SERIOUS INCIDENT

Aircraft Type and Registration:	Boeing 737-300, VP-CKY
No & Type of Engines:	2 CFM56-3B2 turbofan engines
Year of Manufacture:	1992 (Serial no: 26282)
Date & Time (UTC):	15 January 2014 at 2249 hrs (local Grand Cayman time)
Location:	Owen Roberts International Airport, Grand Cayman
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 2 Passengers - 64
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	52 years
Commander's Flying Experience:	18,450 hours (of which 13,800 were on type) Last 90 days - 65 hours Last 28 days - 42 hours
Information Source:	AAIB Field Investigation

Synopsis

Following an unstable approach to a wet runway, the aircraft was flared for landing but floated along the runway. The commander extended the speed brakes to cause the aircraft to touch down and applied maximum reverse thrust and braking. Reverse thrust was cancelled at a groundspeed of 22 kt with 139 m of runway remaining.

One Safety Recommendation is made relating to the reporting of serious incidents and one relating to the reporting of surface winds at Owen Roberts International Airport.

History of the flight

VP-CKY was operating a scheduled passenger flight between Miami, Florida and Grand Cayman, Cayman Islands, with six crew and 64 passengers on board. The commander was the pilot flying (PF) and the co-pilot was the pilot monitoring (PM). The crew recorded the ATIS (valued at 2200 hrs local time)[1] for Owen Roberts International Airport at Grand Cayman, which reported a calm surface wind, a visibility of 10 km, few clouds at 1,800 ft and broken cloud at 3,500 ft above the airfield. The temperature was 24°C and the sea level pressure was 1011 hPa. The crew planned to make a visual approach to Runway 08

Footnote

[1] Local time in the Cayman Islands is UTC - 5 hours and local time is used throughout this report. The event took place on 15 January 2014 at 2249 hrs local time (16 January 2014 at 0349 UTC).

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at the airport by routing from the north west of the island towards the Final Approach Fix (FAF) before turning onto the final approach. The approach was to be made using Flap 40 with a V_{REF} of 133 kt and an Autobrake setting of 3[2]. Figure 1 shows the actual track flown by the aircraft.

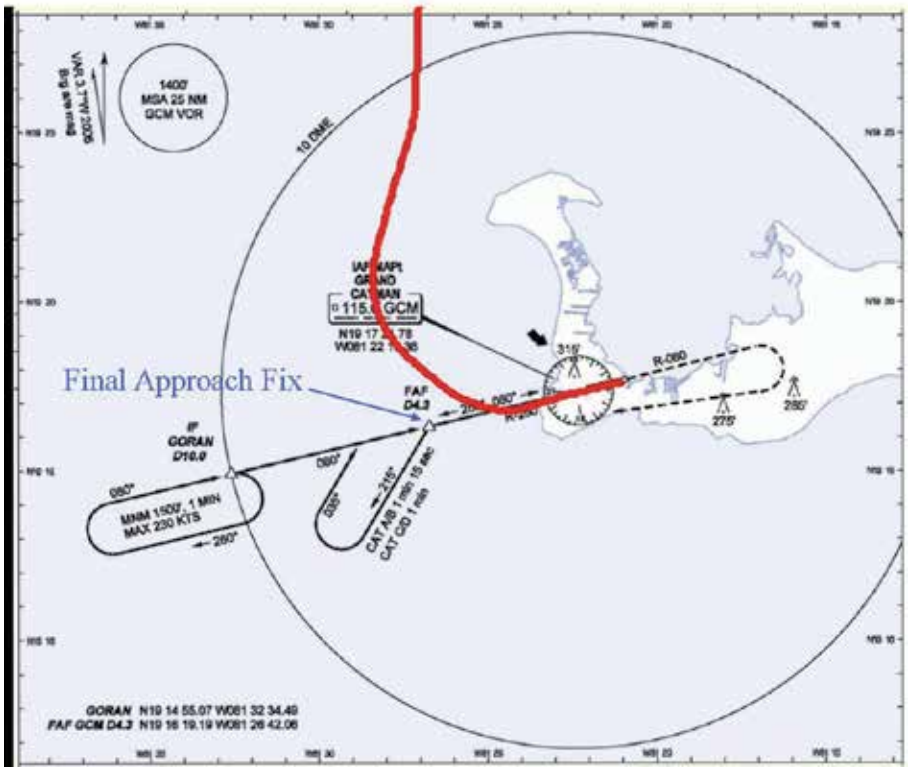

Figure 1

Extract from the Cayman Islands AIP showing the track flown by VP-CKY on its approach to Runway 08 at Owen Roberts International Airport

When the crew of VP-CKY first contacted Cayman Approach control, the Air Traffic Control Officer (ATCO) reported that there were light to moderate rain showers at the airport with a visibility of 2 nm. He also reported that there were rain showers approaching the airport from the east-southeast, moving north-northwest. VP-CKY was cleared to route via ATUVI[3] to the FAF and to descend to 1,500 ft amsl. At 2238 hrs, when the crew reported their position at ATUVI descending through Flight Level (FL) 130, the ATCO (who was in the visual control room in the ATC tower at the airport) reported that the visibility on final approach was now less than 0.5 nm. The commander reported to ATC that he could see on the aircraft's weather radar a "WALL OF BUILD-UP" running "ALL THE WAY OVER GRAND CAYMAN AND OVER THE VOR". The Cayman Islands National Weather Service later provided an image, timed at 2230 hrs, which shows the band of showers to which the commander referred. The colours yellow, amber and red in Figure 2 indicate increasingly heavy precipitation.

