INCIDENT

Aircraft Type and Registration:	Dornier 328-110, D-CPRW
No & Type of Engines:	2 Pratt & Whitney PW 119B turboprop engines
Year of Manufacture:	1998
Date & Time (UTC):	18 January 2006 at 1255 hrs
Location:	On approach to Runway 24R at Manchester Airport
Type of Flight:	Public Transport (Passenger)
Persons on Board:	Crew - 3 Passengers - 17
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:	4,600 hours (of which 400 were on type) Last 90 days - 148 hours Last 28 days - 51 hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft failed to capture the glideslope during an ILS approach in IMC conditions to Runway 24R at Manchester Airport. The operating crew did not monitor the flight path of the aircraft and were only alerted that they had descended (with a high vertical speed) dangerously close to the ground some 5.5 nm from touchdown, by a "GLIDESLOPE" aural alert triggered by the EGPWS. The commander disconnected the autopilot and performed a go-around. ATC provided radar vectors to re-position the aircraft for another ILS approach, following which the aircraft landed without further incident.

History of the flight

The crew reported at 0600 hrs for a four sector day starting at the Isle of Man (Ronaldsway) Airport. Their third sector was from Ronaldsway to Manchester International Airport; the commander was the Pilot Not Flying (PNF) and the co-pilot was the Pilot Flying (PF).

The aircraft was in IMC and being radar vectored by Manchester ATC for an ILS approach. The flight had proceeded uneventfully until it was downwind for Runway 24R. At this point, the crew were advised by ATC that they were 16 miles from touchdown. After acknowledging this, there was a moment of confusion when the co-pilot saw that the DME was only indicating 11.4 nm. This was clarified by the commander who pointed out that ATC had given track miles to fly and

that the DME, which is co-located with the ILS, was reading direct mileage to the runway threshold.

ATC then instructed the crew to turn right, onto a base leg heading of 155º(M), and to descend from 4,000 ft QNH to 3,000 ft QNH. They were advised at this point that their range was 14 miles from touch down. 30 seconds later, they were instructed to "TURN RIGHT HEADING 210º(M)" and to "REPORT LOCALISER ESTABLISHED 24 RIGHT"; subsequently they were told to fly a speed of 160 kt until 4 DME. 25 seconds later, they were instructed to "DESCEND TO 2,000 FT AMSL AND FURTHER DESCENT ON THE ILS." This was acknowledged by the PNF. One minute later, the commander informed ATC that they were established on the localiser; this prompted ATC instruct them to change to the Tower frequency. At this point they were 8.5 nm from touchdown. After establishing radio contact with the tower controller, the crew were instructed to continue the approach to Runway 24R and asked to report at 4 DME. Whilst they were concentrating on configuring the aircraft for landing and trying to reduce the aircraft's IAS to 160 kt, the Mode 5[1] "GLIDESLOPE" EGPWS[2] alert sounded. The commander took control of the aircraft, disconnected the auto-pilot and initiated a go-around; the co-pilot advised ATC. The tower controller asked them if they had a problem, to which the co pilot responded "YEAH, WE HAD THE AUTOPILOT KICK OUT AND WE HAD A PROBLEM WITH THE ILS." The crew were then instructed to fly the standard missed approach procedure and to contact the ATC Director. D-CPRW had descended to within approximately 450 ft of the ground. ATC subsequently radar vectored the aircraft for a second ILS approach to Runway 24R; this ILS and landing were flown without further incident.

After shutdown, the commander was asked to telephone the ATC Duty Watch Manager, who asked him the nature of the problem. The commander told him that they had experienced difficulty with capturing the ILS and later stated that the autopilot would not capture the glideslope on the approach to the airfield. Consequently, he raised a defect report in the aircraft's technical log. The Duty Watch Manager informed him that he would be submitting a Serious Incident report; the commander said that he would be reporting the incident upon his return to the Isle of Man. At 1340 hrs, D-CPRW pushed back at Manchester and flew back to the Isle of Man. The ATC Watch Manager then reported the incident to the AAIB.

Meteorological information

The weather situation at 1200 hrs on 18 January 2006 showed a broad warm sector covering much of the British Isles including the Manchester area. The ATIS at 1255 hrs indicated that the visibility was 2,800 m in mist, with a broken layer of cloud at 300 ft agl and a surface wind of 270º/10 kt.

Aircraft examination

An integrated maintenance terminal system diagnostic test, and a functional test of the aircraft's autopilot and navigational systems, was undertaken by the company's maintenance provider and witnessed by the AAIB. These tests identified no faults or deficiencies in any of the aircraft systems. Also, ILS test equipment was used to establish if the system was capable of capturing the localiser, in addition to determining if the Vertical Speed (V/S) mode in the autopilot would disengage upon glideslope capture. A number of tests were run and both

Footnotes

[1] Relates to excessive glideslope deviation, landing gear down. See paragraph headed EGPWS, page 38.

