

**SERIOUS INCIDENT**

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|--|--|-------------------|
| <b>Aircraft Type and Registration:</b> | DHC-8-402 Dash 8, G-JECI   |                   |
| <b>No &amp; Type of Engines:</b>       | 2 Pratt & Whitney Canada PW150A turboprop engines  |                   |
| <b>Year of Manufacture:</b>            | 2005 (Serial no: 4105)   |                   |
| <b>Date &amp; Time (UTC):</b>          | 5 August 2017 at 1115 hrs  |                   |
| <b>Location:</b>                       | En route Inverness to Jersey, diverted to Manchester   |                   |
| <b>Type of Flight:</b>                 | Commercial Air Transport (Passenger)   |                   |
| <b>Persons on Board:</b>               | Crew - 4   | Passengers - 43   |
| <b>Injuries:</b>                       | Crew - 1 (Minor)   | Passengers - None |
| <b>Nature of Damage:</b>               | None reported  |                   |
| <b>Commander's Licence:</b>            | Airline Transport Pilot's Licence  |                   |
| <b>Commander's Age:</b>                | 29 years   |                   |
| <b>Commander's Flying Experience:</b>  | 5,752 hours (of which 5,593 were on type)<br>Last 90 days - 209 hours<br>Last 28 days - 64 hours |                   |
| <b>Information Source:</b>             | Aircraft Accident Report Form submitted by the pilot and further information from the operator   |                   |

**Synopsis**

While in the cruise at FL250, the co-pilot suffered a seizure during which he made inadvertent rudder inputs which caused the autopilot (AP) to disconnect. The aircraft commander, who was the pilot monitoring (PM), was able to control the aircraft while the Senior Cabin Crew Member (SCCM) attempted to restrain the co-pilot. A diversion was made to Manchester Airport where a safe landing was carried out and where the co-pilot received prompt medical assistance.

**History of the flight**

The aircraft was en route from Inverness Airport (INV) to Jersey Airport (JER) and was established in the cruise at Flight Level (FL) 250. The workload was light and while the aircraft commander, who was the PM, was routinely looking around the flight deck, he noticed that the co-pilot was shaking, his hands and arms were tensed and that he was leaning back in his seat with his head and eyes looking up towards the ceiling. The PM called the co-pilot's name three times but there was no response. On realising that the co-pilot was incapacitated, the PM tried to make the public address (PA) "*This is the Captain, Cabin Crew on Station*" but he selected the intercom inadvertently and not the PA system. The SCCM took the subsequent intercom call and, although she was towards the rear of the cabin conducting service at the time, went immediately to the flight deck. While making her way forward, the aircraft slewed and she had to hold on to a seat to stop

falling over. At the same time, cabin attendant three (CA3) fell over at the rear of the cabin and was helped to her feet by a passenger after which she carried on with her duties.

The PM, who had taken control and was then the PF informed the SCCM that the co-pilot was having a seizure. The SCCM could see that the co-pilot was grey in the face, had blue lips and a rigid body but was still breathing. She moved his seat back, took his legs away from the controls and tried to tuck his arms inside the harness but it was impractical as his arms were so stiff. It also proved impossible to wind the rudder pedals away from the co-pilot using the adjustment handle.

At that point, the co-pilot had a second, more violent seizure. It was physically demanding trying to restrain him as his limbs were flailing and going stiff. The seizure resulted in multiple un-demanded rudder pedal inputs and the AP disconnected. The PF counteracted these inputs but was conscious about applying too large an input on the opposite rudder in case the pressure released suddenly causing a loss of control through control input reversal.

The PF declared a PAN with Air Traffic Control (ATC) and requested an immediate diversion to Manchester Airport (MAN), which was the nearest appropriate aerodrome. ATC offered a direct routing but the PF elected to execute a Standard Terminal Arrival Routing (STAR) which would keep his workload at manageable levels and ensure a stabilised final approach. However, he reported having difficulty entering the required data into the Flight Management System (FMS) due to the distractions in the flight deck.

Having carried out their initial actions, and with the approach to MAN in progress, the PF and SCCM discussed their concerns about the possibility of another violent seizure during the latter stages of the flight. They considered trying to remove the co-pilot from the flight deck but this option was quickly discounted as physically impractical. The SCCM was having continued difficulty restraining the co-pilot, so the PF asked if she would like further assistance from an 'Able-Bodied Passenger' (ABP). They followed this course of action, the CA3 selected an ABP and he was briefed to remain at the flight deck door and provide the SCCM with assistance if necessary. When the PF deemed it would be necessary to do so, he would instruct the ABP to go to the nearest available seat in the cabin.

During the final approach, the co-pilot's condition seemed to improve slightly and he recognised MAN ahead of him. However, he was clearly still unwell and the SCCM continued to restrain him. The final approach and landing were carried out without any further incident, and MAN ATC provided a 'Follow Me' vehicle to assist in the taxi route to a remote Stand where Paramedics boarded the aircraft and took the co-pilot to hospital.

The CA3 sustained minor injuries and bruising due to her fall. The co-pilot was released from hospital after three hours. He had not previously shown any symptoms which might have alerted him or his colleagues in advance to the seizure which occurred on the flight. No other crew or passengers suffered any ill effects during the flight.

## Recorded information

The recorded data from the Flight Data Recorder and the Quick Access Recorder were downloaded. From this information it was possible to confirm that the rudder pedal inputs were the initiating event which caused the AP to disconnect.

