FINAL REPORT

AAIU Synoptic Report No: 2009-024
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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Air Accidents, on 2 March 2009, appointed Mr. Frank Russell as the Investigator-in-Charge to carry out a Field Investigation into this Accident and to prepare a Synoptic Report. The sole purpose of this Investigation is the prevention of aviation accidents and incidents. It is not the purpose of the Investigation to apportion blame or liability.

Aircraft Type and Registration:	BAe RJ85, EI-RJF
No. And Type of Engines:	4 x Lycoming LF 507-1F
Aircraft Serial Number:	E2337
Year of Manufacture:	1998
Date and Time (UTC):	2 March 2009 @ 17.44 hrs
Location:	Dublin Airport Ramp Area
Type of Flight:	Public Transport
Persons on Board:	Crew - 5 Passengers - 48
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	Serious, aircraft skin punctured by impact with tug vehicle
Commander's Licence:	ATPL(A)
Commander's Details:	Male, aged 31 years
Commander's Flying Experience:	4,700 hours, of which 2,800 were on type
Notification Source:	Airside Duty Manager, Dublin Airport
Information Source:	AAIU Pilot Report Form submitted by Pilot - AAIU Field Investigation

SYNOPSIS

During the EI-RJF pushback from Stand C4 in preparation for departure to London City Airport (LCY), while the tug operator carried out a minor realignment of the aircraft on the taxi-line, the tug was turned through 180 degrees, shearing the end off the tow bar at the tug end. With the engines running at idle power, the aircraft continued to move forward under its own inertia, colliding with the tug and came to rest with the tug wedged against the right hand side of the fuselage below the cockpit. This impact caused serious structural damage to the aircraft. There were no injuries.

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1. FACTUAL INFORMATION

1.1 History of the Event

The First Officer (F/O) made a routine request to Air Traffic Control (ATC) to start "*one engine on stand* (C4) *and then push please*". ATC approved the start up and pushback to abeam Stand 37 and to hold clear of an Airbus taxying from Stand 36. This information was then relayed via radio to the Operator's 'headset engineer' positioned alongside the front of the aircraft, who cleared the start of No. 4 engine. In turn, he verbally advised the Service Provider's tug driver of the initial pushback clearance to Stand 37. This pushback was non-standard in that it differed from the procedures published for Stand C4 in the Dublin Airport Authority (DAA) Manual, Direction 9, Appendix 1, i.e. it went to the left instead of the right. As they moved backwards the flight crew mentioned this fact to ATC who responded that there was no problem as the aircraft (at Stand 36) was clearing.

During the pushback to abeam Stand 37, the other three engines were started with the permission of the engineer and were at ground idle as the pushback stopped abeam Stand 37. Here, the tug driver initiated a pull forward with a turning component, in other words this pull forward was not in a straight line but in an arc. This was carried out on his own initiative with the probable intention of a minor realignment of the aircraft nose wheel back onto the taxi-line. During this pull the tug driver felt that the aircraft was pushing the tug (the aircraft weighed approximately 34,300 kgs), he braked but the aircraft continued forward, the tug jack-knifed and the tow bar broke (the shear-pins did not shear). The aircraft continued forward under its own inertia and struck the tug. The impact caused the tug to be lifted up against the starboard side of the front of the aircraft, having been turned through 180 degrees. As a result, the aircraft suffered serious damage to its forward skin under the cockpit and to a number of its structural frames (**Photo No. 1**).

The event occurred over a matter of seconds, the engineer reacted by calling the flight crew to apply the aircraft brakes and stop, but the damage was done. The pull forward took place on a slightly downhill slope of circa 1:100 and there had been recent rain (*rain, icing or snow on the ground can have an adverse effect on the tractive capability of a tug*). The aircrew immediately informed ATC who, in turn, alerted the Airport Emergency Services. They responded quickly.

The tug driver was uninjured. The damaged aircraft was grounded pending an engineering inspection. The aircrew and passengers disembarked via the rear exit door and were facilitated on a later flight to London City.

1.2 Technical Information

The tug used, a Tracma TD 3500, was manufactured in 1988. Its empty weight was 5,750kgs/5.750 tonnes with a draw bar pull capacity of 3,500 Deca Newtons (DAN) kgs. The RJ85 maintenance manual states "tractor used for towing must have a minimum tractive effort of 2,721.6 DAN kgs in normal or wet conditions. This would indicate that the draw bar pull capacity was capable of manoeuvring the aircraft. However, the tug had "for push back only" clearly marked on the body of the tug.

The Hydro-Gerätebau tow bar, manufactured in 2006, was an approved type for the aircraft. There are two shear pins and a retaining pin installed in the towhead. One of the shear pin heads was missing but the body of the pin still remained in the head of the bar. The other two pins were fully intact. The body of the damaged pin was corroded in the head, indicating that it may have been damaged for some time. The eye end had completely sheared off the body of the bar.