[2] Enhanced Ground Proximity Warning System.

the localiser and glideslope captured on each occasion. The glideslope was then swept up and down, at different rates, with the glideslope armed and V/S selected. On each sweep, the glideslope was captured and the V/S disengaged.

A ground test of the Enhanced Ground Proximity Warning System (EGPWS) was undertaken in accordance with the procedure detailed in Avionics Mobile STC 1459-01. This unit provided information on many previous flights, the last 10 of which indicated that transient faults had occurred on flights 5, 6 and 7 and glideslope warnings had activated on flights 2 and 10. Consequently, the EGPWS unit was removed for the data to be downloaded under AAIB supervision. A functional test of the VHF navigational system was also carried out and found to be satisfactory.

In summary, the aircraft examination identified no faults in the autopilot or navigation systems that would have accounted for the aircraft not capturing the glideslope during the incident flight.

Operating crew's comments

The crew were interviewed the following day in the Isle of Man where the commander and the co-pilot both recalled the flight to Manchester with reasonable clarity. However, they both believed that they were cleared to descend from 3,500 ft to 3,000 ft as their final descent clearance from ATC before intercepting the ILS localiser, not to 2,000 ft from a starting altitude of 3,000 ft. While the co-pilot stated that he used the V/S mode to descend the aircraft, he was adamant that he only used approximately 500 fpm during the final approach.

He also stated that it was a "bone of contention" that the use of Standard Operating Procedures (SOPs) and checklists was not standardised within the company. While there was a checklist specifically for the Dornier 328, whenever he flew with the Fleet Captain (FC), for example, he was asked to use the FC's "significantly different" checklist; one that did not differentiate between PF and PNF, 'silent' checks or 'challenge and response' checks. The co-pilot had asked the FC "when was there going to be some form of standardisation across the fleet". He was told to expect something by 1 December 2005, but this date passed without a standardised checklist being issued or published. Consequently, the co-pilot was required to use one checklist when he flew with the FC, another when he flew with a freelance captain and yet another when he flew with the company's two other Dornier 328 captains. Consequently, basic procedures and 'calls' between flight crews were different on each flight. However, having spoken to co-pilots on different aircraft types operated by the company, he felt that this problem only related to the Dornier 328 fleet.

D-CPRW's flight crew, whilst acknowledging that this lack of standardisation might have been a contributory factor in this incident, stated that it was no justification for its occurrence.

ATC procedures

The Manual of Air Traffic Services (MATS) Part 2 states the following as the function of the ATC Director at Manchester Airport:

> *'2.4.1.3 Director*
>
> *1. Continued sequencing of inbound traffic from the point of handover from Approach North/South and positioning to final approach.*

2. Positioning of Woodford inbound flights to a position for transfer to Woodford ATC as necessary.

3. Coordination of inbound spacing requirements with Air Arrivals and liaison with Approach North and South. When Director is not being utilised, the telephones are to be position diverted to Approach South.

4. Assisting Approach South (and North) in the event of a total radar failure.

5. Radar monitoring of all aircraft approaches to Manchester (and Woodford if an aircraft is under the control of Manchester). If an aircraft is seen to deviate significantly from the anticipated approach profile, the appropriate action must be taken.'

Air traffic control officers' comments

Director's comments

The ATC Director at Manchester Airport was not aware of the incident with D-CPRW until the following day as, during the go-around, he was in the process of handing over his position to a colleague before ending his shift. He reported that, once an aircraft is established on the ILS Localiser, he plans for the aircraft to fly level for approximately one nautical mile before intercepting the glideslope. In this incident, he remembered the aircraft being cleared to 2,000 ft amsl, which is not an unusual situation, before becoming established on the localiser, when the crew were instructed to change to the Tower frequency. He added that, normally, he instructs aircraft to change to the Tower frequency when at a range of between 7 and 11 nautical miles.

The Director then started to handover his position to his colleague. While he did not notice any deviation in the aircraft's vertical profile, he thinks he recalled the aircraft drifting south of the extended centre line. Just before he left his position, he was advised by the Tower controller that the aircraft had performed a go-around, but thought this was as a result of it drifting to the south.

Once an aircraft has left the (Director's) frequency, the prime consideration is to vector the following aircraft in such a way to ensure that it has the required vertical and lateral spacing in relation to the preceding aircraft. While the Director stated that he is aware of what is contained in MATS Part 2, he felt, realistically, that it is only possible to monitor the lateral profile of an aircraft on final approach.

