
Risk of collision involving an Air Luxor Lockheed L-1011 and a USAF Learjet 35.

Micro-summary: Procedural errors create a risk of collision between a USAF Learjet and an L-1011.

Event Date: 1998-11-07 at 1115 UTC

Investigative Body: Air Accident Investigation Unit (AAIU), Ireland

Investigative Body's Web Site: <http://www.aaiu.ie/>

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AAIU Report No. 1999/016
AAIU File No. 19980061
Published 11/06/1999

Aircraft Type and Registration: (i) Lockheed L 1011, CS-TEB
(Civil)
(ii) Learjet LJ35, 40085 (Military)

Name of Operators: (i) Airluxor
(ii) USAFE

Call Sign of Aircraft: (i) LXR 3361
(ii) Reno 13

Nationality: (i) Portugal
(ii) U.S.

Date and Time (UTC): 7th. November 1998, 11.15 hours

Location: Within 1.5 m South of extended centreline of Runway 10 at Dublin Airport, 7-8 miles from the threshold.

Information Source: Press Officer, Department of Public Enterprise, Operations Officer, Casement Aerodrome. ATC Dublin Airport.

Synopsis

The military trainer, a Learjet LJ35, was engaged in VOR/DME approach training to Runway 11, at Casement Aerodrome, Baldonnell, which is a military aerodrome 10 miles south-west of Runway 10 at Dublin Airport. At the same time the L1011 aircraft, approaching from the South, was being radar vectored on to the localiser of Runway 10 at Dublin Airport. Whilst the L1011 was at 2500 ft, on the localiser, between 7-8 miles from touchdown, the military trainer was on a northerly heading at 2100 ft, and came within 1.5 miles, and 400 ft of the L1011 aircraft.

1. History of the Civil Flight

1.1 History of the Civil Flight

At 10.57.11 hours, the aircraft, callsign Luxor 3361, was requested by Dublin Control Centre (ACC) to descend to FL 70 and was cleared to the Dublin VOR. The Runway in use at Dublin Airport was RYW 16. Luxor 3361 requested Runway 10 or Runway 28 for landing. Runway 10 was offered and accepted.

At 11.00.52 hours, Luxor 3361, approximately 25 NM south of Dublin Airport, was instructed by ATC to descend to FL 60 on a heading of 360 degrees. At the same time, the crew of the aircraft were advised that there was military activity in the area underneath them, west of Casement Aerodrome, and that they would be vectored for an ILS approach to Runway 10. Control was then handed over to Dublin Approach Radar (APP).

At 11.07 hours, Luxor 3361, at an airspeed of 250 kts and a height of 4,000 ft., was instructed by Dublin Approach Radar to descend to 3,000 ft., to turn on to a heading of 070° and to establish on the localiser for Runway 10.

At 11.11.08 hours, whilst established on the localiser the crew were instructed to maintain 3,000 ft., because of the proximity of a military aircraft. Twenty-two seconds later the crew reported that they had the other aircraft in sight. At 11.11.37 hours Luxor 3361 was cleared to continue the approach to Runway 10.

1.2 History of the Military Flight

The American Air Force Learjet Trainer, based at Ramstein, Germany, made a weekend training visit to Casement Aerodrome. On 7th. November 1998, the crew took the opportunity to carry out some IFR training at the military aerodrome. This involved the execution of VOR/DME approach training based on the Air Corps published VOR/DME procedures for Runway 11.

Prior to the military training flight the Captain was briefed on the military airspace area at the control tower, Casement Aerodrome, by the military air traffic controller on duty. His attention was drawn to the proximity of Dublin Airport and Weston Aerodrome to the military aerodrome.

An ICAO aeronautical chart of Ireland (Scale 1:500,000) was used for this briefing. The captain indicated that he already had a VOR/DME chart for Runway 11 and did not require a briefing on the approach procedure. The briefing took approximately 10 minutes.

The aircraft, callsign Reno 13, took off from Runway 23 at 10.49 hours, and continued on a South-westerly heading. The Captain indicated that he wanted to do some general handling in the area. The military controller then passed him over to the Dublin Control Centre. After a few minutes the Captain indicated that he was ready to do VOR/DME approach training, and was passed back to the military controller at Casement Aerodrome. The military controller did not have access to a radar facility at the time and requested Dublin Control Centre to observe the aircraft whilst it carried out the approach.

