Department, P.O. Box 394, Safat 13004, Kuwait Airways –Kuwait.