

**INCIDENT**

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| <b>Aircraft Type and Registration:</b> | Embraer E120 Brazilia, F-GFEO   |                   |
| <b>No &amp; Type of Engines:</b>       | 2 Pratt and Whitney PW-118 turboprop engines  |                   |
| <b>Year of Manufacture:</b>            | 1987  |                   |
| <b>Date &amp; Time (UTC):</b>          | 31 March 2005 at 0848 hrs   |                   |
| <b>Location:</b>                       | Seven miles to the west of Isle of Man Airport, on approach to Runway 08                                |                   |
| <b>Type of Flight:</b>                 | Public Transport (Passenger)  |                   |
| <b>Persons on Board:</b>               | Crew - 3  | Passengers - 7    |
| <b>Injuries:</b>                       | Crew - None   | Passengers - None |
| <b>Nature of Damage:</b>               | None  |                   |
| <b>Commander's Licence:</b>            | Airline Transport Pilot's Licence   |                   |
| <b>Commander's Age:</b>                | 50 years  |                   |
| <b>Commander's Flying Experience:</b>  | 11,750 hours (of which 2,210 hours were on type)<br>Last 90 days - 117 hours<br>Last 28 days - 37 hours |                   |
| <b>Information Source:</b>             | AAIB Field Investigation  |                   |

**Synopsis**

An inexperienced first officer was undergoing line training with the company's chief training captain. The aircraft was being radar vectored for a localiser/DME approach to Runway 08 at Ronaldsway, Isle of Man. The crew had mistakenly selected the IOM VOR frequency instead of that for the ILS, although the commander became aware of this, prior to the aircraft commencing its descent. Believing it would make a good training point he did not identify the mistake to the first officer and left the IOM VOR selected. As a result, the crew used the incorrect DME, descending the aircraft in the procedure to 475 ft over the sea, more than 5 nm short of the runway, with terrain 1 nm ahead rising to approximately 600 ft.

When the crew's actions were questioned by ATC the commander immediately climbed the aircraft to 1,600 ft re-establishing on the correct approach path, before landing.

**History of the flight**

The aircraft, F-GFEO ('EO), was operating a shuttle service between Ronaldsway Airport on the Isle of Man and Manchester International Airport. The commander of the aircraft, the company's chief training captain, was conducting line training with a new first officer who had 250 hours of total flying experience and only five hours on type. They had conducted the first sector of the day from the Isle of Man to Manchester without incident and

were returning to the Isle of Man with seven passengers on board.

The aircraft took off from Manchester Airport at 0817 hrs with the commander acting as the handling pilot. During the cruise the commander briefed for a localiser/DME approach to Runway 08 at the Isle of Man, Figure 1. He recalled selecting the ILS frequency on his instruments for the approach whilst the first officer retained the Isle of Man (IOM) VOR. The crew were given radar vectors by ATC, to position the aircraft onto an intercept heading for the final approach and were cleared for the localiser/DME approach. The commander stated that, at about this time, and for reasons he cannot recall, either he or the first officer changed the ILS frequency previously selected on the commander's instruments to the IOM VOR frequency. The aircraft was fully configured for landing and the first officer reported to ATC that they were established on the localiser. The Approach controller then instructed the crew to transfer to the Tower frequency. The commander later stated that when he established the aircraft on the final approach track, by reference to the IOM VOR, he believed he was in fact establishing on the localiser. The IOM VOR antenna is positioned 5.2 nm to the west of the I-RH Localiser/DME antenna on the final approach track to the airfield, Figure 1<sup>1</sup>.