During the aircraft's first approach it appeared to the military controller that the aircraft did not come to the overhead position to commence the approach, but commenced at the intermediate fix (IF), and descended from 5,000 ft., to the missed approach point. The military controller then read out the procedure over the R/T as the captain commenced his go-around.

The military controller then asked the Dublin Control Centre if they were happy with the aircraft flight path as conducted. Dublin confirmed that they were happy with the approach. The captain then informed the military controller that the same approach procedure would be repeated again. The military controller then cleared Reno 13 to conduct a second VOR/DME approach.

On the second approach, the aircraft commenced a go-around at the missed approach point and the crew were told, after they requested to climb, not to climb above 2,000 ft., until advised to do so. The crew then asked were they allowed to climb when they crossed the 345 radial from the Baldonnel VOR. The controller replied that once they reached the 345 radial, they were cleared to climb, but not before. The military controller then requested that the crew report when the aircraft was established outbound on the 292 radial from Baldonnel VOR.

Meanwhile the controller at Dublin Radar had noticed that Reno 13 had turned left out of Baldonnel VOR, as required, but had exited the R16 military zone and was tracking on a heading of approximately 345° at an altitude of 2,000 ft.

At 11.10.56 hours, the controller requested military ATC, through land line, to instruct the aircraft to turn on an immediate westerly heading. At 11.11.03 hours military ATC requested Reno 13 to turn "*immediately westerly heading*". This request was acknowledged and Reno 13 turned on an approximate heading of 270°. At this stage communication with Reno 13 was handed over to Dublin Radar.

During this turn, the altitude of the aircraft was recorded as 2100 ft., and the time was 11.11.40 hours. At that time the position of the Learjet aircraft was recorded as being within 1.5nm from the extended centreline of Runway10 at Dublin Airport, and approximately 7 miles from its touchdown point. At the same time LXR 3361 was on Runway 10 localiser at a height of 2,500 ft at the same distance from touchdown and within 1.5nm north of Reno 13.

Reno 13 was then informed by Dublin Radar that the aircraft had come very close to the Dublin localiser and had passed within 1.5 miles of traffic on final approach to Runway 10 at Dublin Airport. The military aircraft then returned for a full stop landing at Casement Aerodrome.

On landing at Casement Aerodrome, the Captain of the military trainer indicated that he had been flying the approach in a simulated single engine configuration. He subsequently reported that after initially coming to a heading of 270° at 2,000 ft., MSL, he turned to a 345° heading intending to intercept the 292° radial outbound from Baldonnel VOR. After 10-15 seconds, on this heading, he realised that this heading of 345° would not intercept the 292° radial outbound. He reported that as he was commencing to turn on to a westerly heading, the Baldonnel approach control told him to turn to a westerly heading and to contact Dublin radar on frequency 121.10. He reported seeing the LXR 3361 aircraft 1,000 ft., above and 1.5 nm distance.

He said the surface wind at the time was 190° gusting 33 knots and at 2,000 ft. AMSL, winds gusted up to 60 kts from the same direction. The captain reported, that in his opinion, the momentary heading deviation combined with the significant tailwind pushed his aircraft to the fringes of Dublin airspace.

Military and Civil Area Control

At 11.03 hours Dublin Radar contacted Baldonnel ATC over the dedicated land line to inform the military controller that LXR 3361, routing from the south, was being vectored on to Runway 10 at Dublin Airport. Military ATC informed Dublin Radar that the military aircraft was under procedural control and that military ATC did not have radar facility at the time. They also informed them that during the first VOR/DME approach, the aircraft went out a maximum of 15 miles west in conducting the MAP procedure. Dublin Radar confirmed that he could see the military aircraft on the radar screen. Dublin Radar was then informed that the military aircraft would be making an approach on to Runway 11 at Casement Aerodrome, and then at the missed approach point making a left turn to intercept 292 radial outbound.

The Dublin Radar controller confirmed that he would watch the progress of the military trainer whilst vectoring LXR 3361 on to Runway 10 at Dublin Airport. At 11.08 hours, the Dublin Radar controller indicated to military ATC that LXR 3361 was well clear of the military aircraft making its second missed approach to Runway 11.

Communications

Baldonnel Tower and Dublin Radar have a facility to communicate point to point, using a dedicated land line, leased from Telecom Eireann. The communication between Baldonnel ATC and Dublin Approach Radar is similar, from an ATC controllers perspective, to inter-sector communication in Dublin ACC.