## Incapacitation procedures

The operator's Operations Manual Part A, '*Flight Procedures*', contains the following procedures for dealing with pilot incapacitation:

### ***'Incapacitation of Flight Crew Members***

*Incapacitation is defined as any condition affecting the physical or mental health of a crew member during the performance of his duties which renders him incapable of properly performing those duties. While the remedial action which can be taken within an aeroplane in the event of flight crew incapacitation varies according to cockpit design and size, as well as to the overall crew compliment of the aeroplane, the general principles are as follows.*

### ***Recognition***

*'Incapacitation falls into two categories, obvious and subtle, and of these subtle is by far the most potentially dangerous. Early recognition of subtle incapacitation will greatly enhance the preservation of a safe and calm operation. Aids to recognition of subtle incapacitation are:*

- (a) Alertness to crew member's mistakes. A mistake is not necessarily caused by incapacitation but may be and, in any event, requires correction;*
- (b) Any unbriefed deviation from Standard Operating Procedures (SOPs). SOPs provide a yardstick of what is accepted as normal operating practice which can be used to measure crew members' performance. They are not absolute but any deviation from or variation to SOPs should be pre-briefed. If not then deviation or variation must be challenged, the deviation or variation may be entirely justifiable but confirmation is necessary;*
- (c) Compliance with (i) and (ii) above allows the trigger for the '**Two Communication Rule**' which states that crew members shall have a very high index of suspicion of a subtle incapacitation at:
  - *Any time a crew member does not respond appropriately to two verbal communications; or*
  - *Any time a crew member does not respond to a verbal communication associated with a significant deviation from a standard flight profile.**

**Action Following Recognition**

*'If in visual contact with the runway, prepared in all respects for a safe landing with the aeroplane in full control, and control unaffected by the incapacitated crew member then the other pilot should continue the approach and land. When this is not the case:*

- (a) The other pilot should control the aeroplane and when control is assured engage the autopilot (if fitted).*
- (b) He should care for the incapacitated crew member by summoning the assistance of other crew members – or passengers if no other crew are available to:
  - *Administer oxygen 100%;*
  - *Consider enquiring if there is a medical doctor amongst the passengers.**
- (c) He should declare an emergency and fully inform ATC of the situation and proceed to the nearest suitable aerodrome at which medical assistance can be provided. Radar vectors from ATC can significantly reduce workload.*
- (d) Removal of the incapacitated crew member from the flight deck area is rarely practical but can now be considered if the process will not endanger safe operation of the flight.*
- (e) He should revise crew duties and where cabin crew, or travelling crew are available they should be asked to read the relevant checklists.*
- (f) He should pass as much medical detail to ATC and request an ambulance to meet the aeroplane on arrival.*
- (g) If the passengers are aware of the problem or notice the aeroplane deviating from its planned route, he should make a PA to inform and reassure if time and duties permit.*
- (h) He should not allow the incapacitated crew member to take any further part in the conduct of the flight, even if they feel fully fit.*
- (i) After landing he should taxi to a normal, but nearest practical, ramp position if able. This is where facilities will exist to best remove the incapacitated crew member quickly.*
- (j) After the flight, medical advice must be sought before remaining crew members continue further flying.'*

## Emergency Procedures

The Operations Manual Part A includes Safety and Emergency Procedures and, under the section that includes the Emergency Procedures, gives the following instructions:

### ***'Pilot Incapacitation***

*'If either pilot becomes ill in flight, the other pilot may require cabin crew assistance. The pilot in control will use the Alert Call to gain the attention of the cabin crew.*

### **Action**

*PA from pilot in control:*

***"This is the Captain/First Officer: Cabin crew on station."***

*SCCM goes to nearest station and contacts the Captain/First Officer via the interphone to receive instructions.*

*SCCM will be called to the flight deck.*

- *Pull incapacitated pilot upright and support.*
- *Pull seat and pilot rearward.*
- *Lock seat.*
- *Fasten the harness, securing pilot's arms inside harness, and lock the inertia reel.*
- *Move pilot's feet away from the pedals.*
- *Be prepared to administer oxygen and read from the checklist.*

**Note:** *The pilot oxygen mask may be used to deliver immediate 100% oxygen first aid to the incapacitated flight crew member (default setting is 100%), then if available, substitute with a spare portable oxygen bottle and mask as soon as possible. Cabin crew should never use the emergency flow on the pilot oxygen mask on an unconscious pilot.*

*The SCCM will normally be the first to respond, if a cabin crew member is required to remain on the flight deck for landing it should be the No. 3 to assist the pilot flying with the pilot incapacitation drill. The SCCM must be seated at their station for landing so that they can continue with the cabin management and on landing their doors are covered in case of emergency.*

*Part of the Pilot Incapacitation Drill may be the requirement of the cabin crew member to read from the checklist. The pilot flying may require you to use the headset to communicate with him.'*

## **Analysis**

The co-pilot's seizure condition was identified by the aircraft commander as part of his routine scan of the flight deck and not as the result of any unexpected control inputs or non-compliance with procedures by the co-pilot.

The operator had provided detailed guidance and actions to be taken in the event of pilot incapacitation. The commander, who was initially the PM but took control becoming the PF, and SCCM adapted that guidance based on their circumstances and delivered a safe and successful outcome to what was, potentially, a hazardous incident.

The sharing of the response to the incapacitation meant that the commander could concentrate on flying the aircraft while the SCCM restrained and monitored the co-pilot. By anticipating the areas of potential hazard such as overstressing the rudder, navigating the descent and the approach, and having an ABP ready to assist, particularly close to the ground in the final stages of the approach, the commander and SCCM had solutions to manage the problems.

## **Conclusion**

This serious incident was the result of the co-pilot suffering a medical incapacitation which was professionally managed by the aircraft commander supported by the SCCM on the flight deck and the CA3 in the passenger cabin.