In this incident, aircraft were being vectored to achieve seven nautical mile spacing on final approach, due to the poor weather. This separation was at the request of the Tower controller, in order for him to manage departing and landing aircraft. The Director felt that, if aircraft were being positioned with only three nautical mile spacing, he would have little, if any, chance of monitoring aircraft once they have left his frequency. He added that if he did notice a deviation in an aircraft's vertical profile he would have difficulty contacting the Tower controller to advise him in a timely manner, due to the limitations of the current telephone system and his normal work load.

Tower controller's comments

At the time of the incident, the Tower controller was conducting single runway operations. After D-CPRW had made his initial call on the Tower frequency, the controller was waiting to see the aircraft descend below the cloud base. When visual contact had been made, he could then have issued a conditional clearance of …'clear to line up after the landing Dornier 328'… to the next departing aircraft. When the crew reported

that the aircraft was going-around, he asked if they had a problem. At the time they were replying with "WE HAD THE AUTOPILOT KICK OUT AND WE HAD A PROBLEM WITH THE ILS.", he observed the aircraft on the Aerodrome Traffic Monitor[3] at 700 ft amsl, at a range of some 5.5 nm from the runway.

He informed the Duty Watch Manger of the incident but felt confident that the ILS was operating correctly, as he had dealt with inbound aircraft flying the ILS for some 30 minutes, without any problems being reported. Additionally, the aircraft following D-CPRW had just reported that they were successfully established on the ILS localiser. This aircraft was subsequently monitored by the Duty Watch Manager before engineers were instructed to check the serviceability of the ILS. No faults was found.

Company procedures

Standard Operating Procedures (SOPs)

The company's Operations Manual states, under *Aeroplane Operating Matters (Altimeter Setting and Checking)*, the procedure to be used upon receiving a clearance to climb or descend to a different altitude or FL, as follows:

> *'The PF initially sets the new altitude in the Altitude Pre-selector. He then states the new altitude/FL and adds "Set." Having cross checked the cleared altitude/FL in the pre-selector the PNF advises the PF of this by saying "Checked.".'*

Analysis of the CVR revealed that, throughout the flight to Manchester, the majority of altitude/FL clearances issued by ATC were not verbally announced by the PF to the PNF, as required by the SOPs, or cross checked by the PNF. On the one occasion the PNF did cross check an ATC altitude clearance it was not verbally announced by the PF.

Accident and incident reporting

The company's operations manual states that in the event of any emergency, accident or incident the Flight Operations Department is to be immediately informed by the aircraft commander.

Flight Recorders

General

The aircraft was equipped with a solid state 25 hour duration Flight Data Recorder (FDR) and a solid state two hour duration Cockpit Voice Recorder (CVR) The entire incident flight was recovered from both the FDR and CVR, and the CVR had also recorded the subsequent sector from Manchester to the Isle of Man. In addition to the flight recorders, the EGPWS computer was removed for downloading, which was successfully completed, with data from one hundred flight sectors being available. One entry related to the incident flight and this was used in conjunction with data from the FDR.

National Air Traffic Services provided secondary radar recordings based on Manchester radar and recordings of the radio transmissions from ATC and D-CPRW.

Recorded Data

The aircraft took off at 1220 hrs, the takeoff and subsequent climb to FL110 being uneventful. The aircraft remained at FL110 until 1234 hrs when it started to descend, initially to FL60, during which time the flaps were extended to 11°. FL 040 was attained at 1241 hrs.

Footnote

[3] A radar display at the Tower controller's position that utilises a feed from aerodrome based Watchman radar.

Figure 1 is a plot of the salient parameters of the initial approach and go-around. At 1251 hrs, the aircraft was approximately 12.5 DME track miles from the runway and on a magnetic heading of 090º; the autopilot was engaged with the lateral mode in Heading Select, and the pitch mode in Altitude Hold. About that time, ATC instructed the crew to make their heading 155º and to descend to 3,000 ft; this was subsequently followed by a heading change instruction to 210º. The crew acknowledged both heading changes and the altitude change, and the aircraft started to make a right turn and descend. During the descent, the autopilot pitch mode initially changed to FLC CAS[4], followed about 20 seconds later by a change to the V/S mode; the rate of descent increased to about 1,500 fpm. As the aircraft descended the crew said that the "NAV IS ARMED"[5]. As the aircraft approached 3,200 ft QNH, the autopilot pitch mode changed to Altitude Selected. Capture followed, 14 seconds later, by a change to Altitude Hold. The aircraft levelled off at 3,000 ft QNH, by which time it had completed its right turn and was on a magnetic heading of 209º. About that time, ATC advised the crew to maintain 160 kt to 4 DME.

When approximately 10 DME from the runway (Figure 1, Point A), ATC cleared the aircraft to descend to 2,000 ft for the ILS, which the PNF acknowledged. The autopilot Pitch mode then changed to V/S, the aircraft started to descend at about 1,500 fpm and, a short time later, the Altitude Alert 'chime' sounded[6] as the aircraft descended through 2,700 ft QNH. There was no apparent response from the operating crew.