Footnote

[2] Available Autobrake settings are OFF, 1, 2, 3 and MAX.
[3] ATUVI is 43 nm north of the airport.

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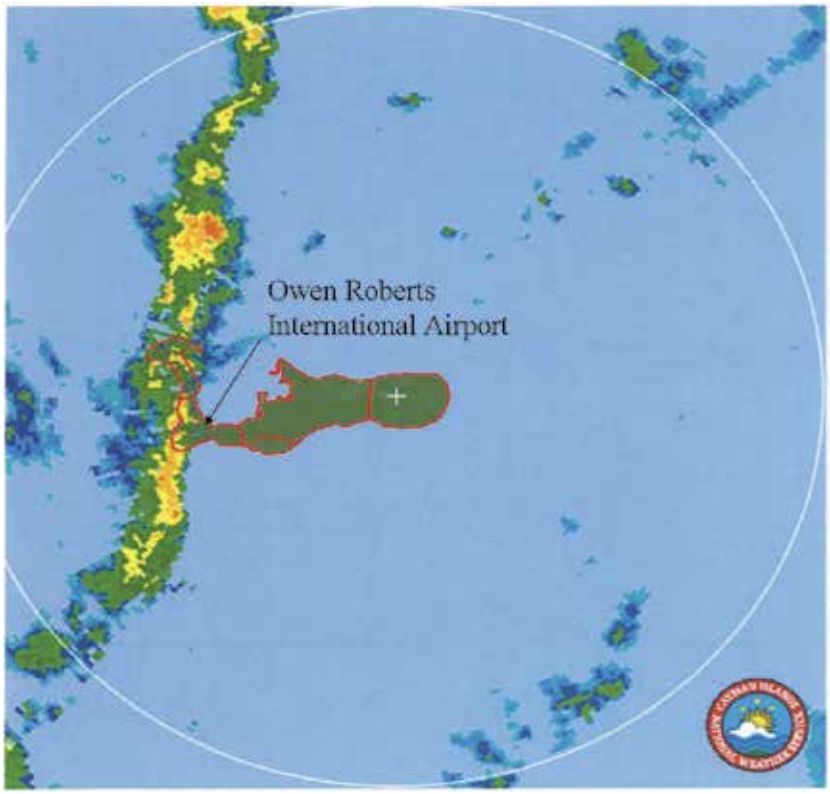

Figure 2

Weather image at 2230 hrs provided by the Cayman Islands National Weather Service showing the line of showers referred to by the commander of VP-CKY

The commander transmitted that he intended to route to the right (west) of a line towards the VOR and position on base leg for the runway. As a backup plan, the commander said that he would pass over the VOR and position to the east of the airport where the weather looked better on the aircraft's weather radar.

At approximately 2248 hrs, the crew reported that the aircraft was at an altitude of 1,500 ft and on a 5.5 nm base leg for Runway 08. The ATCO cleared the crew for a visual approach and to report when on final approach. Approximately 30 seconds later, the crew reported that the field was in sight and the controller cleared them to land, adding that the surface wind was from 350° at less than 5 kt. The aircraft touched down at 2249:25 hrs.

At 2250 hrs, the ATCO transmitted "107 TOWER" and, after the commander replied "GO AHEAD", he said "JUST MAKING SURE YOU'RE STILL ON [the runway]; BACKTRACK VACATE CHARLIE". The commander asked for the current wind velocity and was told that the anemometer was indicating calm wind while the digital system was indicating wind from 260° at 5 kt gusting to 15 kt[4].

Footnote

[4] See the section, *Information from the Air Traffic Control Officer,* for an explanation of the two systems.

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Recorded data

Flight data recorded on the aircraft's Quick Access Recorder (QAR) was available from the flight and salient parameters relating to the approach and landing are shown in Figures 3 and 4.

The approach

Figure 3 starts with the aircraft at 1,300 ft amsl on the approach to Runway 08. At 1,000 ft amsl (992 ft aal), the landing gear was down, the flap was passing the Flap 15 position in transit to a final flap setting of Flap 30, and the calibrated airspeed (CAS[5]) was 188 kt. The engines were set at idle thrust during the descent from 1,100 ft to 550 ft amsl, during which the average rate of descent was 1,200 ft/min.