Meteorological Conditions

The meteorological report for Casement Aerodrome, Baldonnel for 7th. November 1998 was as follows:-

09.00 hours

Wind	200/13 Max 26 Kt
Visibility	10 Km
Cloud	FEW 2900; SCT 5000; BKN 20,000
Temperature	11°C; DP 6°C

10.00 hours

Wind	190/18 Max 29 Kt
Visibility	10 Km
Cloud	FEW 2200; SCT 4300; BKN 20,000
Temperature	11°C; DP 7°C

11.00 hours

Wind 190/23 Max 33 Kt
Visibility 10 Km
Cloud FEW 2600; SCT 9000; OVC 14,000
Temperature 12°C; DP 5°C

The 24 hour forecast for winds valid to 1200 hours

Flight Level 10 Wind 190/40
Flight Level 50 Wind 190/55

Published Approach Plates

The investigator examined three published plates for Runway 11 at Casement Aerodrome as follows:

(a) Jeppesen. This chart for a missed approach states:-

"Climb straight ahead to VOR, then turn left on 270° to max 1500 ft. When established West of R-345 continue climb to 2600 ft. Contact ATC."

(b) Ordnance Survey, (published on behalf of the Air Corps). This chart for a missed approach states:-

"1.5 NM DME climb straight ahead to VOR, then turn left on to 270° to not above 1500 ft. When established West of Radial 345, continue climb to 2600 ft."

(c) U.S. Navy, (used by Reno 13). This chart for a missed approach states:-

"At VOR/DME turn left on 270. Climb to but not above 1500 ft. When established West of BAL R-345, continue climb to 2600 ft contact ATC."

Aircraft Proximity

Aircraft proximity is defined by the International Civil Aviation Organisation Doc 4444 as:- *"A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. An aircraft proximity is classified as follows:-*

Risk of collision:- *The risk classification of an aircraft proximity in which serious risk-of-collision has existed.*

Safety not assured:- *The risk classification of an aircraft proximity in which the safety of an aircraft may have been impaired.*

No risk of collision:- *The risk classification of an aircraft proximity in which no risk of collision has existed.*

Risk not determined:- *The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or conflicting evidence precluded such determination."*

VOR/DME Approach Training

The normal procedure used at Casement Aerodrome is for the aircraft to establish overhead at 5,000 ft., turn right on to 175°, and then left on to 292° to descend to 2,600 ft., at the intermediate fix point.

The aircraft then descends to the missed approach point, 1.5 nm from the DME on a heading of 112°. On reaching the missed approach point the aircraft then turns left, not above 1,500 ft, crosses Radial 345 and again climbs to 2,600 ft., heading 292°.

Because the military controller was concerned about activity at Weston on this particular occasion, he considered it wise to allow Reno 13 an extra 500 ft in height. The Captain was advised, therefore, not to fly above 2000 ft in the turn rather than "not above 1500 ft."

2. ANALYSIS

The military aircraft, having passed the missed approach point, turned left as appropriate and climbed to 2,000 ft. The radar trace of the aircraft's track (see Annex A), indicates that the aircraft did not continue the turn on to a heading of 270° as required, but stopped turning on a heading of 345° with the mistaken intention of intercepting the 292° Radial to Baldonnel VOR. He continued on this heading of 345° and passed through the Dublin Control Zone boundary at about four miles from the Baldonnel VOR. The Dublin Approach controller then contacted military ATC who instructed the military aircraft to turn on to a westerly heading. By the time the military aircraft turned it was within 1.5 nm of the Luxor 3361 flight and approximately 400 ft below that aircraft.

Considering the closing speed of 360kts between the military aircraft whilst on a heading of 345° and the civilian aircraft on the ILS approach, with its vertical profile set, the risk must be considered to be in the "Risk of Collision" category.

There was no radar service being provided by the military ATC at the time either from Casement Aerodrome or from the military control position at Dublin Airport. The military control position at Dublin Airport was not manned at that time.

The Dublin controller acted promptly when he noticed the incursion but, between the time he contacted military ATC by land line and military ATC requesting Reno13 to turn on a westerly heading 7 seconds had elapsed.

Reno 13, during that time, was closing rapidly on the civilian aircraft. The military controller had no radar monitor available and, working in procedural environment, was unaware of the situation.

