Synopsis

On 31 January 2003, at 0621 UTC (1521 local time), an Ilyushin 76TD (IL-76TD) aircraft, registered RDPL-34141, impacted terrain near Caicido village during a landing approach, about 1 NM (1.87 km) to the northwest of Cakung Airport, Baucau, Timor-Leste. The pilot in command was the handling pilot during the descent and approaches at Baucau. The aircraft was destroyed by impact forces and a severe post-impact fire, and the six occupants were fatally injured. The occupants included the flight crew, which comprised the pilot in command, the copilot, the flight navigator and the flight engineer, and two loadmasters who did not form part of the flight crew.

At the time of the occurrence, there was low cloud near the aerodrome. Witnesses at the aerodrome estimated the cloud base to be about 1,000 ft (305 m) above ground level, and visibility to be about 1,500 m (0.8 NM).

Before the aircraft's departure from Macau, the flight crew was provided with notices to airmen (NOTAMs) and weather forecast information for the planned flight. The weather information provided to the flight crew did not include a terminal aerodrome forecast (TAF), or an aviation routine weather report (METAR) for Baucau. Those weather forecasts were not produced for Baucau.

The investigation determined that the flight crew's compliance with procedures was not at a level to ensure the safe operation of the aircraft. Before the flight crew commenced the descent into Baucau, the pilot in command briefed them that he would conduct a non-precision instrument approach at Baucau, with reference to the Baucau non-directional beacon (NDB).

The flight instruments fitted in the occurrence aircraft provided readings of height, speed and distance in metric units. The pilot in command's briefing included information on the relevant heights for the missed approach procedure expressed in feet, and not in their metric equivalents.

None of the other crewmembers commented on that fact. The cockpit voice recorder (CVR) data revealed that the pilot in command did not refer to the source of data that he used for the briefing on the intended NDB approach at Baucau. The pilot in command's arrival briefing also contained no information or discussion on:

• the planned altimeter subscale settings for the descent to Baucau
• the applicable minimum sector altitude (MSA) within 10 NM (18 km) of the Baucau NDB; the MSA was 9,300 ft (2,834 m) above mean sea level (AMSL)
• the commencement altitude for the runway 14 NDB approach at Baucau, which was 5,500 ft (1,676 m) AMSL
• the lowest safe altitude (LSALT) for the last route sector into Baucau, which was 4,500 ft (1,372 m) AMSL
• the applicable minimum descent altitude (height) (MDA(H)) for the approach
• the expected weather at Baucau
• the Baucau NOTAMs.

The CVR data revealed that none of the other crewmembers commented on the omission of this critical information. As a result, the arrival briefing was not effective.

Controlled airspace was established at Baucau, but air traffic services (ATS) at Baucau was only available for UN aircraft on UN troop rotation days. The NOTAMs for Baucau included that information. The occurrence aircraft was not engaged in UN troop rotation operations, and no troop rotations took place during the aircraft's approach to Baucau.

When the aircraft was about 300 km from Baucau, the pilot in command instructed the copilot to call Baucau ATS. Over the next 23 minutes, the copilot called Baucau Tower 25 times, but received no response to those calls. The flight navigator then called Baucau Tower. A controller, who was present at Baucau aerodrome at the time, but not on operational duty, advised the flight crew that ATS was not available and that landing would be at the discretion of the flight crew. The flight navigator acknowledged the controller's advice, but did not seek information from the controller about the prevailing weather at the aerodrome. That was a missed opportunity for the flight crew to obtain updated information on the weather at Baucau. Had the flight crew sought and received that information, it may have provided them with an improved situational awareness of the prevailing weather.