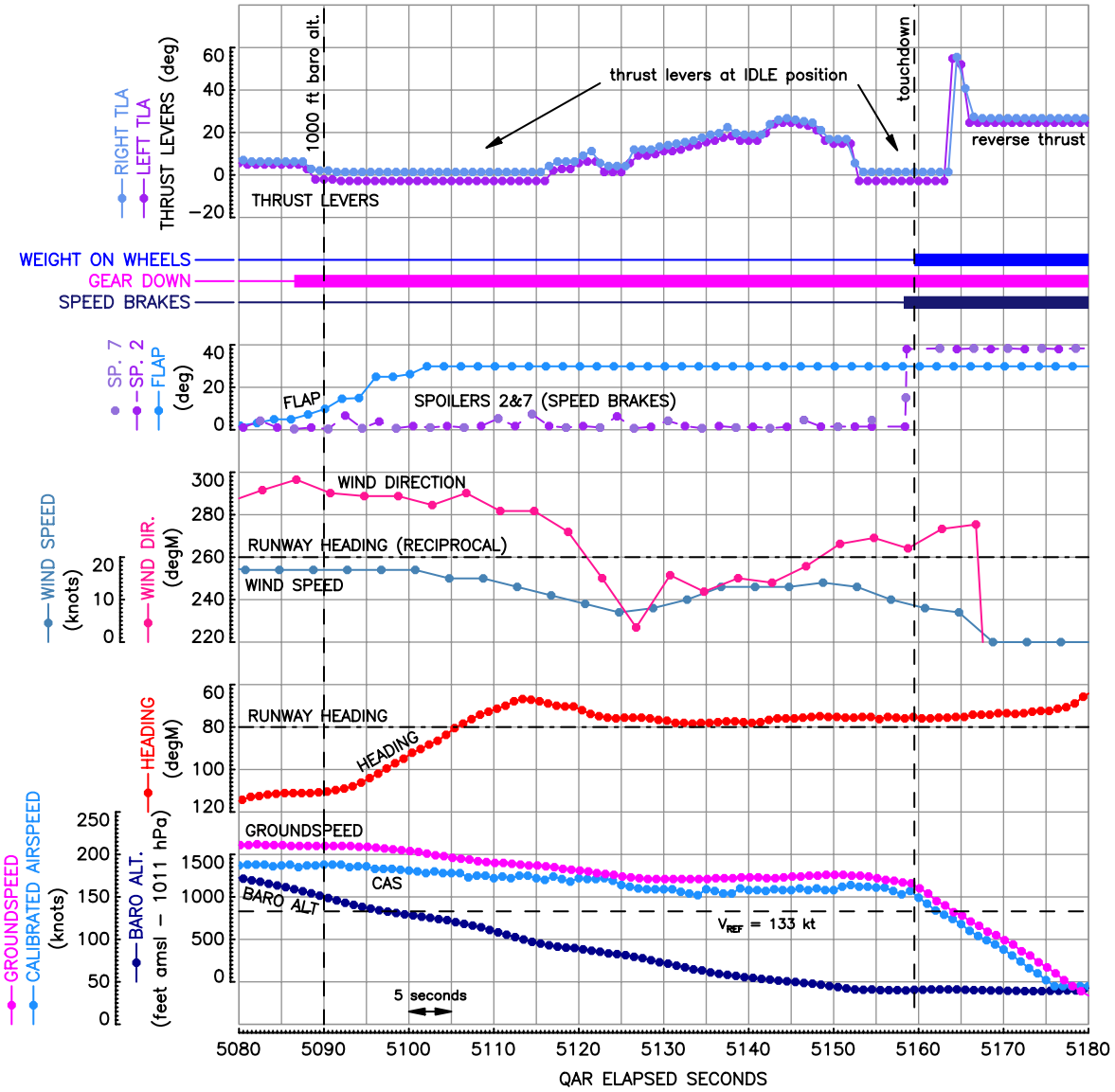

Figure 3

Recorded flight data during the approach

Footnote

[5] CAS is the indicated airspeed (IAS) corrected for airspeed indicator system errors.

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As the aircraft descended through 1,000 ft amsl, the aircraft was in a left turn to intercept the runway centreline, which it briefly flew through at 800 ft amsl. The aircraft was established on the final approach track at approximately 400 ft amsl.

The landing

Figure 4 starts with the aircraft at 60 ft agl, a little under 12 seconds before touchdown. At 50 ft agl, the aircraft was flying at 160 kt CAS but had a groundspeed of 175 kt. At about 3 ft agl, approximately six seconds after the thrust levers were set to the IDLE position, the speed brakes were deployed and the aircraft touched down approximately one second later at 157 kt CAS (166 kt groundspeed). Maximum braking was then applied, followed four seconds later by the selection of reverse thrust, both of which were maintained until the aircraft slowed to approximately 22 kt groundspeed, by which time the aircraft was being positioned to the left side of the runway. The distance from touchdown to the point that reverse thrust was cancelled was 1,027 m (derived from recorded groundspeed).

