Air Accident Investigation Unit Ireland

INCIDENT REPORT
Tecnam P2002JF, EI-LFC
Coonagh Airfield, Co. Limerick
29 September 2010

An Roinn Iompair
Turasóireachta agus Spóirt

Department of Transport,
Tourism and Sport

AAIU Report No: 2011-017
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In accordance with the provisions of SI 460 of 2009, the Chief Inspector of Air Accidents, on, 29 September 2010, appointed Mr. Paul Farrell as the Investigator-in-Charge to carry out a Field Investigation into this Incident and prepare a 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:	Tecnam P2002JF, EI-LFC
No. and Type of Engines:	1 x Rotax 912 S
Aircraft Serial Number:	063
Year of Manufacture:	2007
Date and Time (UTC):	29 September 2010 @ 11.00 hrs
Location:	Coonagh Airfield (EICN), Co. Limerick, Ireland
Type of Flight:	Private, training
Persons on Board:	Crew - 2 Passengers - 0
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	Minor
Commander's Licence:	Private Pilot Licence
Commander's Details:	Male, aged 61 years
Commander's Flying Experience:	2,300 hours, of which 640 were on type
Notification Source:	Maintenance organisation
Information Source:	Report from the Maintenance Organisation, AAIU Report Form submitted by Pilot, AAIU Field Investigation

SYNOPSIS

Following landing at EICN, the aircraft turning arc during ground manoeuvring was noted to be greater than usual. Inspection revealed that the left-hand side rudder pedal assembly had failed adjacent to a welded joint.

1. FACTUAL INFORMATION

1.1 History of the Flight

The aircraft was flying right hand circuits to Runway (RWY) 10 at EICN. On the first approach the student was a little high and the Instructor asked for a go-around which was carried out. On the second approach the landing was satisfactory and, as per normal practice, the aircraft was allowed to run to the end of the runway where there is a turning area. The aircraft needed a wider than normal turning circle. Having turned, the aircraft backtracked and took off again for another right hand circuit. On landing from this circuit the aircraft could not be turned within the available area. The aircraft was shut down, manually turned and aligned with the runway, and then re-started and taxied to the ramp for examination. The nose wheel connections were checked and nothing abnormal was noticed. The aircraft was re-started and taxied to the runway end where, again, it failed to turn within the available area, prompting another shut-down, manual turn and taxi back to the ramp. Further inspection revealed that the left side rudder pedal assembly had fractured adjacent to a welded joint where the nose wheel steering horn was attached (See **Photo No. 1**). It is noted that rudder movement is exercised via a different horn on the same assembly. Thus, although this failure impacted aircraft steering it did not, of itself, affect aircraft rudder control.

