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KNOWINGLY BREAKING THE RULES

At night in a clear sky, on February 14, 2010, the crew flew a Cessna 550 B, OK-ACH, owned and operated by Time Air Flight, without passengers to Karlskrona in Sweden. At flight level 270 the co-pilot levelled the aircraft and started a barrel roll to the right. Flight conditions were VMC on-top with a new moon and no natural horizon. After passing the inverted attitude the nose dropped to a pitch of 90° nose down. 40 seconds later the aircraft disintegrated on impact in a forest near Reinhardtsdorf-Schöna in Germany.

The crew were performing a positioning flight from Prague in the Czech Republic to Karlskrona in Sweden. During the climb-out from Prague the co-pilot, who was Pilot Flying on this sector asked the commander if she (the Commander) had ever performed a barrel-roll in a Citation jet. During the ensuing conversation the two crew members mutually re-enforced each other to attempt this manoeuvre.

What leads a properly trained and qualified flight crew to deviate from Standard Operating Procedures and to take a jet aircraft outside of its certified flight envelope?

Boredom or Bravery

The dialogue between the Commander and the Co-pilot during climb is quite revelatory about the psychological conditions of the crew. The Co-pilot asked whether she had already experienced a roll during night. She answered laughing: "Yes, really." He: "Better we won't". She laughing: "Do you enjoy that thing?" Co-pilot: "You are the first one with whom I talked about it, don't tell it." She: "Whom shall I not tell?" She again: "I also do it always, but I persuade to do that." The conversation went on by both crew making allusions to the roll. Finally, right before 20:19 hrs, the Commander asked: "Sufficient, is it sufficient?". Co-pilot: "For what?": She "Sufficient. The altitude." Co-pilot: "For what?" She: "For that." Co-pilot: "It is sufficient".

Was is boredom or bravery? Or trying to impress each other?

TEAM-WORK

Understanding team dynamics is vital for multi-crew aircraft pilots.



Social Norms – Leadership - Risk Behaviour

The Co-pilot was 32 years old, had a total of 1,600 flying hours and had joined the company in 2005. The Commander who was Pilot Non-Flying on this sector was 27 years old, had a total of 1,700 hours and had joined the company in 2009.

The leadership role of the Commander on this flight was hence made more challenging by a number of social norms prevalent in Western society: Firstly, the Commander was a woman commanding a crew consisting of a man. Secondly she was younger than her subordinate. And thirdly, she had joined the company the year previous to the accident, while the co-pilot had been with the operator for 5 years. All of these factors required more affirmative leadership from the commander in order to fulfil her role as Commander. Furthermore she was PNF on this sector, as such she was assisting the PF with navigation and communication. In the context of the occurrence her functional role was that of supporting the PF. Given her inexperience in the role of Commander she seems to have regressed into a

more familiar Second-in-Command role.

While none of these factors were insurmountable, they added up to a very challenging situation for the Commander. The commander training should have prepared her to identify such threats to her authority and should have given her the tools to establish her leadership position within the crew.

The Commander carries ultimate responsibility for the safety of the flight. According to the CVR download the Commander failed to stop the suggestion of the co-pilot to perform an aerobatic manoeuvre, but instead told him that she had already performed such manoeuvres and thereby encouraged him to do it.

The co-pilot on the other hand exploited the lack of experience of the commander by challenging her bravery and her flying abilities when he asked her if she had already performed such a manoeuvre. He hinted that he had performed barrel rolls previously. Not wanting to be seen as scared or less experienced she answered in the affirmative. Later she challenged the co-pilot to go ahead with the manoeuvre.

Experience vs. Rules

The limited flight experience of the crew meant that they would have to rely on SOPs and rules and regulations to keep them operating within a safe envelope. As the flight experience of pilot's increases, their ability to judge situations based on previous encounters with the same or similar situations improves. The more experience a pilot has, the more he will base decisions on experience rather than rules and regulations. For an operator who employs crews with limited flying experience, creating a culture of adherence to SOPs is a vital component of maintaining the safety standards of flight operations.

Recovery from Abnormal Attitudes

Both pilots had limited flying experience which meant they lacked the skills to perform a barrel roll at night safely. And more importantly, once they lost control of the aircraft, they lacked the skills to correctly identify and recover from the extremely abnormal attitude they had put the aircraft into.

Dealing correctly with abnormal attitudes is part of the simulator training programme. However the attitudes encountered during the second half of the barrel roll are outside of the parameters normally trained in the simulator. On a night without moon and without the visual reference of a natural horizon, the recovery from the extreme unusual attitude they had put themselves into would have required a tremendous amount of skill.

Intentional Noncompliance

That their behaviour was against Standard Operating Procedures and in contravention of the flight envelope contained in the manufacturer's Aircraft Flight Manual must have been clear to both crew members. Their behaviour represented an extreme case of what in the LOSA (line operations safety audit) framework is regarded as an intentional non-compliance.

In data collected by 'The LOSA Collaborative' during thousands of LOSAs starting in 1996 a conclusive link was established between the number of intentional non-compliances and the number of unintentional errors: flight crews who perform

intentional non-compliances are likely to perform a high number of unintentional errors.

On the other hand the data proves that threat and error management is accomplished much more successfully by crews who commit no intentional non-compliance.

Old and Bold Pilots

As the old pilot saying goes: There are old pilots and there are bold pilots. But there are no old bold pilots. Ignoring SOPs and Rules and Regulations is not a sign of superior skill or admirable coolness, it is foolish and highly unprofessional.



Norms – Acceptable Behaviour

The Citation jet was equipped with a FDR and a CVR. When analysing the CVR, the investigators found that both pilots made references to having performed barrel rolls in Citation jets previously. Whether this was in fact the case could not be definitively answered by the investigation. However the possibility of such behaviour having occurred previously lead the investigating team to issue the safety recommendation that all aircraft in the fleet of the specific operator involved be checked for structural overload. No such overload was detected on the other aircraft in the fleet.

Flight Data Monitoring

The operator did not have a Flight Data Monitoring programme. Had this been the case, the flight ops management team would have been notified of any acrobatic manoeuvres immediately. The lack of social supervision by the passengers would then have been provided by an automated monitoring system. Most likely the pilots would not have attempted to barrel roll the aircraft.

The heroes of today's highly automated flight decks are not Chuck Yeager or World War Two fighter aces, but highly knowledgeable computer system operators, who understand team dynamics and can deal with human emotions and who reliably execute standardized procedures. They need patience and discipline to monitor highly reliable computer systems for hours on end. Taking personal risks and displaying bravery are not desirable skills for multi-crew commercial air transport pilots.



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FOCUS

The best crews have the patience and discipline to monitor computer systems for hours on end.