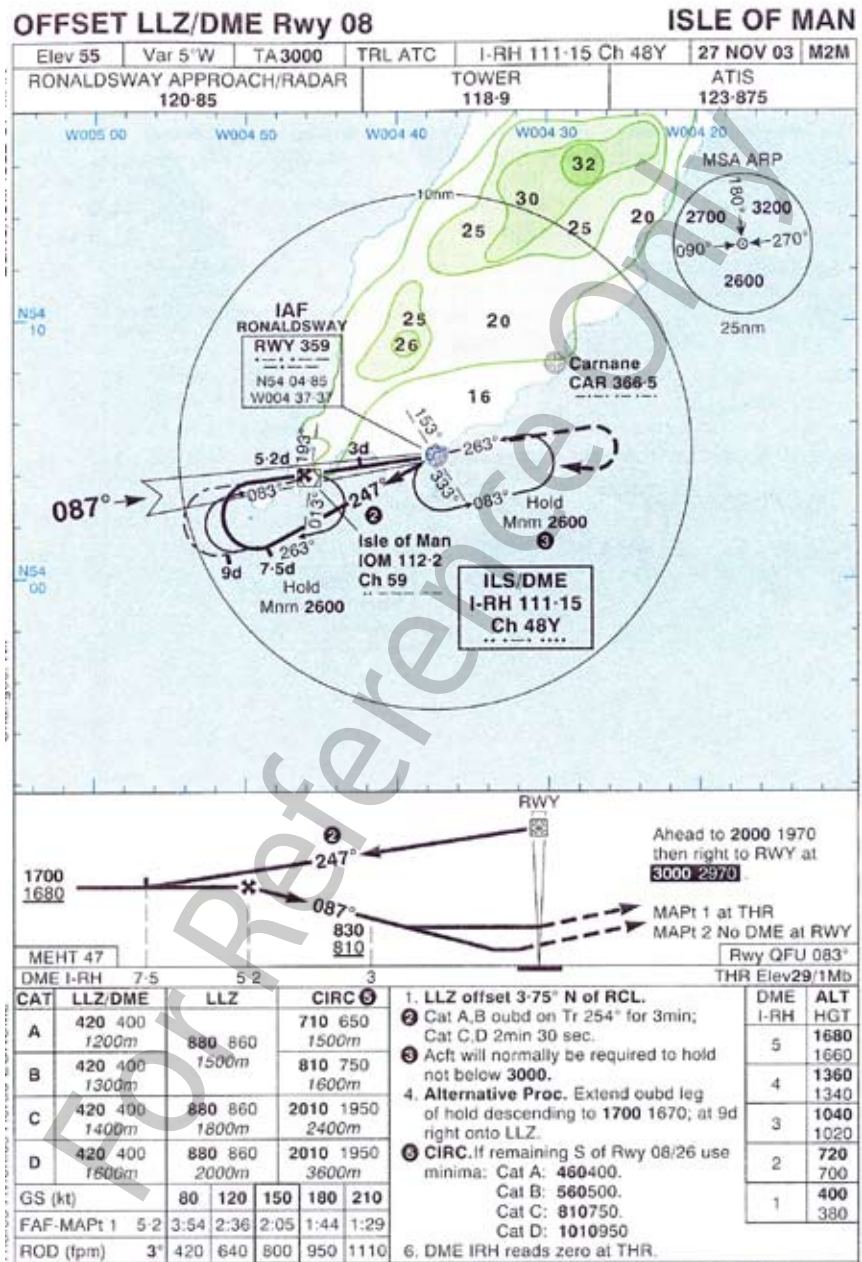


Figure 1

The commander was familiar with this particular approach and noticed that the DME reading was less than he was expecting when initially establishing on the final inbound track. On checking, he realised that he had the IOM VOR frequency selected instead of that for the ILS. The commander considered that this would make a good training point for the first officer

**Footnote**

<sup>1</sup> Confusion with the DME distance from the airfield had led to two aircraft descending early whilst on approach to the same runway in 1998. These incidents were subject to an AAIB investigation (EW/C98/6/2) published in the 1/2000 AAIB Bulletin.

and refrained from either resetting the ILS or pointing out the error<sup>2</sup>. When the aircraft was approaching 5.2 DME from the IOM VOR, the commander asked the first officer if they were at the correct point to start their final descent. The first officer confirmed they were and the commander initiated a descent.