During the descent in Timor-Leste airspace, none of the flight crew monitored the Timor Common High frequency of 123.45 MHz while the aircraft was above 10,000 ft (3,048 m). They also did not monitor the Timor Common Low frequency of 127.1 MHz while the aircraft was below 10,000 ft, or broadcast their intentions and traffic information on that frequency. Therefore, the flight crew had no assurance that there was no conflicting traffic. The flight crew's disregard of the requirement for traffic information broadcasts within Timor-Leste airspace increased the potential risk of an inflight collision. The pilot in command diverted the aircraft from the published inbound track to the Baucau NDB, and descended the aircraft below the published 10 NM MSA. He continued descending the aircraft through the commencement altitude for the published non-precision instrument approach for runway 14, and through the LSALT. None of the other crewmembers commented that the pilot in command had breached those relevant safety heights.

The Baucau NOTAMs included information that instrument approach charts for Baucau were available from the Civil Aviation Division (CAD) of the Ministry of Transport, Communication and Public Works, Timor-Leste.However, the investigation determined that the flight crew used Jeppesen instrument and approach charts, and not the CAD-issued charts. As the aircraft approached Baucau, the flight crew decided to conduct an overflight of the aerodrome before making a landing approach, and during the overflight, the flight crew realised that the runway was not where they expected it to be.

The investigation determined that the flight crew did not conduct the overflight of the aerodrome, or either of the landing approaches, with reference to the Baucau NDB. The flight crew used selected data from their instrument approach charts for Baucau to formulate a user defined non-precision approach using the onboard global positioning system (GPS). That user-defined procedure was a non-approved procedure. It deviated from normal practice, bypassed all the safety criteria and risk treatments inbuilt into the design of the published non-precision approach procedures, and increased the risk of a controlled flight into terrain (CFIT) accident.

The flight navigator provided the pilot in command with distance to run and lateral offset distance from the runway centreline during the overflight and the first landing approach. The flight navigator's reference to distance and lateral offset during those manoeuvres corresponded to the position of the aircraft in relation to the threshold of runway 14 as depicted on the Jeppesen charts. The navigation data provided by the flight navigator was therefore accurate in terms of where he expected the threshold of runway 14 to be, based on the Jeppesen charts. However, erroneous data on the Jeppesen charts meant that it was inaccurate in terms of where the threshold of runway 14 was actually located. The flight crew's inappropriate reliance on that data therefore increased the risk of a CFIT event.

Had the flight crew followed the non-precision runway 14 NDB approach procedure as published on either the CAD or Jeppesen charts, and not descended below the relevant MDA(H) until visual flight was assured, the position of the runway, as depicted on the Jeppesen charts would have been irrelevant. Although the runway would not have appeared where the flight crew expected it to be at the MDA(H), in visual meteorological conditions (VMC) a safe approach could have been conducted to the actual threshold of runway 14. Alternatively, if a visual approach could not be made from the relevant MDA(H), a safe missed approach could have been conducted by following the published missed approach procedures.

During the overflight and the subsequent (first) landing approach, the flight crew realised that the runway was not where they expected it to be as it was depicted on the Jeppesen charts. The pilot in command discontinued the landing approach, and the flight navigator stated that he would apply a 4 km correction to position the aircraft for a second landing approach to where he thought the runway was located. By applying the 4 km correction, the flight navigator was providing the pilot in command with inaccurate data, and resulted in the aircraft being repositioned towards a point about 1.65 km (0.88 NM) northwest of the actual position of the threshold of runway 14. That incorrect data substantially increased the hazards of the user defined approach procedure, and the risk of a CFIT event at that stage of the flight increased to a high degree. The flight crew did not appear to identify the hazards associated with the intended improvised approach procedure, and were therefore not in a position to manage the associated risks.

As the aircraft turned on to the final approach heading during the second landing approach, the flight navigator stated that the aircraft was high on the approach profile, based on his assumption of the location of the threshold of runway 14. The pilot in command increased the rate of descent of the aircraft to about 18 m/sec (3,543 fpm), and stated ‘Increased’. None of the other crewmembers commented on the high rate of descent, or drew the pilot in command’s attention to the fact that the approach was unstabilised at that point. The risk of a CFIT event is diminished by a stabilised approach, and the high descent rate in close proximity to terrain at that stage of the flight increased the risk of a CFIT event to the point where impact with terrain was almost certain. The CVR data provided no evidence that the flight crew was monitoring the increasing risk and evaluating whether to discontinue the approach to treat that risk.