The localiser deviation slowly reduced and, when it was at about 2 'dots', the autopilot mode changed to NAV LOC capture 1, which was quickly followed by NAV LOC capture 2. The localiser deviation continued to reduce and, as the aircraft crossed the localiser beam centreline, the lateral mode changed to APP LOC capture 2 and the aircraft started to make a left turn onto the localiser. At that time, the aircraft was 2.2 'dots' below the glideslope and at an altitude of about 2,350 feet (Figure 1, Point B). The commander advised ATC that they were established on the localiser and the crew were then passed to the tower frequency.

When the aircraft was at about 1,600 ft QNH, the glideslope deviation had increased to 3.5 'dots' (Figure 1, Point C) and this remained at 3.5 'dots' as the aircraft descended. Coincidentally, the autopilot lateral mode changed to APP LOC Track 1[7], followed almost immediately by APP LOC Track 2[8] and the aircraft stabilised on a magnetic heading of about 240º. Throughout this period, neither of the crew had referred to the aircraft's altitude or glideslope capture status.

When at 6 DME, the aircraft was at about 890 ft QNH (600 ft agl), the flaps were extended to 20º and, a short time later, the landing gear was extended. As the gear was lowered, the commander said "WHY HASN'T THAT…..UM", but his comment was without reference. As the landing gear locked down, an EGPWS "GLIDESLOPE" alert then occurred, (Figure 1, Point D). Almost immediately, the commander said "GLIDESLOPE…PULL-UP" and, after a delay

Footnotes

[4] FLC CAS – Flight Level Change and airspeed, both managed by the autopilot.

[5] The FDR did not record the switch positions on the autopilot guidance control panel.

[6] The Altitude Alert is triggered when the aircraft climbs or descends through 300 ft from the altitude in the Altitude Pre-selector.

Footnotes

[7] The autopilot Track 1 mode is designed for beam tracking when the aircraft is still a substantial distance from the airport. In this mode the autopilot is trying to establish the aircraft on the beam centre, when the beam may be unstable.

The autopilot Track 2 mode is designed for tight beam tracking. The mode is configured for a stable beam to allow the autopilot to tightly track any beam deviations and control the aircraft to meet CAT2 requirements.

