

Statement of Captain Khris Harrington (PIC)
January 13, 2013
FPR – PDK
N662QS

While climbing out of FL350 in IMC with anti-ice on at 1000 feet per minute, the aircraft suddenly pitched down into a descent. Upon recognizing the un-commanded change in the aircraft attitude the autopilot was disengaged and the aircraft was leveled off at FL350. ATC was informed of the need for us to maintain FL350 until an appropriate assessment could be made to determine the proper action to be taken as a result of the malfunction. After disengaging the autopilot it was determined that the control wheel required excessive force to change the pitch of the aircraft. I requested that the SIC contact ATC to request lower altitude and AC complied with our request. While descending I observed that the aircraft elevator control was effected and it was abnormally more difficult to move the aircraft controls and upon application of forward and/or back pressure on the control wheel the aircraft had a tendency to move to an exaggerated nose angle (up or down) depending on the control input, so very minor and slow corrections needed to be accomplished in order to have the required effect. In our initial descent I utilized the electric trim and noticed that the trim wheel moved as commanded, however using the trim had the same undesirable effect of causing the aircraft to move to more exaggerated pitch angle than was commanded. As a result, the trim wheel was used to limited extent and only manually. At no time during the flight did the elevator trim become jammed or inoperative. After descending to below the freezing level the pitch controls seemed to operate and eventually returned to having normal tactile feel and normal pressures could be used to control aircraft pitch and no excessive pitch changes occurred when using pitch commands. Upon our arrival into the Atlanta area, with normal indications regarding the use of flight controls, the autopilot was re-engaged and a normal approach and landing were executed safely and uneventfully.

It seemed as though the flight conditions at the time of the event contributed to the incident. The event occurred in icing conditions with temperatures below -20C and the malfunction was resolved upon our descent below the freezing level. This indicates that formation and existence of ice on the control cables or actuators, which are associated with the elevator, contributed to the initial incident and the abnormal pressures required changing the aircraft pitch. My recommendation is that the matter be investigated to ascertain the cause of the malfunction in order to take the appropriate action necessary to remedy this problem in order to prevent this event from occurring again in the future on this and other aircraft of this type.

DATE: January 21, 2013

TO: NTSB

FROM: Eric Knott

SUBJECT: N662QS

On Sunday January 13, 2013, I was the First Officer on N662QS during a flight from KFPR to KPDK. The following is an account of the events that took place during the flight to the best of my recollection. All altitudes, times and temperatures are approximations.

Captain Khristopher Harrington and I picked up N662QS from the KMCO Cessna Service Center earlier in the day. A short ferry flight from KMCO to KFPR took place early in the afternoon. At 2258z we departed from KFPR with two passengers on board en-route to KPDK. Climbing through FL290 ATC asked us to climb at a minimum of 1000 fpm. Prior to entering clouds at FL320 the anti-ice was turned on. Climbing through FL350 with the autopilot on and the captain acting as the flying pilot, the aircraft started an un-commanded descent at a rate greater than 400 fpm. The RAT was -25C. Although we were in the clouds, I did not notice any ice accumulation on the windshield or any other surfaces. The captain disengaged the autopilot and took over manually. He complained of control stiffness and requested decent to a lower altitude. ATC was contacted and made aware of our situation and request. Upon my request, the captain transferred the controls to me so that I could feel the control stiffness. The controls were extremely stiff and took a large amount of force to make small adjustments in pitch and roll. The electric trim worked fine and I used it several times. The controls remained as previously noted until FL180, at which point there was a feeling as if something broke loose and the controls became slightly less stiff. The RAT was 6C at this time. Our decent was continued to 14,000 feet and the RAT increased to 10C. At this point the controls had a normal feel in both pitch and roll. A normal landing was completed at KPDK without any further incident.

Additional Questions – Answers from PIC – N662QS

1. The original maintenance write up on the aircraft mentioned control “stiffness” in pitch only. When you disconnected the autopilot and were hand flying the aircraft, did you notice any stiffness in any other flight controls?

Since the aircraft was being operated with the autopilot engaged in 1000 fpm climb (as requested by ATC) and the aircraft suddenly pitched forward into a descent, my immediate consideration was to disengage the autopilot and to hand fly the aircraft to prevent any further deviations and in doing so and in leveling the aircraft at FL350, my additional focus and concern was with regard to the difficulty associated with changing the aircraft pitch. Once I disengaged the autopilot and was hand flying, I did move the flight controls about the pitch, roll and yaw axis to determine the controllability of the aircraft and the most pronounced issue with regard to the movement of the control surfaces was the requirement of using excess pressure on the yoke to change the aircraft pitch. In moving the flight controls, I did not notice that excessive pressure was required to adjust roll or yaw rate.