The flight engineer misinterpreted the pilot in command’s statement ‘Increased’ to be an instruction for him to increase the engine thrust, and he advanced the thrust levers. It took about 2 seconds for the pilot in command to realise that engine thrust had been increased, and he reacted by calling ‘No, I increased vertical speed’ and reduced the engine thrust. The flight engineer’s action in increasing engine thrust was a significant distraction to the pilot in command at that stage of the flight, and probably diverted his attention from the primary task of flying the aircraft to restoring the thrust to the proper setting. At about the same time, the aircraft descended through 162 m, which was the published MDH for a straight-in landing on the runway 14 NDB approach. Neither the pilot in command nor the co pilot appeared to notice that the aircraft had descended through the MDH, and it is probable that both were distracted by the flight engineer’s erroneous action. The risk of a CFIT event is diminished if an approach is flown no lower than the published MDA(H) of an instrument approach procedure until visual flight can be assured and maintained. At that stage of the flight, descent below the MDH in instrument meteorological conditions (IMC) at a high rate of descent meant that the risk of a CFIT event had increased to an unacceptably high level and could not be treated. Impact with terrain was almost certain from that point onwards.
The high rate of descent continued unchecked until slightly less than 2 seconds before impact. It is probable that the pilot in command and the copilot were each unaware of the high rate of descent, because neither was monitoring the flight instruments while they were looking ahead of the aircraft and trying to establish visual contact with the ground.

The pilot in command applied back elevator to increase the aircraft pitch attitude in response to the co pilot’s urgent expression of concern that impact with terrain seemed almost certain. However, the pilot in command did not simultaneously increase the engine thrust, and it remained unchanged. Consequently, the pilot in command’s attempt to avoid impact with terrain was unsuccessful because of the inertia of the aircraft and its close proximity to terrain. The aircraft’s impact with terrain was a direct consequence of the pilot in command descending the aircraft below the published minimum descent height for the runway 14 non-precision instrument approach procedure in an unstabilised manner. Furthermore, it was also as a result of poor planning by the flight crew and less than effective crew coordination. During that landing approach, the actions of the flight crew steadily increased the risk of a CFIT to an extreme level, yet they seemed unaware that the likelihood of impact with terrain was almost certain until about 22 seconds before it occurred.

Research conducted by an aviation industry task force, under the patronage of the International Civil Aviation Organization (ICAO), has credited the main reasons for accidents involving aeroplane hull losses to CFIT and approach-and-landing accidents. In recent years, CFIT reduction has been the focus of organisations such as ICAO and the Flight Safety Foundation (FSF). The findings of the FSF approach-and-landing accident reduction (ALAR) task force resulted in several conclusions and recommendations, and from those, the production of the FSF ALAR Tool Kit.

This report highlights that deviations from recommended practice are a potential hazard, particularly during the approach and landing phase of flight, and increase the risk of a CFIT event. It also highlights that crew coordination is less than effective if crewmembers do not work together as an integrated team, and that support crewmembers have a duty and responsibility to ensure that the safety of a flight is not compromised by non-compliance with recommended practices.

The potentially serious to catastrophic consequences of a CFIT event remain constant, irrespective of likelihood of the event. The potential risk of CFIT can be diminished by using current technology and equipment, by implementing adequate standard operating procedures, by assessing and managing CFIT risk factors, and by developing effective crew decision-making and risk management processes.

Safety recommendations from many investigations of CFIT events and serious incidents have related to the prevention of CFIT and approach-and-landing accidents. The Australian Transport Safety Bureau (ATSB) and CAD Timor-Leste endorse those recommendations and their implementation.

This report includes a number of recommendations made by the ATSB with the intention of enhancing the safety of flight within Timor-Leste airspace. The report also includes a recommendation by CAD Timor-Leste that ICAO publicise the safety information contained in this report.