The autopilot was engaged and the commander selected a descent rate of about 600 fpm. As the aircraft descended, the first officer monitored the altitude by reference to the approach plate, which contained figures for the altitude to be achieved at various distances based on the I-RH DME located on the airfield. He later stated that they were, at the time, over the sea, which was visible below, and they could make out the Calf of Man, a small island on the south-west tip of the Isle of Man. He could also see the coastline ahead, although cloud cover prevented him seeing the airfield. The weather conditions recorded at the airfield were an easterly wind of about 12 kt, with 4,000 m visibility in smoke, a scattered cloud base at about 600 ft agl with broken cloud at about 2,000 ft agl.

The approach controller was concerned that 'EO was being caught up by a following aircraft positioning to land on the same runway. He was monitoring the distance between the two aircraft on radar when, suddenly, both the primary and secondary returns from 'EO disappeared. He continued to watch and saw the radar return re-appear, but indicating an unusually low Mode C altitude of 400 ft for an aircraft at that distance from the runway. The tower controller had also become aware of this and contacted the crew to ask if they had the ground ahead in sight which, at that time, was approximately 1 nm ahead rising to an altitude of 600 ft. They replied that they did and the

commander later stated that he believed at this point the aircraft was at about 1,000 ft above the sea. He also later stated that it was at this time he pointed out to the first officer that the Calf of Man was on their right side, in the 2 o'clock position. He asked the first officer if he believed they were in the correct position. It was only then that the first officer realised they were flying with reference to the IOM VOR and not the I-RH ILS/DME. The commander then climbed the aircraft to 1,600 ft, leaving it in the landing configuration, and both pilots selected the I-RH ILS/DME frequency on their respective instruments. The aircraft was subsequently established on the localiser and, at about 5.2 DME from the airfield, began another descent in accordance with the procedure, landing without further incident on Runway 08.

### Flight Recorders

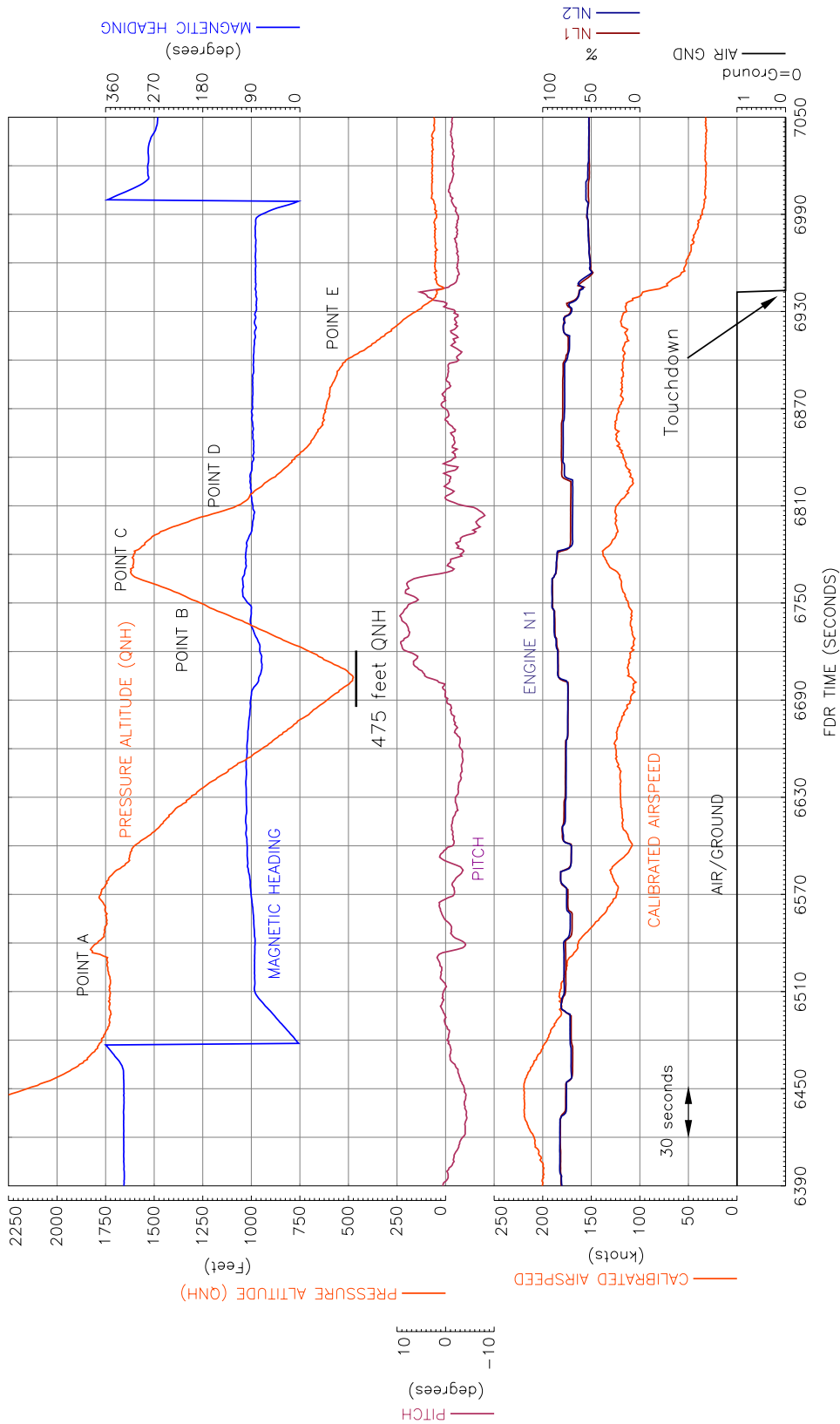
The aircraft was equipped with a cockpit voice recorder (CVR) and a 25-hour duration flight data recorder (FDR). The CVR had not been electrically isolated following the landing and aircraft electrical power had been applied for a sufficient duration to cause the recording of the incident to be overwritten. The CVR therefore did not assist in this investigation. The FDR had retained data for the relevant flight and this was successfully recovered. The FDR recorded a total of 45 parameters and contained an integral clock from which recorded times were taken. These times have been converted to UTC for inclusion in this report.