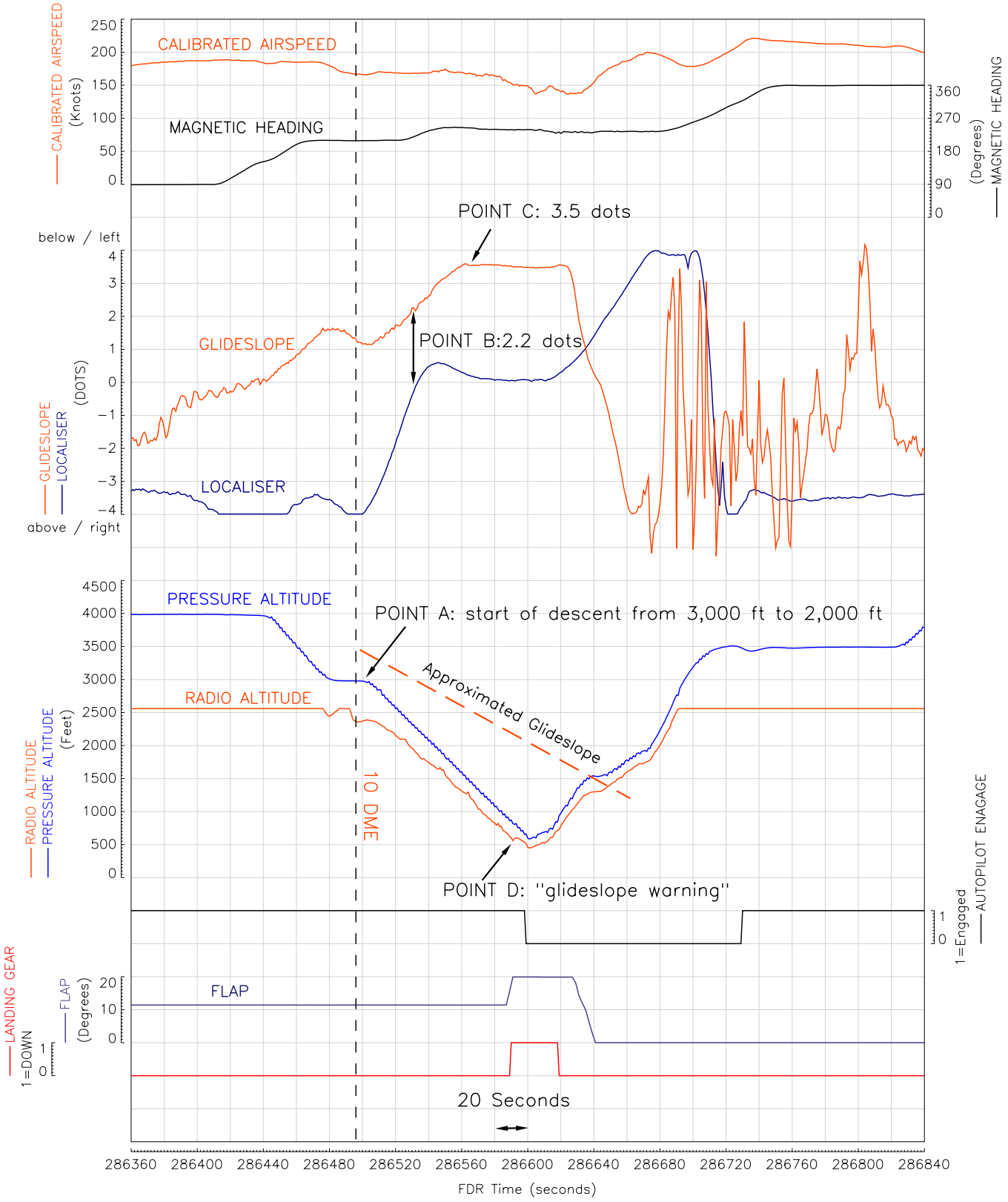


Figure 1

Salient FDR Parameters

of about six seconds, the autopilot was disconnected, the aircraft pitched up and started to climb. The aircraft had descended in IMC to about 450 ft above the ground. The commander subsequently advised ATC that they were going around due to an autopilot and ILS problem.

As the aircraft climbed both the landing gear and flaps were retracted and the crew carried out the missed approach procedure. The aircraft was flown manually to 3,500 ft QNH before the autopilot was engaged. The aircraft subsequently climbed to 4,000 ft QNH, under the instruction of ATC, and repositioned for a second approach.

The second approach and landing were uneventful. Both the localiser and glideslope were captured at 4,000 ft QNH and the aircraft then descended, tracking the ILS. The autopilot was disconnected at 250 ft agl and a manual landing was performed. The aircraft taxied from the runway to a stand where, at 1317 hrs, the engines were shutdown.

Autopilot Glideslope Capture

The aircraft was equipped with a Honeywell Primus® 2000 automatic dual flight control system that provided full three-axis control. To enable the capture of the ILS for a precision approach, the Approach mode is selected by the crew; the system then initially attempts to 'capture' the localiser beam. When this occurs, the system then computes when to initiate a glideslope capture manoeuvre. However, this manoeuvre is not triggered if the aircraft is greater than two 'dots' deviation from the glideslope and/or is diverging from the glideslope beam.

Enhanced Ground Proximity Warning System (EGPWS)

The aircraft was also equipped with a Honeywell MK-VI EGPWS. This provided a number of warning modes, one of which was Mode 5, and this provides two levels of alert whenever an ILS frequency is tuned and the aircraft descends below the glideslope with the landing gear down, see Figure 2. The first level alert occurs if the aircraft is below 1,000 feet radio altitude (RA) and the aircraft is 1.3 'dots' or greater below the glideslope. Alert lights in the flight deck illuminate and a 'soft' audio alert is generated; termed 'soft' because the audio message "GLIDESLOPE**"** is annunciated at half volume when compared to the second level of alert volume. A 20% increase in the glideslope deviation causes additional "GLIDESLOPE" messages to be aurally annunciated.