2. Your statements indicated that “anti-ice” was turned on. Can you tell us which anti-ice systems were used and for how long?

The anti-ice systems were activated prior to entering the high cloud layer and included the wing and engine anti-ice and the pneumatic tail deice system. The cloud layer extended from FL300 to above FL350. During our climb, at no point did we ever climb above the cloud layer after the event occurred.

3. Can you describe any moisture that you encountered during the flight? Can you characterize the type (clouds, rain, snow etc) and intensity of the moisture?

The cloud layer was a high cirrus layer that was not associated with any convective activity and the outside air temperature at the time of the event was approximately -25 degrees C.

4. If moisture was present, did it result in airframe icing at any point during the flight (before or after the initiating event)?

After the event occurred, I observed light rime ice on the leading edge wing fence outboard of the heated leading edge area along the left wing. There was no other contamination observed on any other portion of the airframe.

5. What troubleshooting actions were performed in-flight? What procedures, if any, were referenced?

The procedure that I employed as the pilot flying during the event was the immediate action memory item for autopilot malfunction due to the change in aircraft pitch that had not been commanded or required during the climb. The situation required that the autopilot be disengaged to maintain aircraft control and to prevent any further deviation from our assigned clearance from ATC. Since it was determined that the aircraft was controllable along all axis and that the pitch trim and control surfaces were operable, there was no other procedure employed from the aircraft checklist that pertained to our specific condition and after the event occurred. After the initial event occurred I looked for any additional secondary indications associated with the malfunction regarding illuminated annunciators or popped circuit breakers and noticed that there were none. ATC had been contacted soon after the event and our request to initially maintain FL350 was approved, as was our request to descend shortly thereafter. No emergency condition existed or was declared at any point after the event since the aircraft was able to be maneuvered and controlled and upon entering the warmer air at lower altitude, the condition that existed at high altitude in the colder air was no longer prevalent.

6. Have you ever experienced any similar occurrences on previous flights with any flight control surface? Do you have direct knowledge of any other pilots who might have? If so, who?

I have never had any experience of this nature in any aircraft that I have ever operated. During my initial training for the Cessna XL at

Flight Safety International, I was informed of the issues that had been encountered by various Net Jets flight crews associated with the elevator trim and rudder that had become inoperative during flight and the possible causes and actions taken by the flight crews and Cessna to alleviate those issues. Although these issues were associated with other components of the flight control systems on the XL/XLS, I do believe that there are similar concerns with regard to the cause of the events as they relate to outside air temperature and the possible formation of ice in areas that could cause a malfunction.

7. Did you observe any moisture/water/wetness anywhere on the airplane during preflight?

I did not view any moisture, water or wetness on any surface on the exterior or interior of the airplane. I did notice water dripping from the drain stem that was installed on the underside of the tail cone prior to our departure from MCO. The drain stem I am referring to is located in the opening that was of concern with regard to the previous issues regarding the jammed elevator and rudder. I explained this to Paul McClaskey, John Harbuck (Cessna Tech. on site at PDK on 01/14/13), Dave Hyman, and the maintenance control personnel on the night of the event.

Additional Questions – Answers from SIC – N662QS

1. The original maintenance write up on the aircraft mentioned control “stiffness” in pitch only. When you disconnected the autopilot and were hand flying the aircraft, did you notice any stiffness in any other flight controls?

From what I remember roll felt stiff as well, I don't remember checking the rudder.

2. Your statements indicated that “anti-ice” was turned on. Can you tell us which anti-ice systems were used and for how long?

All anti-ice was on.

3. Can you describe any moisture that you encountered during the flight? Can you characterize the type (clouds, rain, snow etc) and intensity of the moisture?

Clouds. If any moisture was present it was very light.

4. If moisture was present, did it result in airframe icing at any point during the flight (before or after the initiating event)?

I didn't notice any.

5. What troubleshooting actions were performed in-flight? What procedures, if any, were referenced?

Auto- pilot was dis- engaged. No emergency procedure appeared to apply to our situation.

6. Have you ever experienced any similar occurrences on previous flights with any flight control surface? Do you have direct knowledge of any other pilots who might have? If so, who?

No. No.

7. Did you observe any moisture/water/wetness anywhere on the airplane during preflight?

No.