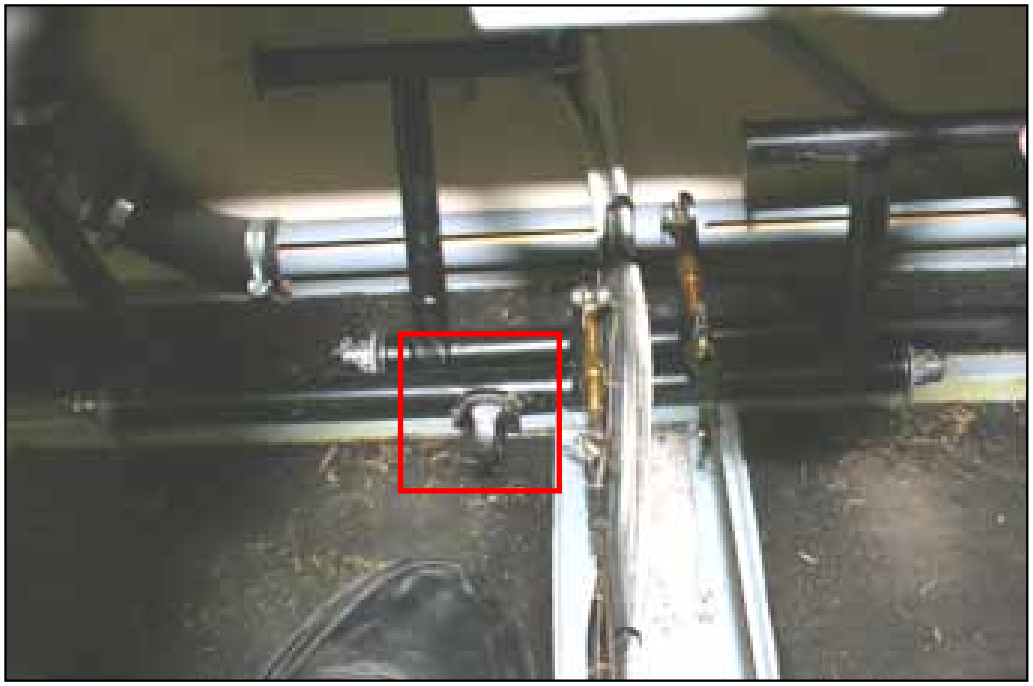

Photo No. 1: Fractured pedal assembly in-situ

1.2 Aircraft History

The Operator purchased EI-LFC in 2007. On 4 May, 2008 the aircraft was involved in a landing accident at EICN. The AAIU investigated that event and published Final Report 2009-002. At the time of the accident the aircraft had amassed 157.5 hours of flight time, during which the aircraft rudder pedal assembly did not exhibit any abnormal behaviour or failures. Following the accident the aircraft was repaired at a UK based facility. As the aircraft was registered in Ireland, the Irish Aviation Authority (IAA) exercised some oversight on this work and specifically requested the maintenance facility to contact the aircraft manufacturer to request additional maintenance tasks aimed at ensuring the re-certification of EI-LFC's airworthiness.

Following the post-accident repair, the aircraft was returned to service in 2009 and accumulated 351.5 hours between the accident and the current rudder pedal assembly failure. During that time the aircraft experienced a previous failure of the left hand rudder pedal assembly, a previous failure of the right hand rudder pedal assembly and the current failure of the left hand rudder pedal assembly. In addition, following the subject event the right hand pedal was removed and inspected and found to be distorted in a similar manner to the previously failed right hand pedal. In effect this aircraft had experienced four rudder pedal failures in 351.5 hours, which equates to a Mean Time Between Failure (MTBF) of approximately 88 hours.

1.3 Aircraft Inspection

The Investigation inspected the aircraft and noted certain residual distortion (from the previous accident) that might have resulted in misalignment and unintended stress causing rudder pedal failure. These matters were brought to the attention of the Operator, the maintenance organisation and the IAA. The maintenance organisation contacted the manufacturer and obtained dimensions other than those available in the aircraft publications, to assist with identifying the root cause of the series of rudder pedal failures. Inspection of the rudder system revealed that the *"End Run Stop"* on the left hand side was out of position and allowed less travel than the right hand stop. Aircraft records indicate that this stop was last adjusted during the post-accident re-build. However, the Maintenance Organisation found that the *"End Run Stop"* was subject to inadvertent movement if put under pressure; such pressure would be applied when executing tight turns.

Subsequent to this event the incident aircraft and its sister ship, another Tecnam flown by the same operator, both exhibited rudder pedal distortion when inspected during scheduled maintenance. Following consultations with the Maintenance Organisation, the Operator has now amended their ground manoeuvring procedures to reduce the rudder pedal loading experienced during such manoeuvring. Specifically, the operator avoids tight turning manoeuvres whenever possible. When tight turns are necessary the Operator requires that the aircraft is brought to a complete halt, following which the brake is released and the aircraft is turned slowly using the minimum throttle and rudder pressure necessary to accomplish the turn. Since introducing the new turning procedures the Maintenance Organisation have not found any distortion problems with rudder pedal assemblies.

2. ANALYSIS

The stop may have been misplaced either during the post-accident re-build or it may have moved due to pressure applied during tight turning manoeuvres. In either case, the misplaced stop allied with the Operator's ground manoeuvring procedures resulted in rudder pedal loads which exceeded the design loads of the assembly, causing pedal assembly distortion and ultimately pedal assembly failure. Re-alignment of the stop coupled with the Operator's revised turning procedures should reduce the likelihood of further such failures.

3. CONCLUSIONS

(a) Findings

1. The left hand rudder stop was misaligned either because it was incorrectly set or because it had moved due to the pressure generated during tight turning manoeuvres.

2. The Operator's turning procedures prior to the event, allied to the stop misalignment, resulted in rudder pedal loads which exceeded the design loads of the assembly.

3. The Operator's revised turning procedures should reduce the likelihood of further such failures.

(b) Probable Cause

1. Misalignment of the left hand rudder stop.

(c) Contributory Factor(s)

1. Turning procedures which caused excessive loads on the rudder pedal assembly.

4. SAFETY RECOMMENDATION

This Investigation does not sustain any Safety Recommendations.

- END -

In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Regulation (EU) No 996/2010, and Statutory Instrument No. 460 of 2009, AIR NAVIGATION (NOTIFICATION AND INVESTIGATION OF ACCIDENTS, SERIOUS INCIDENTS AND INCIDENTS) REGULATION, 2009, the sole purpose of these investigations is to prevent aviation accidents and serious incidents. It is not the purpose of any such accident investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

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