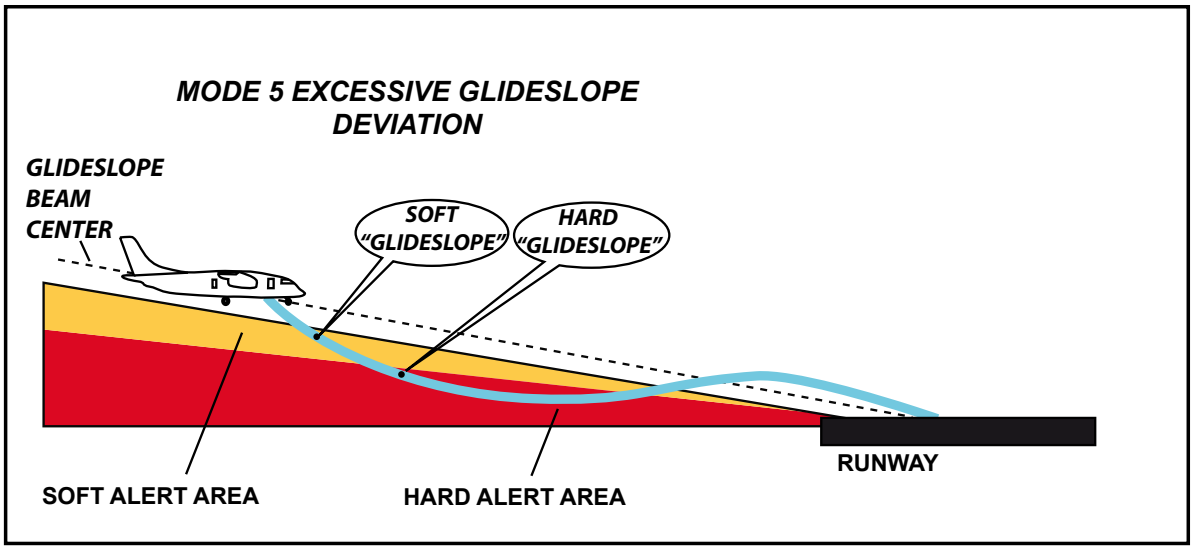
The second level alert occurs if the aircraft is below 300 ft RA, with 2 'dots' or greater glideslope deviation. This is called a 'hard' alert as a louder "GLIDESLOPE, GLIDESLOPE" message is aurally annnunciated every four seconds until the 'hard' envelope is exited. The alert lights remain on until a glideslope deviation of less than 1.3 'dots' is achieved.

To avoid unwanted alerts when capturing the localizer between 500 ft and 1,000 feet agl, 'below glideslope' alerts are only enabled if;

- the localizer is within ± 2 dots, if available
- the landing gear and flaps have been selected
- the glideslope Cancel is not active
- a front course approach has been determined

The upper altitude limit for the alert is modulated with vertical speed. For descent rates above 500 fpm the upper limit is set to the normal 1,000 feet agl; for descent rates lower than 500 fpm, the upper limit is desensitized (reduced) to a minimum of 500 ft agl.

Data from the preceding 100 flights was downloaded from the EGPWS. Of these flights, there were ten



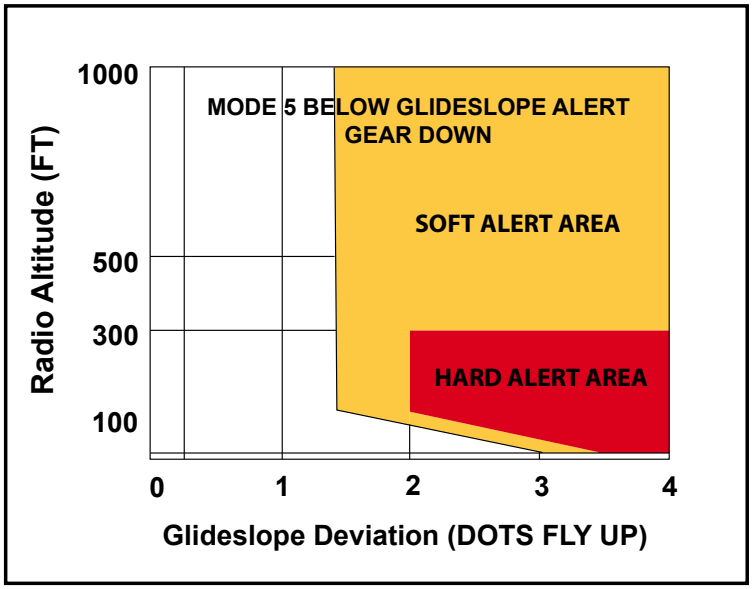


Figure 2

EGPWS Mode 5 hard and soft alert areas

EGPWS events that would have triggered alerts, of which nine were Mode 5 warnings of a similar nature to this incident. One was a Mode 1 "SINK RATE, SINK RATE, PULL UP" warning. The full circumstances surrounding these events is not known, as they had not been reported or investigated. The operating company reported that they had received no reports of EGPWS alerts (real or spurious) from their Dornier 328 crews, either by Air Safety Reports or a Mandatory Occurrence Report.

Autopilot capture/descent

When the aircraft was cleared by ATC from 3,000 ft to 2,000 ft the aircraft descent was performed by the autopilot in vertical speed (V/S) mode, with a selected

descent rate of about 1,500 fpm. As the aircraft descended through 2,350 ft QNH, the autopilot captured the localiser; the aircraft was 2.2 'dots' below the glideslope at that time. As a result of the high descent rate, the aircraft diverged further below the glideslope and, as the deviation was not within the required 2 'dots' and the aircraft was effectively flying away from the beam, the autopilot system was not able to capture it. As the aircraft continued to descend, the glideslope deviation increased to about 3.5 'dots' at 1,600 ft QNH, but the crew did not discuss the glideslope capture status or the fact that they were now below their cleared altitude of 2,000 ft and descending rapidly.