The crew of the military aircraft were from a foreign base and were not familiar with the exacting requirements of the Baldonnel VOR/DME missed approach procedure in the vicinity of the Dublin Control Zone. Under these circumstances the execution of a simulated single engine go around with its own restrictions on aircraft manoeuvrability may have placed too high a workload on the pilot.

The three published VOR/DME charts in use have some differences which may be misinterpreted if adequate briefing before hand does not take place. Specifically, the USN plate in use by the military crew states:- "*At VOR/DME turn left on 270*", (no degree symbol and not prefixed with the word "to"), the Jeppesen plate states "*turn left on 270°*", and the Ordnance Survey chart states "*turn left on to 270°*". In all three the Radial is expressed as either Radial 345 or R345. The degree symbol is not used in this case. The use of the word 'established' on the approach plates used by the crew of Reno 13, may also have led to a misinterpretation of the procedure. The word "crossing" would be better in this case.

Other differences between the USN plate used by the military visitors and Ordnance Survey plates are:-

- (a) The USN chart is headed VOR RWY 11 and not VOR/DME RWY 11 as would be normal when conducting VOR/DME missed approach training.
- (b) The USN chart does not show the Dublin Control Zone boundary nor is adequate attention drawn to the proximity of Dublin Airport to the airbase. It does however, have the Radial 345 indicated which is not indicated on the Ordnance Survey plate.

The Captain did not carry out the procedure in accordance with the normal VOR/DME approach training at Casement Aerodrome. On the first run his initial descent was from 5,000 ft., to the MAP, whereas he should have descended from a height of 2,600 ft. This caused the military controller to have doubts as to whether the Captain was aware of the full procedure. The military controller then read out the instructions over the R/T until the first attempt had been completed. The controller was confident that the Captain was now aware of the procedure, so as to be able to carry out a further go round. However, the subsequent events showed that the Captain was not aware of the approach procedure contrary to what he had indicated to the controller at the briefing beforehand.

3. CONCLUSIONS

- 3.1** The occurrence was a Class A aircraft proximity (i.e. a serious risk of collision did exist).

- 3.2 The incident was due to poor navigation on the part of the military aircraft and the non compliance with ATC clearance.
- 3.3 The deviation from the correct missed approach procedure was compounded by the crew having to cope with a simulated engine failure.
- 3.4 The captain was not properly briefed on the procedure by the ATC Controller because he indicated to the controller that he was familiar with such procedure.
- 3.5 The USN VOR RWY 11 plate used by the captain of Reno 13 did not adequately warn him of the proximity of the military aerodrome and civil airport.
- 3.6 The missed approach procedures on all available plates were different in their wording content. The word "established" used in all plates may have lead to some confusion.

