INCIDENT

Aircraft Type and Registration:	DHC-8-402 Dash 8, G-ECOK
No & Type of Engines:	2 Pratt & Whitney Canada PW150A turboprop engines
Year of Manufacture:	2008 (Serial No: 4230)
Date & Time (UTC):	16 Nov 2011 at 1300 hrs
Location:	8 nm north-east of Manchester Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 4 Passengers - 46
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	46 years
Commander's Flying Experience:	7,000 hours (of which 1,600 were on type) Last 90 days - 130 hours Last 28 days - 50 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, operator's Safety Investigation Report and recorded flight data

Synopsis

During an ILS approach at Manchester, the aircraft descended on the glidepath without being correctly established on the localiser. With the aircraft displaced more than two dots right of the localiser centreline and at about 800 ft aal, a go-around was initiated on ATC instruction.

History of the flight

The two flight crew, each qualified Commanders, reported for duty at their Manchester base between 0610 and 0615 hrs and learned of a change to their planned rosters. The revision was for a four-sector duty: a return flight to Norwich, followed by a return flight to Knock, in Ireland (the right-hand seat pilot was originally to fly this sector, but as Commander). The aircraft departed ahead of schedule but was unable to land at Norwich due to poor visibility, so returned to Manchester before operating the flight to Knock. The incident occurred on the return flight from Knock, during the approach to Runway 23R at Manchester Airport.

The aircraft was being flown by the right-hand seat pilot; he was a Training Captain but was operating as acting First Officer following the roster change. His brief for the ILS/DME approach included his intention to fly the aircraft manually, with the flight director, for practice.

The reported visibility at Manchester was 3,900 m in haze, with a light and variable wind and scattered cloud at 800 ft aal.

The aircraft was vectored by Manchester ATC onto an intercept heading for the localiser (ILS QDM was 234°) and descended to 2,500 ft. The acting First Officer recalled[1] that the flight guidance approach mode had been armed and that, as the course deviation indicator (showing localiser deviation) started to move from full-scale deflection, the flight guidance localiser and glideslope capture modes engaged automatically. The acting First Officer followed the 'turn right' flight guidance indications, and commenced descent to follow the glideslope.

With the localiser deviation indicator giving a 'fly left' indication, the crew were aware that the aircraft was actually to the right of the localiser centreline. Suspecting a false localiser capture, the crew selected heading and vertical speed guidance modes, whilst descent continued on the glidepath. The acting First Officer steered the aircraft left to recapture the localiser and again armed 'approach' mode. He thought he saw conflicting localiser deviation indications at about this point, with his side indications showing 'fly right' and the Commander's side showing 'fly left'. With the Multi-Function Display navigation page to assist, it was determined that the aircraft was still to the right of the actual localiser centreline.

The acting First Officer stated that they would execute a go-around at 1,000 ft aal if the aircraft was not correctly established on the localiser by that stage. With the aircraft at about 1,300 ft, Manchester ATC asked the crew if they were visual with the approach lights. The crew were not, although they did have visual contact with the ground and were able to recognise significant features in the approach area. They advised ATC and were instructed to go around.

As the aircraft was vectored for a further ILS approach, the crew noticed a discrepancy between the left and right side localiser inbound courses as selected on the flight guidance control panel: the left side was set to 265° and the right side was set to 234°[2]. The left side was set to the correct value of 234° and the second ILS approach was completed, using the autopilot, without incident.

Operating company's investigation

The AAIB was provided with a report on the operating company's own investigation. It was judged that the two pilots worked together effectively to resolve the problem they were faced with, although there existed a relatively unusual situation whereby the acting First Officer was senior to the aircraft Commander by virtue of his Training Captain status.

The crew retained sufficient situational awareness to determine that the aircraft was not on the correct track, although this would probably not have been aided by the miss-set course on the Commander's side. It was also noted that the crew's capacity to deal with the problem may have been enhanced if the autopilot had been engaged.

Although the crew maintained an overall awareness of their situation and were endeavouring to correct it, it

Footnote

[1] The AAIB was notified one month after the incident occurred and the operator's own investigation was similarly delayed. Due to the elapsed time, the flight crew considered that their recollection may not be entirely accurate.

Footnote

[2] The ILS at Knock has a localiser QDM of 265°, so it is likely the left side course had remained unchanged since the aircraft's approach there.

was established that they had begun to deviate from standard operating procedures in allowing the aircraft to continue to descend without it being correctly established on the localiser.

The operator conducted a simulator exercise to explore the effect of the discrepancy in selected inbound courses. The results suggested that, while localiser deviation indications should not be affected, it may have caused the flight director to function inefficiently at the point of localiser intercept.

The operator reported a number of false localiser capture incidents affecting its Q400 fleet, more than half of which have been at Manchester. Internal investigations were ongoing at the time of this incident, although it was felt that the subject incident was more probably a case of the flight guidance system not following the localiser as expected rather than an actual false localiser event.

Safety actions

The operator's report made three internal safety recommendations. As a result, a Notice to Crew was issued warning against starting final descent before the aircraft was confirmed as being established on the correct localiser. It also stressed the importance of discontinuing an approach if inconsistent localiser indications are observed. As there was some evidence that flight director performance could be impaired with one miss-set selected course, an appropriate cross-check was introduced prior to the localiser intercept point.