Once the aircraft descended through 1,000 ft RA, the aircraft would have entered the EGPWS Mode 5 first level alert area. When it was at about 600 ft RA, the landing gear was lowered and, almost immediately, the EGPWS generated a soft "GLIDESLOPE" warning, which was heard by the commander. The aircraft continued to descend for a further six seconds before the autopilot was disconnected and a missed approach carried out.

Additional information

The crew of D-CPRW were using current Jeppesen approach charts. The relevant approach chart for Runway 24R, Figure 3, shows the Final Approach Fix at 10 DME, based on the ILS, at an altitude of 3,500 ft amsl; the runway elevation is 249 ft.

Aeronautical Information Circulars

Aeronautical Information Circulars (AIC) published by the CAA are notices containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP. As a general rule, AICs refer to subjects that are of an administrative rather than an operational nature. They are, however, also used to publish advanced warnings of impending operational changes and to add explanation or emphasis on matters of safety or operational significance. Aeronautical chart issues and corrections are also notified through the medium of the AIC.

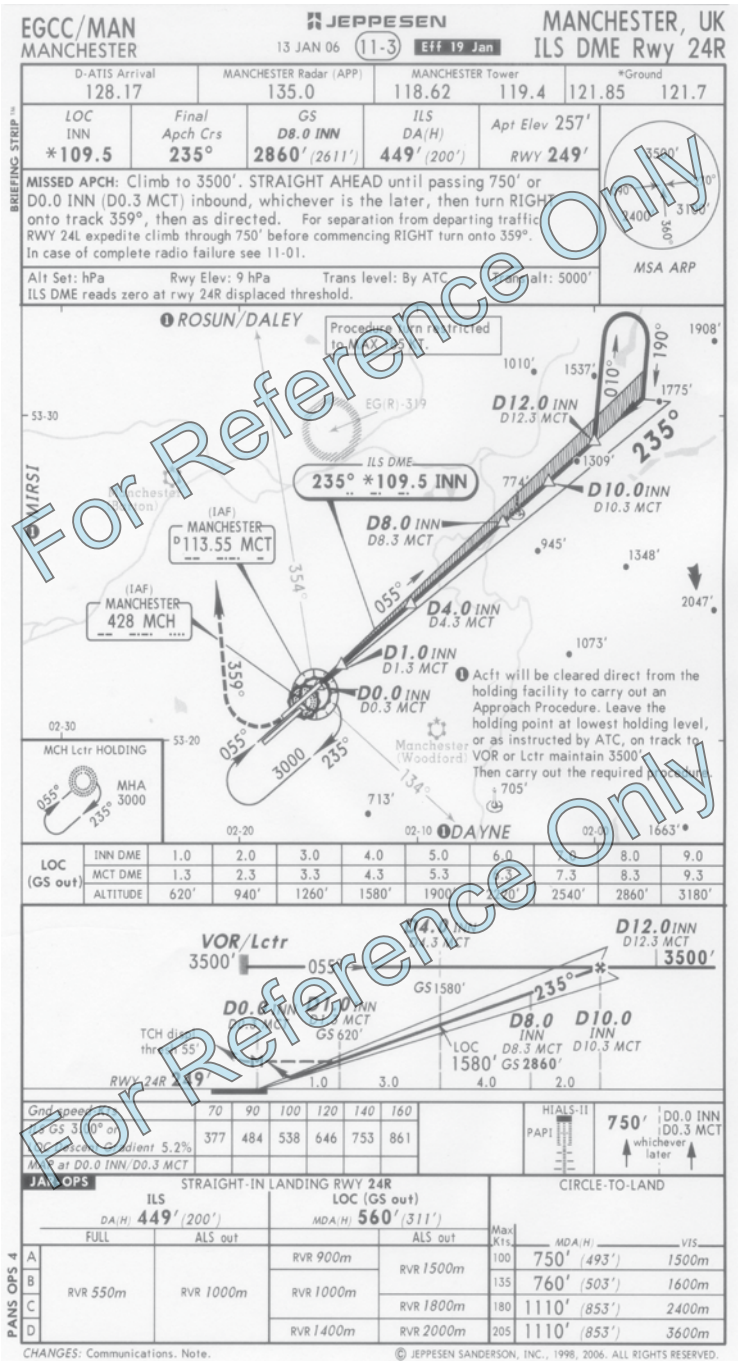


Figure 3

An extract from AIC 111/2004 (Pink 74), *Controlled Flight Into Terrain (CFIT) - Risk Avoidance*, is shown below:

> ***'10. Ground Proximity Warning Systems (GPWS) and Minimum Safe Altitude Warning Systems (MSAWS)***
>
> *10.1 The relevance of GPWS and MSAWS needs to be clarified. Both systems have been designed to provide alerts and warnings (via the controller in the case of the latter) that the aircraft has infringed certain preset thresholds and that, if not corrected by the pilot, it may fly into terrain.* ***Neither system is a substitute for crews so planning and executing their flight that the need for GPWS or MSAWS never arises.*** *Despite continuous improvements being made to them, and the undoubted safety benefit each can provide, neither system can be relied upon absolutely.*
>
> ***10.2 There is not, and there never will be, any better 'CFIT Avoidance' system than pilots and other flight crew members who by their pre-flight preparations and in-flight actions ensure that all relevant preventive measures to avoid CFIT are applied conscientiously on every occasion.'***

Other incidents

The AAIB reported on a similar incident at Stansted Airport in Bulletin 7/2005 (N523MC, EWC2004/12/03). In this incident the Approach controller failed to notice the aircraft flying significantly below the glideslope. The AAIB is currently investigating three other incidents of aircraft deviating significantly below the approach path. On these three occasions the controllers noticed the deviations and took the appropriate action.

Presently there is no MSAWS, or equivalent system, installed at any airport in the UK where the National Air Traffic Service (NATS) provides the ATC service. NATS were approached to see if they are considering the installation of any system which would aid an approach controller to identify when an aircraft deviates significantly below the correct approach path. Their response is shown below:

> *'NATS are currently investigating various technology solutions to determine if it is possible to provide air traffic controllers with appropriate alerts if an aircraft deviates significantly below the approach path. A key element of this investigative activity is ensuring that any alert is provided to the relevant controller (i.e. the controller on frequency) in sufficient time for the controller to assimilate the information and issue appropriate instructions to the aircraft.'*

Analysis

Tests carried out on the aircraft failed to identify any faults in the ILS/autopilot /EGPWS systems that could be considered as causal or contributory factors in this incident.

The aircraft came to within 450 ft of the ground, whilst in IMC some 5.5 nm from the runway. In the absence of any identifiable technical problem with the aircraft, it was considered that this resulted from the flight crew not performing adequate 'cross cockpit' monitoring, not applying Cockpit Resource Management (CRM) techniques and poor use of SOPs throughout the flight. Whilst the crew noticed, initially, that they were below the glideslope, the aircraft continued with an excessive rate of descent and the range from touchdown was not checked against the associated heights on the approach plate. The crew subsequently became distracted while

configuring the aircraft for landing and trying to reduce their IAS. When data from the CVR and the radar recording were synchronised, it was apparent that the aircraft was descending through 2,700 ft QNH as the Altitude Alert chime sounded. This indicated that 3,000 ft was set in the Altitude Pre-selector window at that time, as opposed to the cleared altitude of 2,000 ft. Both the crew members reported that they did not recall receiving the clearance to descend from 3,000 ft to 2,000 ft given by the approach controller, and believed that their final descent clearance from ATC before intercepting the localiser was from 3,500 ft to 3,000 ft. However, as the PNF actually acknowledged the clearance to 2,000 ft, he must have done so by some form of 'reflex action' but did not change the Altitude Pre-selector from 3,000 ft to 2,000 ft. As a result, and the use of the V/S mode to descend, the aircraft may have continued into the ground had the crew not been alerted to the situation by the EGPWS.

The company's Operations Manual required that an incident such as this should have been reported immediately to the company. As a result, the aircraft flew another (35 minute) sector before it was impounded for the investigation. Fortunately, a two hour duration CVR was fitted to the aircraft and the recording of the incident flight was preserved. Should a 30 minute duration CVR have been installed, or the subsequent sector have been longer, the recording would have been over-written, resulting in the loss of data essential to the investigation. Whilst it would have been possible to confirm the clearance given by ATC to descend from 3,000 ft to 2,000 ft from recordings of the ATC frequency, it would not have been possible to identify the Altitude Alert which sounded in the cockpit at around 2,700 ft. This would have raised the possibility that some unidentified system error might have occurred.

Safety Recommendations

Although the aircraft was registered in Germany, it was operating under an AOC for an Austrian based company, EuroManx Airlines GmbH. In view of the findings of this investigation in relation to the operation of the aircraft, the following safety recommendation is made:

Safety Recommendation 2006-086

It is recommended that the Austrian aviation authority, AustroControl, review the flight crew training and operational procedures of EuroManx Airlines GmbH, with the intent of ensuring that the operation of their aircraft is conducted in accordance with approved procedures.

Conclusion

The crew were nearing the end of an uneventful flight in a serviceable aircraft. Due to a failure to operate the aircraft in accordance with SOPs, the safety of the aircraft was seriously compromised. A possible Controlled Flight into Terrain (CFIT) accident was only avoided by the crew taking appropriate action upon being alerted by the EGPWS.