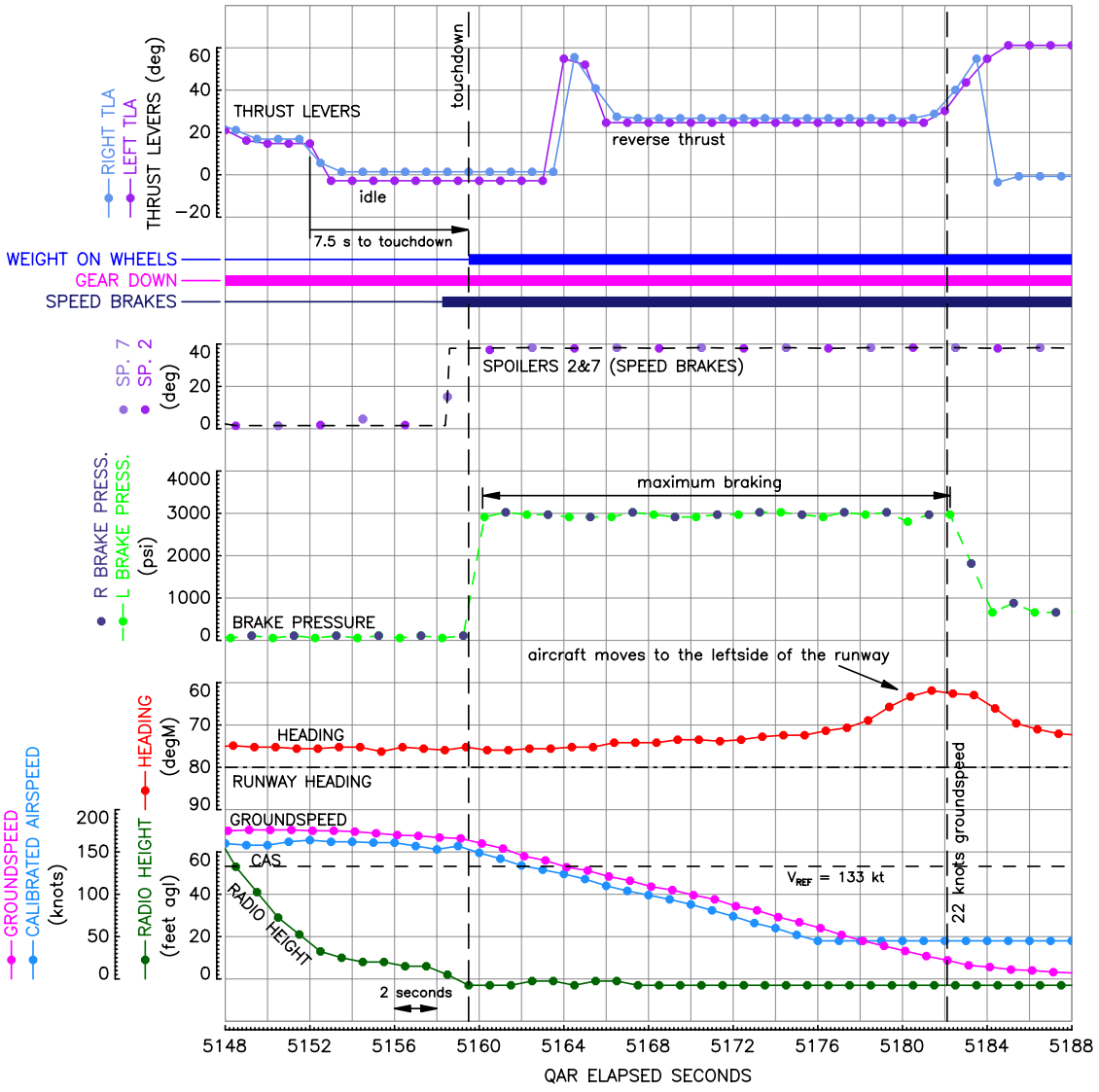

Figure 4

Recorded flight data during the landing

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Figure 5 shows information on the landing derived from recorded flight data and depicted on a plan of the airport (all distances are approximate). The aircraft touched down 634 m beyond the touchdown zone markers. When reverse thrust was cancelled at 22 kt, there was 139 m remaining of the landing distance available (LDA). The aircraft began to turn around when the groundspeed was 6 kt, 95 m from the end of the LDA.

Calculation of ground stopping distance

The recorded flight data was used to calculate a ground distance from touchdown to the point on the runway where the aircraft was at 22 kt, the groundspeed at which the maximum braking action ceased. This gave a distance of 1,027 metres. This was compared with calculations based on the tabulated information in the Boeing 737-300 Quick Reference Handbook (QRH) for two cases:

1) a 'Dry' runway
2) a 'Wet' runway with 'good' braking action.

The conditions used in each case were a landing weight of 113,300 lb, an airspeed of V_{REF}+25 kt, a tailwind of 10 kt and maximum manual braking. Allowing an 'air distance' of 305 metres in each case, the calculated ground distances (to a standstill) were 785 metres for the Dry runway, 1,205 metres for the Wet runway.