Figure 2 represents data covering the approach and landing phase of the flight. At 0846 hrs, the aircraft had descended to about 1,700 ft QNH (Point A) and had turned onto a magnetic heading of about 080°, with Flap 25 set. At 0847 hrs, the aircraft was approximately 12 nm from the airfield, at which time it started to descend at approximately 600 fpm on a

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#### Footnote

<sup>2</sup> The operator is based in Paris where a simulator for this type of aircraft is available for training.



**Figure 2**  
Salient FDR Parameters  
(Incident to F-GFEO on 31 March 2005)

glide path of about 3°. The descent continued until, at approximately 475 ft QNH, engine power increased, the aircraft pitched up and started to climb. The climb rate was stabilised at about 1,000 fpm (Point B) until it levelled off at 1,600 ft QNH. The aircraft remained at this level until, at approximately 5 nm from the airfield (Point C), it began its final descent. Initially, the average descent rate was about 800 fpm, (Point D), but this was then reduced as an altitude of 650 ft was approached (Point E). Subsequently, it increased again to about 600 fpm following which the aircraft flew down a glide path of approximately 3° to touchdown, which occurred at 0853:21 hrs. The aircraft taxied clear of the runway and the FDR stopped recording at 0858:32 hrs, when the anti-collision beacon was turned off.

#### **Additional information**

ICAO Doc 8168-OPS/611, Procedures for Air Navigation Services (PANS), Volume I Chapter 3 Aircraft Operations, describes the procedures to be used in order to safeguard aircraft from obstacles whilst on the Arrival and Approach Segments of their flight. Section 3.5.5.3 states:

*'Descent on the glide path/MLS elevation angle must never be initiated until the aircraft is within the tracking tolerance of the localizer/azimuth. The ILS obstacle clearance surfaces assume that the pilot does not normally deviate from the centre line more than half a scale deflection after being established on track. Thereafter the aircraft should adhere to the on-course, on-glide path/elevation angle position since a more than half course sector deflection or a more than half course fly-up deflection combined with other allowable system tolerances could place the aircraft in the vicinity of the edge or bottom of the protected airspace where loss of protection from obstacles can occur.'*