1.3 Aircraft Damage

At the request of the Operator of EI-RJF, the manufacturer, BAe Systems, was requested to carry out a structural survey of the aircraft following this accident. Their comprehensive Report showed that the aircraft had sustained damage at various locations between Frames 4 and 12. The recommended corrective action included repairs to fuselage skin panels, frames and sub-structure. This repair work was carried out at the Operators hangar facility at Dublin Airport. The aircraft then returned to service on 18 of May 2009.

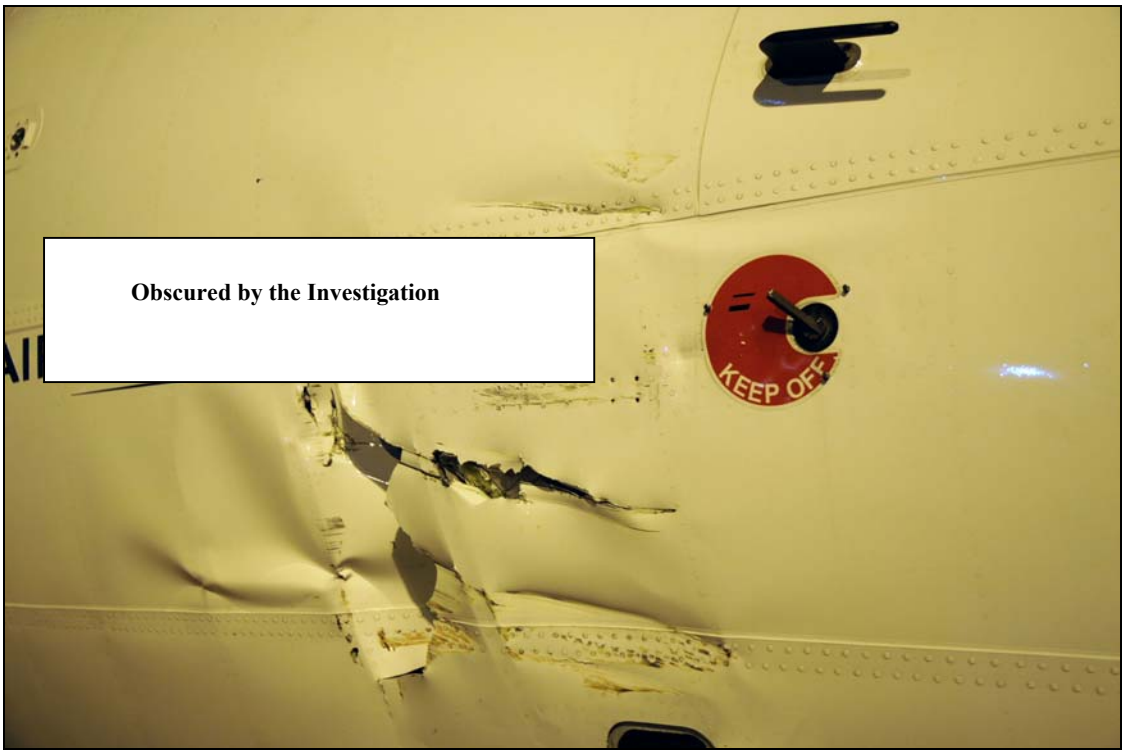

Photo No. 1: Damage to aircraft

2. AAIU Comment

As a result of this accident both the Operator and the Tug Service Provider initiated an internal review of their respective procedures as they applied to the ground handling and movement of aircraft on the ramp area of the airport.

The Operator promulgated a Flight Crew Information (FCI) Mandatory Read Notice, outlining new procedures that came into force on 1 August 2009, in which new engine starting and pushback procedures were introduced for evaluation over an initial period of eight weeks.

As a result of this trial period the Operator issued a Flight Crew Instruction (FCI 34/2009) that:

- limits the starting of engines to one on stand and the remainder until after the pushback manoeuvre is completed and the brakes are set,
- emphasises the headset person's control of the manoeuvre,
- emphasises the need for flight crews to be vigilant throughout,
- if the flight crew consider that the manoeuvre is not proceeding as planned or expected, they should stop the manoeuvre, set the brakes and seek clarification.

In addition, the Operator is awaiting IAA approval for a draft Ground Crew Instruction (GCI) dealing with tractor weight and drawbar pull specifications, responsibilities of the headset person, pushback training content for service providers and certain changes to the Ground Operations Manual.

The Tug Service Provider reviewed its procedures following the accident and while it was found that the Tracma TD 3500 conformed to the IATA Airport Handling Manual – AHM955 (*which categorises tractors according to maximum aircraft weight*), it was decided to take the tug out of service and to use it for cargo towing henceforth.

Finally, the Service Provider is to emphasise to operatives during their training and operations, the importance of adherence to the established procedures of the DAA SOP (Direction 9), as amended.

3. SAFETY RECOMMENDATIONS

This Investigation does not sustain any Safety Recommendations.

- END -