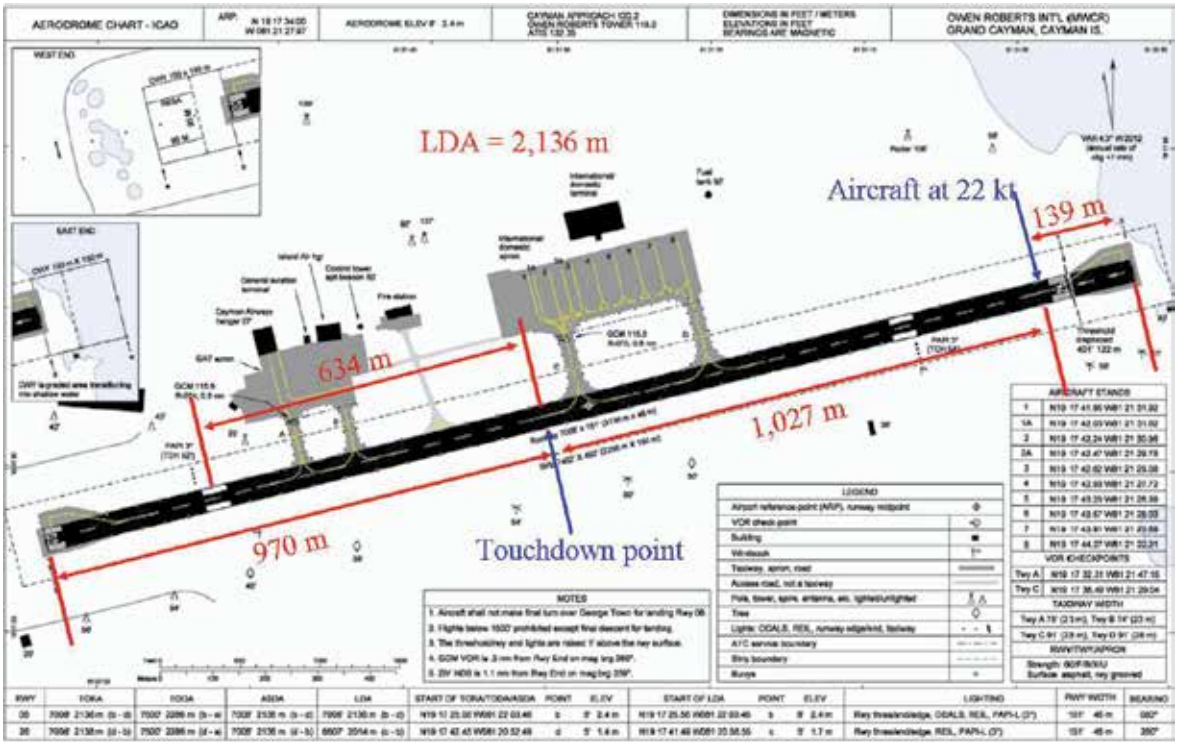

Figure 5

Information on the landing derived from recorded flight data

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Engineering action

Following evaluation of the recorded data from the incident, and the identification of a significant peak value (2.249g) of vertical acceleration at touchdown, a Hard Landing inspection was ordered on VP-CKY. This inspection was in accordance with the aircraft manufacturer's Aircraft Maintenance Manual (AMM), which details two Phases. The Phase 1 inspection, conducted on 5 February 2014, did not show any damage so, in accordance with the AMM, the further Phase 2 inspection was not performed.

Information from the commander

The commander reported that, as the aircraft passed the north-western tip of the island, he could see the whole of the west coast of the island, including the airport and runway, beneath the cloud. The cloud had a "*flat ceiling"* at what he estimated to be 1,200 ft to 1,400 ft amsl. The aircraft joined the base leg approximately 5 nm west of the runway at 1,500 ft amsl and 220 kt. The commander reported that it was raining at the FAF (Figure 1) and so he turned left, inside the FAF, to avoid the weather and intercept the final approach at approximately 4 nm. He also briefed the co-pilot that the landing would be made using Flap 30 instead of Flap 40.

As the aircraft flew along the final approach path, the crew could see the runway through light rain. However, the commander reported that, just after the aircraft descended through 50 ft radio altitude and he began to flare, "a wall of heavy rain hit the windscreen*"*. He considered that the situation was "too critical to go around*"*, so he maintained runway alignment using the runway edge lights as his reference and deployed the speed brakes at what he estimated to be 6 ft radio altitude. After touchdown, the commander selected maximum reverse thrust and maximum manual braking and brought the aircraft to a halt just before the turnaround bay at the end of the runway. He commented that he had difficulty selecting reverse thrust, such that it seemed to take longer than normal to engage, and that the brakes felt ineffective.

The commander stated that, although he had been aware that the aircraft was faster than normal on the approach, the speed had been fluctuating in the gusty conditions and he had expected it to decrease when the aircraft was below 200 ft aal.

Information from the Air Traffic Control Officer

The ATCO was in the visual control room in the ATC tower and he based his report of visibility upon knowledge of the distance from the tower of lights in the local area.

The ATCO saw the lights of the aircraft while it was on base leg and commented that it appeared closer than would normally be expected. During the landing, he noticed that the aircraft floated before touching down just before Taxiway C. He had expected the aircraft to go around, basing his judgment on the distance it floated along the runway and the fact that the runway was wet. He lost sight of the aircraft after it touched down because of the intensity of the rain and the spray from the thrust reversers. He could see the red centreline lights at the end of the runway[6] and he saw them disappear as they were occluded by the passing aircraft. This prompted him to ask the commander whether the aircraft was still on the runway.

Footnote

[6] The runway centreline lights are red along the final 300 m of runway.

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The ATCO explained that the primary system for reporting wind velocity is the digital Automated Weather Observing System (AWOS) which uses equipment located on the south side of the airfield. However, during inclement weather, there is doubt about the accuracy of the information this equipment provides because the wind can be disrupted by local obstacles. An alternative display of wind velocity is available in the ATC tower which takes its information from an anemometer on the north side of the airfield. During inclement weather, the controller considered this equipment to be more accurate.