Recorded information

Data from the aircraft's quick access recorder (QAR) was available for analysis. This showed the aircraft descending on a steady intercept heading of about 200°(M) when localiser and glideslope capture modes engaged simultaneously. The aircraft was slightly above the glideslope but correcting to it, so descent continued uninterrupted. At the point of localiser capture, localiser deviation was just in excess of two dots (about 2.5°) and reducing. The selected heading was moved to align with the inbound course of 234° but the aircraft continued to turn right (lateral flight guidance was localiser mode) until reaching about 255°. Deviation reduced to one dot 'fly left' before increasing again to full scale deflection as the aircraft started to fly away from the localiser centreline. Figure 1 shows the relationship between localiser deviation and aircraft heading, with the engaged flights guidance modes at each stage of the approach.

The heading slowly reduced from its maximum 255° to a value slightly less than the inbound course, at which point heading and vertical speed modes were selected and a heading of about 210° set. The aircraft was descending through about 2,250 ft altitude (2,000 ft aal) at this point. Localiser and glideslope capture modes re-engaged at about 1,700 ft, followed by an almost identical profile as before, with localiser deviation again reducing to about one dot before increasing again to full-scale deflection. As deviation increased through two dots deflection, the aircraft was descending through 1,400 ft and heading about 250°. When go-around mode engaged, the localiser deviation was full scale 'fly left' and the aircraft was descending through about 1,050 ft altitude (800 ft aal).

Recorded information for the whole approach showed continuous agreement between the localiser deviation values for both left and right ILS receivers. A comparison with recorded radar data showed a good correlation between the aircraft's actual position and the indicated deviation.

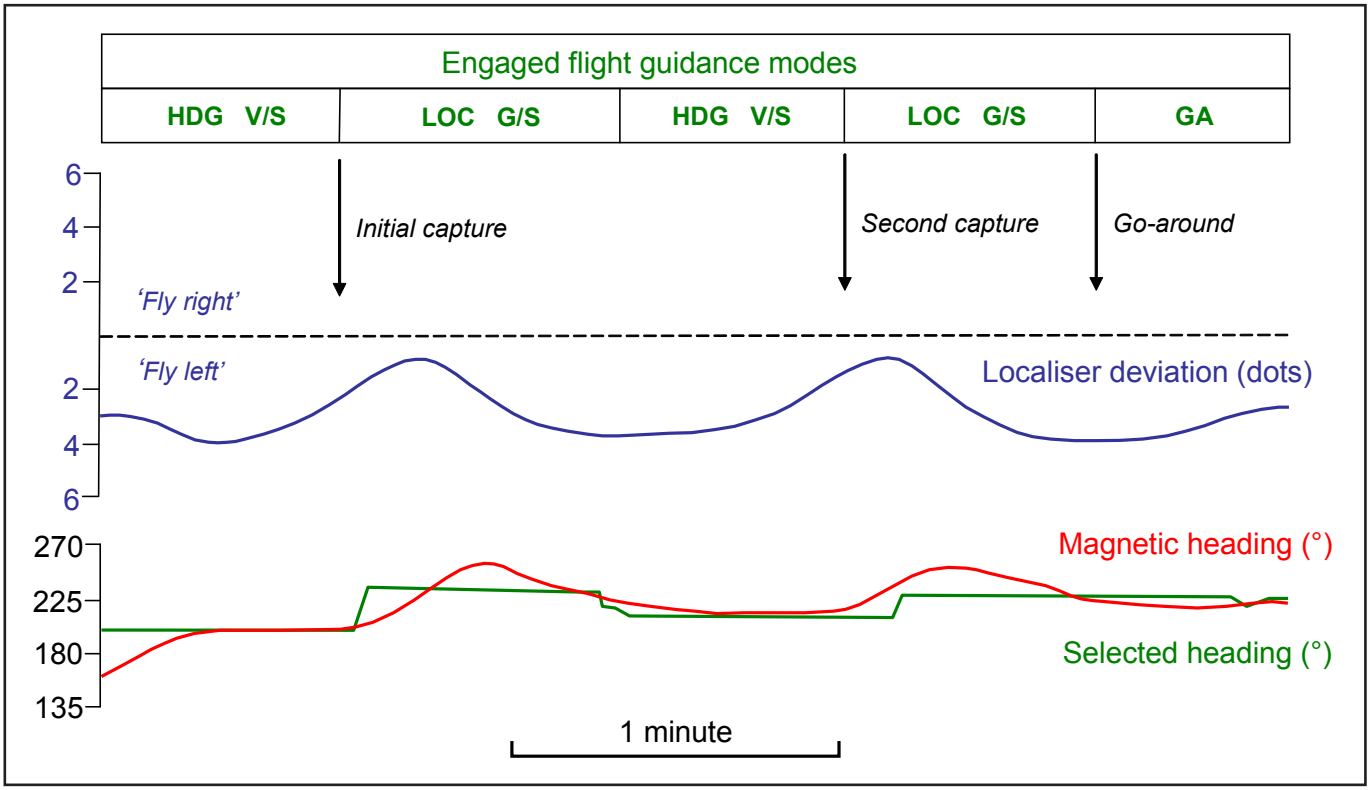

Figure 1

QAR derived information showing the relationship between localiser deviation and aircraft heading, with engaged flight guidance modes

Analysis

As Figure 1 shows, the pattern of each localiser capture and subsequent deviation is remarkably similar. It is reasonable to assume that the handling pilot followed the flight guidance on each occasion (as he reported) in which case the flight guidance system responded in a very similar manner on each occasion too. With both ILS receivers showing consistently accurate deviation and the position and altitude of each intercept being different, it is most likely that the guidance issue arose as a result of the discrepancy between the left and right inbound courses selected on the flight guidance control panel.