#### **Analysis**

It can be seen by reference to the PANS extract that, by commencing the descent some 5 nm early, the aircraft was no longer in protected airspace. The airfield was not visible to the crew at the time and the weather conditions were not favourable for flying a visual approach from this position. Whilst the commander stated he was in sight of the sea below the aircraft, it is generally accepted that it is difficult to judge height visually over water when flying at low level. At the point the aircraft began to climb, in order to establish on the correct approach path, not only had 'EO descended to some 475 ft amsl, about half the altitude recalled by the commander, it was also approximately 1 nm away from high ground ahead, whose maximum elevation was some 125 ft above the aircraft. At this time, the aircraft's airspeed was some 110 kt, which gave approximately 30 seconds of flight time before the aircraft would have descended to sea level or, had it flown level, impacted with the rising ground. As aircraft position data was not recorded on the FDR, it was not possible to determine the margin by which the aircraft cleared the ground as it climbed to re-establish on the correct approach path.

Originally, it was considered that the most likely reason for this incident was that the pilots had made a genuine mistake, unknowingly using the IOM VOR/DME rather than the ILS/DME I-RH to decide when to begin their descent to the airfield. However, later in the investigation the commander was insistent that he was fully aware of his actions, wishing to use the mistake as a training point for the first officer. It is considered that to knowingly take such action (on a scheduled passenger flight) was highly inappropriate and runs counter to accepted practices.

#### **Safety action**

The AAIB investigated several similar incidents in

1998. At that time, Runway 08 was not equipped with an ILS and the secondary surveillance radar information for the airport was not recorded. The AAIB report concerning these incidents (1/2000) made nine safety recommendations, two of which are relevant to this incident.

*Safety Recommendation 99-55*

*It is recommended that the Isle of Man Government, Department of Transport, arrange for the installation of an Instrument Landing System facility for Runway 08 at the Isle of Man (Ronaldsway) Airport.*

*Safety Recommendation 99-56*

*It is recommended that the Isle of Man Government, Department of Transport, arrange for the Ronaldsway Airport Secondary Surveillance Radar data to be recorded and preserved for a suitable period of time.*

In 2000, an ILS was introduced into service for Runway 08, although at the time of this incident the glide slope was out of service. In this instance, neither pilot had the correct approach aid selected. Had the normal ILS been available, the glide slope, or if the ILS frequency had not been correctly selected, the lack of a glide slope indication, would have acted as a significant prompt to both pilots that they had not reached the correct descent point. This incident highlights the potential for confusion when the wrong DME reference is used, where two separately located sources of DME are available. In such circumstances, the careful monitoring of aircraft on approach by ATC, which was the case here, continues to be vital.

Secondary surveillance radar (Mode C) remains

un-recorded at Ronaldsway Airport: information that would have been of benefit to this investigation. The Airport Authority recognises this need and is considering the most practical way of incorporating a suitable facility into the existing infrastructure. This has not been achieved, to date, and it seems likely that the matter will be addressed during the construction of a new control tower, planned for 2008.

**Safety Recommendations**

The operator's procedure, for the non-handling pilot to use his VOR to confirm the aircraft's track relative to the ILS centreline, is protection against flying through the localiser at airfields where parallel runways exist; for this operator notably at Charles de Gaulle Airport in Paris. Whilst this allows a degree of improved situational awareness, it carries with it the risk of confusing the approach aids.

The genuine mis-selection of an approach aid is always a possibility in a busy aviation environment. To counter this possibility, flight crews are trained to monitor each other's actions and, if appropriate, challenge these actions. However, to deliberately deviate from established procedures on a scheduled flight, potentially endangering the aircraft, raises concerns about the training and oversight of the flight crew conducting this flight.

Consequently, it was the AAIB's intention to make a safety recommendation to the French Regulator, the DGAC, suggesting an audit of the operator to ensure that their procedures and training for instrument approaches adhere to regulatory requirements and best practice. However, the DGAC have advised that, in July 2005, the operating company was sold to another owner and re-named and that, in December 2005, the new company's Air Operator's Certificate (AOC) was withdrawn by the DGAC 'due to unsafe operations'. The company then ceased trading.