Reporting of the event

The commander considered that the event did not lead to an accident or an incident that would be classified as reportable. Nevertheless, after discussion with managers at the airline, he submitted an *Air Hazard Report Form* as part of the operator's Safety Management System (SMS). Approximately two weeks later, the operator instigated an investigation after receiving further information about the event. Subsequently, the Civil Aviation Authority of the Cayman Islands (CAACI) asked the operator to produce a report on the event which the operator submitted through the CAACI's Mandatory Occurrence Reporting (MOR) scheme.

The ATCO did not feel that guidance on reporting within the Manual of Air Traffic Services (MATS) was clear in respect of this type of incident. He did not consider the incident to be reportable because the aircraft had remained on the runway.

Stabilised approach criteria

The landing mass recorded on the landing data card was 113,300 lb, at which mass V_{REF} would have been 133 kt for a Flap 40 landing and 136 kt using Flap 30.

At the time of the event, the operator required all approaches to be stabilised by 1,000 ft aal. The operator's stabilised approach criteria included:

1. Aircraft on the correct flight path.
2. Speed not more than V_{REF} + 20 kt and not less than V_{REF} with a thrust setting appropriate for the airplane configuration ('*engines spooled to the required engine thrust setting for the approach').*
3. Aircraft in the correct landing configuration ('*gear down and landing flaps'*).
4. Sink rate no more than 1,000 ft/min.
5. All briefings and checklists completed.

Boeing 737 Flight Crew Training Manual (FCTM)

The Boeing 737 FCTM states that, if a go-around is initiated before touchdown but touchdown occurs, the crew can continue with the go-around. A go-around can be initiated after touchdown until the point at which reverse thrust is selected.

The FCTM states that, after touchdown and with the thrust levers at idle, the reverse thrust levers should be raised rapidly aft to the interlock position and then to the reverse idle detent.

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Safety Action

Following this incident, the operator issued an Operational Notice to reinforce its policy with regard to stable approaches. The Notice noted that two risk factors typical in runway excursion events during landing were that go-arounds were not conducted and that touchdown occurred beyond the expected point. The Notice stated that, in 75% of occasions, the prime cause was an unstable approach. It amended the operator's policy and guidance on stable approaches to require a go-around to be flown in circumstances where an approach was unstable at 1,000 ft aal. The Notice stressed the importance of the role of the PM who, if the approach was not stable at 1,000 ft aal, was to call "UNSTABLE GO AROUND".

The operator issued a further Operational Notice, instructing pilots to carry out a baulked/rejected landing in circumstances where the aircraft did not touch down within the touchdown zone of the runway. The touchdown zone is the first 3,000 ft (ICAO = 900 m) of the runway or one third of the LDA, whichever is less (equivalent to 712 m at Owen Roberts International Airport).

Reporting and investigating accidents and serious incidents

Definition of incidents and serious incidents

Annex 13, *Aircraft Accident and Incident Investigation,* to the Convention on International Civil Aviation (the Chicago Convention) contains definitions of incidents and serious incidents. An incident is defined as:

> *'an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.'*

A serious incident is defined as:

> *'an incident involving circumstances indicating that there was a high probability of an accident.'*

The Annex states that the difference between an accident and serious incident lies only in the result and suggests that takeoff or landing incidents are likely to be considered serious.

Reporting and investigating accidents and serious incidents in UK Overseas Territories

Section 75 of the *Civil Aviation Act 1982* contains provisions for the investigation of air accidents occurring in the UK, or to aircraft registered in the UK, in accordance with Annex 13 to the Chicago Convention. The Act adopts the definition of an accident contained within the Annex but states that the term includes:

> *'any fortuitous or unexpected event by which the safety of an aircraft or any person is threatened.'*

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The *Civil Aviation Act 1982 (Overseas Territories) Order 2001* extends the provisions of section 75 to specified Overseas Territories (including the Cayman Islands) and allows the Governor to make provisions for the investigation of air accidents. The Governor of the Cayman Islands makes such provisions in the *Cayman Islands Civil Aviation (Investigation of Air Accidents and Incidents) Regulations.* The Regulations require aerodrome authorities, aircraft commanders and aircraft operators to give notice to the Governor should an accident or serious incident occur on or adjacent to an aerodrome. The Regulations define an incident as:

> *'an occurrence, other than an accident, associated with the operation of an aircraft which affects or is relevant to the safety of its operation.'*

A serious incident is defined as:

> *'an incident involving circumstances indicating that an accident nearly occurred.'*

The Regulations require any undertaking[7] or authority to which a Safety Recommendation is made to consider the recommendation and act upon it where appropriate. The undertaking is to pass to the Governor details of measures to be implemented in response to the recommendation, if any, or an explanation of why no measures will be implemented.

Memorandum of Understanding (MoU) between the Government of the Cayman Islands and the AAIB

The MoU between the Government of the Cayman Islands and the AAIB provides for the AAIB to assist the Governor of the Cayman Islands in the event of an investigation into an aircraft accident or serious incident. Under the MoU, the Chief Inspector of Air Accidents at the AAIB is appointed as Chief Inspector of Air Accidents of the Overseas Territory of the Cayman Islands. The Governor determines whether AAIB assistance is required and the level of assistance is determined through discussion with the Chief Inspector of Air Accidents.