4. **SAFETY RECOMMENDATIONS**

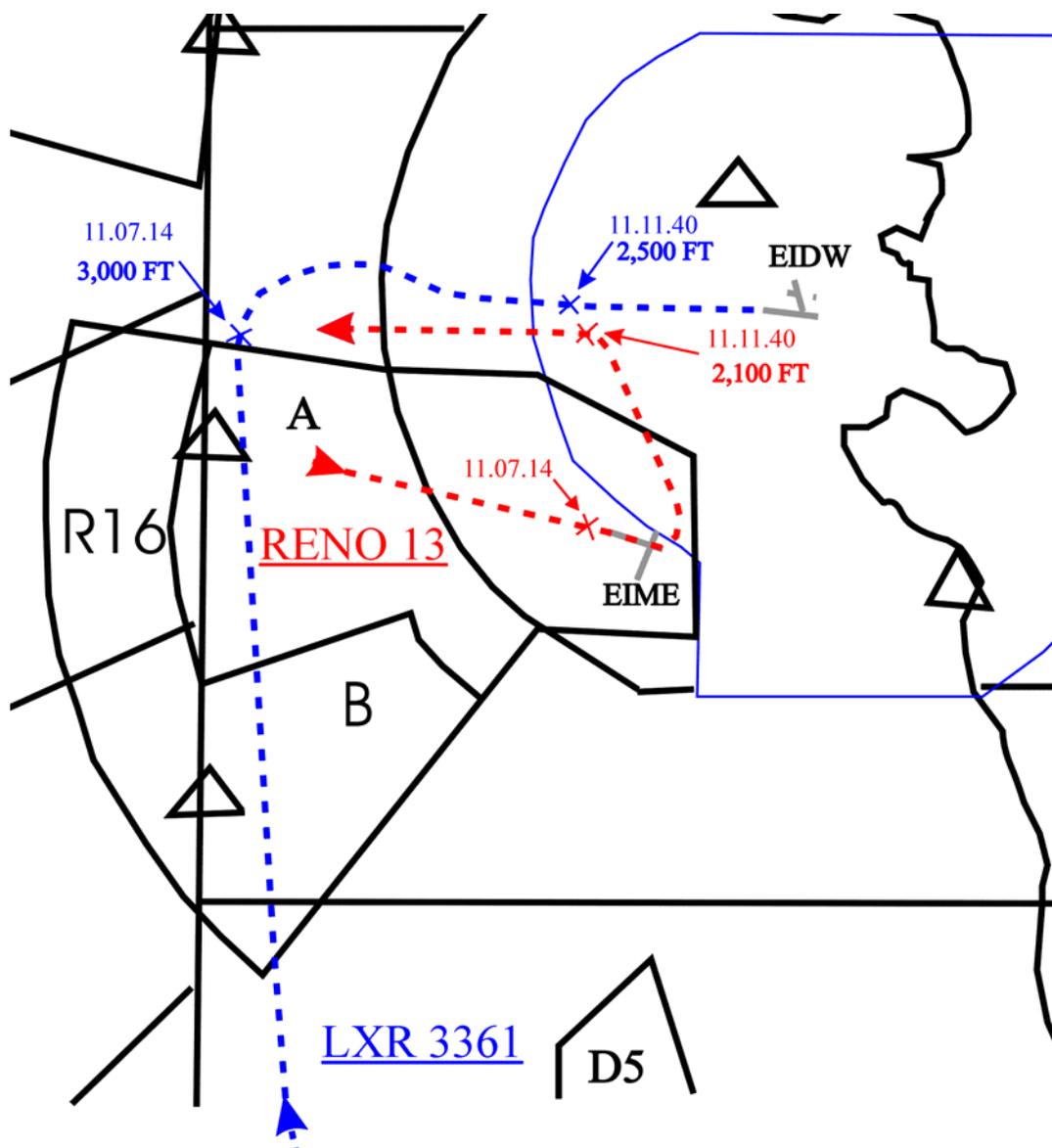
- 4.1 The Standing Civil/Military Air Navigation Co-Ordination Committee (STACMAN) should amend their procedures to include a notification of the level of Air Traffic Services available at Casement Aerodrome and Dublin Airport when military activity is taking place. **(SR 39 of 1999)**
- 4.2 The Standing Civil/Military Air Navigation Co-Ordination Committee (STACMAN) should study the implications of simultaneous operations on to Runway 11 at the military aerodrome and Runway 10 at Dublin Airport. **(SR 40 of 1999)**
- 4.3 The Standing Civil/Military Air Navigation Co-Ordination Committee (STACMAN) should re-evaluate the procedures for civil traffic under VFR routing to Weston Aerodrome. **(SR 41 of 1999)**
- 4.4 The Standing Civil/Military Air Navigation Co-Ordination Committee (STACMAN) should examine the appropriateness of the missed approach procedure used on Runway 11, at Casement Aerodrome, which brings Casement traffic close to the traffic approaching Runway 10, at Dublin Airport, on a converging track. **(SR 42 of 1999)**
- 4.5 The Department of Defence should provide a Distance to Touchdown Indicator or Aerodrome Traffic Monitor (ATM) to the controller at Casement Aerodrome. **(SR 43 of 1999)**
- 4.6 The Department of Defence should consider the re-wording of the missed approach procedure used on to Runway 11 at Casement aerodrome and to substitute the word "establish" with the word "crossing". Procedural instructions should be more precise and less open to interpretation. **(SR 44 of 1999).**

4.7 The Air Corps should appoint a liaison officer who should ensure that all visiting flight crews are in possession of plates or charts which are in agreement with those issued to locally flying personnel.
(SR 45 of 1999)

4.8 Flight personnel using military airspace for any reason should ensure that they are in possession of plates or charts which are in agreement with those issued to local aircrew. **(SR 46 of 1999)**

Note: The Department of Defence have purchased an Aerodrome Traffic Monitor (ATM) which is about to be installed at Casement Aerodrome. This is slaved to the Dublin Radar and will be helpful as an aid to the controller at Casement Aerodrome.

ANNEX A



SKETCH SHOWING FLIGHT PATHS OF
RENO 13 AND LXR 3361