Mandatory Occurrence Reporting (MOR)

Part 21 of *The Air Navigation (Overseas Territories) Order (AN(OT)O) 2013* considers Mandatory Occurrence Reporting in Article 174 and states that reportable occurrences (as defined in the Order) must be reported to the Governor. The CAACI publishes the Manual of Mandatory Occurrence Reporting to satisfy this requirement. Article 174, paragraph (6) states:

> *'Any accident or serious incident notified to the Governor under regulations made under section 75 of the Act does not constitute a reportable occurrence for [the] purposes of this article.'*

Footnote

[7] Undertaking is defined in the Regulations as '*any natural person or any legal person, whether profit-making or not, or any official body whether having its own legal personality or not*'.

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The purpose of the MOR scheme is for the CAACI to investigate reportable occurrences and make the findings available to other organisations. Appendix C to the MOR manual describes the reporting procedure. It explains that the CAACI will categorise an occurrence and, for an accident or serious incident, the DGCA will consult with the AAIB when deciding whether AAIB support is required. For other incidents, the CAACI will carry out the investigation and publish the findings.

Overseas Territories Aviation Requirements (OTARs)

OTARs are published by Air Safety Support International, a subsidiary company of the UK CAA, as part of its objective to support Overseas Territories in the safety regulation of civil aviation. OTARs Part 13, *Occurrence Reporting,* reproduces or amplifies certain provisions of the AN(OT)O. Subpart A, paragraph 13.9, *Applicability,* states:

> *'In the event of an aircraft accident or serious incident occurring in a Territory any Civil Aviation (Investigation of Air Accidents and Incidents) Order or Regulations in force in the Territory will be applicable. The Order or Regulations lay down the requirements relating to the notification of accidents and incidents and the obligations to provide information to the Governor or to an Inspector of Air Accidents appointed by him to carry out an investigation.'*

OTAR Part 13 is amplified by Overseas Territories Aviation Circular (OTAC) 13-1 which describes the Overseas Territories MOR scheme and provides further guidance to those who are involved in its operation.

Information from the operator

Operator's Safety Management System (SMS)

The operator's SMS includes an internal hazard reporting procedure where a safety hazard is defined as:

> *'any event or situation with the potential to result in significant degradation of safety and [which] can cause damage and/or injury.'*

The MOR section of the SMS includes a process for reporting accidents to the CAACI under the CAACI's MOR scheme. The SMS also gives examples of events to be notified under the MOR scheme, some of which feature in the Annex 13 list of examples of serious incidents.

Operator's Safety Policy Manual

Section 2.14 of the operator's Safety Policy Manual details company policy with respect to the CAACI MOR scheme. Section 2.14.5 categorises *'Reportable Accidents and Incidents'* between Category 'A' and Category 'H'. A Category 'A' accident which, under the policy, is to be reported under the MOR scheme, is one that results in the apparent destruction of the aircraft and/or involves heavy loss of life.

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Cayman Islands Airports Authority (CIAA)

CIAA Safety Management System

The CIAA SMS requires ATCOs to report internally:

> *'any incident involving an unsafe, or potentially unsafe, occurrence or condition, irrespective of whether it involves injury or property damage.'*

In addition, the SMS lists examples of occurrences which are subject to mandatory reporting to the CAACI under its MOR scheme. It states that mandatory reporting is required for:

> *'any accident or event that results in a fatality, injury or illness to person or damage to property or the environment'; or*
>
> *'an event which if not corrected would likely endanger people, property or the environment, or an incident involving circumstances indicating that an accident nearly occurred.'*

Owen Roberts International Airport Manual of Air Traffic Services

The airport operator's MATS instructs controllers to:

> *'submit a report using the forms in the CAACI Manual of Mandatory Occurrence Reporting (CAM131) within 96 hours of any occurrence involving aircraft.'*

There is no other guidance in relation to the reporting of occurrences.

Analysis

Incident and accident reporting

The decision whether or not to report an event, and how to classify how serious it was, is aided by descriptive examples in the various documents referred to in this report. In this occurrence, to VP-CKY on 15 January 2014, procedures developed to prevent overrun accidents, in particular the options to go around from an unstable approach or reject a 'long' landing. The use of speed brakes in the air, in this event, was an improvised, non-standard technique which allowed the aircraft to touch down and decelerate and which possibly prevented a runway overrun. However, at the time the speed brakes were deployed, the length of runway required, or available, to stop were unknown and the aircraft's landing performance was compromised. Therefore, this event met the criteria to be classified as a serious incident.

This event was originally considered to represent a hazard to be recorded in the operator's SMS (and not to be reported otherwise) but it became the subject of an internal investigation once further information became available. Following a request from the CAACI, the event was reported by the operator under the MOR scheme to the CAACI and, thereby, to the Director General of Civil Aviation (DGCA) of the Cayman Islands. The DGCA, believing the incident to be serious, brought it to the attention of the AAIB through the provisions of the MoU between the Government of the Cayman Islands and the AAIB.

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Accidents and serious incidents are to be reported to the Governor of the Cayman Islands under the provisions of the *Civil Aviation Act 1982 (Overseas Territories) Order 2001*, and the *Cayman Islands Civil Aviation (Investigation of Air Accidents and Incidents) Regulations*. Accidents and serious incidents reported under the Order and Regulations are not reportable under the MOR scheme. In practice, however, it is the policy of the operator and airport authority to report all occurrences, including accidents and serious incidents, through the MOR scheme and for the CAACI to determine the appropriate response after categorising the occurrence. This process results in the correct type of investigation taking place but does not appear to be strictly in accordance with the Order and Regulations. Therefore:

Safety Recommendation 2014-036

It is recommended that the Civil Aviation Authority of the Cayman Islands review whether accidents and serious incidents are being reported in accordance with the requirements of the *Civil Aviation Act 1982 (Overseas Territories) Order 2001* and the *Cayman Islands Civil Aviation (Investigation of Air Accidents and Incidents) Regulations*.

The landing

The operator's stabilised approach criteria (SAC) were required to be satisfied as the aircraft passed 1,000 ft aal (1,008 amsl). As VP-CKY descended through 1,000 ft amsl (992 ft aal), the SAC required it to be at a maximum airspeed of V_{REF} + 20 kt whereas its actual airspeed of 188 kt was equivalent to V_{REF} + 52 kt for a landing with Flap 30. The SAC required the aircraft to be in the landing configuration with landing gear down and landing flap extended. In fact, the landing gear was down, but the flaps were travelling past Flap 15 towards Flap 30 which they reached at approximately 880 ft amsl. The SAC required the engines to be producing appropriate thrust for an approach in the landing configuration whereas they were actually producing idle thrust. The SAC required a rate of descent of no more than 1,000 ft/min whereas the average rate of descent was 1,200 ft/min from 1,100 ft to 550 ft amsl. It was clear from the data that the aircraft did not meet the operator's stabilised approach criteria at 1,000 ft aal.

As the aircraft descended through 50 ft agl, it was flying at 160 kt CAS (equivalent to V_{REF} + 24 kt) but the groundspeed was 175 kt because the aircraft experienced a tailwind during the approach and landing. This was consistent with the wind velocity reported by the ATCO shortly after the aircraft landed but would have been unexpected by the crew because, when the ATCO had cleared the aircraft to land, he had transmitted that the wind was from 350° at less than 5 kt. The ATCO commented that he was unsure about the accuracy of the AWOS during adverse weather conditions but it appeared that the AWOS might have been more accurate during this event than the anemometer. Tailwinds have a significant effect on aircraft landing performance, and it is important that crews are aware when a tailwind is present and that ATCOs have confidence in the validity of meteorological information they are passing to crews. Therefore:

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Safety Recommendation 2014-037

It is recommended that the Cayman Islands Airport Authority satisfy itself that it can be confident in the reliability and accuracy of the Automated Weather Observing System installed at Owen Roberts International Airport.

The high airspeed of the aircraft as it approached the runway, combined with the tailwind, caused the aircraft to float along the runway for a considerable distance. The pilot took the unusual decision to deploy the speed brakes, which helped the aircraft descend onto the runway at a point along its length equivalent to approximately 45% of the LDA.

Reverse thrust was selected approximately four seconds after the aircraft touched down rather than 'rapidly' as the FCTM advised. Once on the runway, the use of maximum manual braking and maximum reverse thrust was sufficient to stop the aircraft within the landing distance available. The aircraft slowed to 22 kt groundspeed in 1,027 metres after touchdown. Tabulated data from the QRH for a wet runway showed that the distance from touchdown to a halt would have been 1,205 meters. This suggests that the braking performance in this event was consistent with maximum manual braking on a Wet runway with 'good' braking action. Both distances were considerably greater than the braking distance on a Dry runway, which may explain the commander's impression that the brakes were less effective than normal.

Risk mitigation against runway overrun accidents

The point at which an aircraft comes to a halt on the runway is governed mainly by the touchdown point and speed, and the deceleration after touchdown. All three factors were compromised in this case: the aircraft touched down 634 m beyond the touchdown zone marker; the aircraft touched down at V_{REF} + 21 kt (157 kt CAS) with a groundspeed of 166 kt due to an unexpected tailwind; and there was a delay before full reverse thrust was achieved.

At a groundspeed of 166 kt, the aircraft would have covered 139 m (the length of runway remaining beyond the point where thrust reverse was cancelled) in less than 2 seconds. It is probable that the aircraft was capable of remaining airborne for at least that period given that it was flying at V_{REF} + 21 kt when the speed brakes were deployed. Therefore, it is likely that the act of deploying the speed brakes (in the absence of a go-around or rejected landing) prevented the aircraft from running off the end of the runway, or very close to it.

The operator issued two Operational Notices to mitigate the risk of a similar incident recurring. The first Notice was designed to ensure that crews go around from unstable approaches, thereby increasing the likelihood that their aircraft touch down at the correct place and with the correct speed. The second Operational Notice was designed to reduce the likelihood of a runway overrun by ensuring that crews reject the landing in circumstances where an aircraft appears to be landing too far into the runway.

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