FINAL REPORT

AAIU Synoptic Report No: 2006-029
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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 9/08/05, appointed Mr. John Hughes as the Investigator-in-Charge to carry out a Field Investigation into this occurrence and prepare a Synoptic Report.

Aircraft Type and Registration:	ATR 42-300, EI-BYO
No. and Type of Engines:	2 x Pratt & Whitney PW100-120
Aircraft Serial Number:	161
Year of Manufacture:	1989
Date and Time (UTC):	5 August 2005 @ 13.28hrs
Location:	Enroute to Cork Airport
Type of Flight:	Public Transport
Persons on Board:	Crew - 3 Passengers - 45
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	No Damage to Aircraft
Commander's Licence:	JAA ATPL
Commander's Details:	Male, aged 31 years
Commander's Flying Experience:	5,000 of which 570 were on type.
Information Source:	Operator and Irish Aviation Authority.

SYNOPSIS

The aircraft was enroute to Cork Airport when the crew observed that No. 1 engine was producing progressively less power. The landing at Cork was routine and the passengers disembarked via the normal stairs. The crew discovered that No. 1 engine nacelle was leaking fuel. Further investigation revealed that the fuel was leaking from a pipe connection, which had become loose.

1. FACTUAL INFORMATION

1.1 History of the Flight

During climb enroute to Cork the crew noticed a discrepancy in parameters between engine No1 and engine No.2. This got progressively worse with increasing altitude. Since the aircraft was almost halfway at that stage the crew decided to continue to Cork Airport. Engine No.1 was not producing the normal amount of torque and all it's other parameters were also unusual. The cabin attendant was then informed of the situation. During approach the crew had a large split throttle between the two engines but otherwise the landing was normal. After touch down the crew feathered No.1 engine and 20 seconds later shut it down.

On arrival at the parking position the cabin attendant informed the crew that fuel was leaking from engine No.1 nacelle. The crew shut down No.2 engine and pulled the fire handle for No.1 engine. The Airport Fire Service was requested and after discussion with the Fire Chief the Captain decided to allow the passengers to disembark. They did so in the normal way and there were no reported injuries.

1.2 Aircraft Information.

The leak was traced to a nut on the fuel flow divider union. The nut was discovered to be incorrectly wire locked and had backed off the divider. The union was re-torqued in accordance with the Maintenance Manual (MM) and leak tested. An engine run was carried out which was satisfactory. The nut was then wire locked correctly.

1.3 Aircraft History.

The aircraft had completed 303 flight hours since the last A-Check on 5 June 2005. No work had been carried out on the engine fuel pipe since that date when the fuel nozzles were replaced. It is reasonable to assume that the nut was incorrectly wire-locked at that time.

1.4 Manufacturers Instructions

Appendix A shows a photograph and drawing of the fuel flow divider assembly installation. The Maintenance Manual requires that items to be wirelocked together are the tube coupling nut to its thrust pin, and the coupling nut to the adjacent dump valve bolts.

The sole function of the thrust pin is to retain the nut on the pipe. Without the thrust pin installed the nut could slide over the flared end of the pipe. The pin facilitates replacement of a worn or damaged nut on a pipe assembly without having to replace the pipe. Disconnecting the coupling nut from the flow divider does not involve removal of the thrust pin.

1.5 Operator Actions

In August 2005, days after this incident, the Operator issued Engineering Notice No. 28/2005 instructing it's technical personnel that the instructions detailed in the engine manufacturers Maintenance Manual should be followed during the removal/installation of the flow divider delivery tube nut. The Operator also found that an incorrect thrust pin configuration may be found due to an error in the engine shop Cleaning Inspection and Repair Manual (CIR). An Operators Quality Assurance Notice (ENO705) was issued on 10 August 2005 requiring that a duplicate inspection be carried out anytime part of the fuel system downstream of the fuel booster pumps is disturbed.

A fleet inspection was initiated following this incident and one further instance of incorrect wire locking was revealed. The above CIR Manual 72-09-20 page 901/902 was amended by the engine manufacturer on 25 November 2005.

2. ANALYSIS

Correct wire-locking procedure will ensure that this nut is held tight against the threads during in service vibration of the pipe assembly. In this case the incorrect method of wire-locking had significant safety implications.

The method of wire-locking used did not prevent the nut from backing off due to normal engine vibration. This allowed the nut to loosen with a consequent leakage of fuel on to the engine nacelle. The fuel flow to the engine was progressively less and a reduction in available power followed. Had the flight time been longer the engine could have suffered complete fuel starvation, necessitating a descent and approach with only No.2 engine operating. On landing, the Captain took the correct action in pulling the No.1 fire handle and calling the Fire Services. Operator actions, in issueing the Engineering Notice and the QA Notice, following the event were adequate. The preliminary amendment of the manufacturers CIR manual was also timely. The Investigation does not, therefore, intend to make any Safety Recommendations.

3. CONCLUSIONS

(a) Findings

1. Fuel leaked from the fuel flow divider of No. 1 engine during flight causing a loss of engine power.

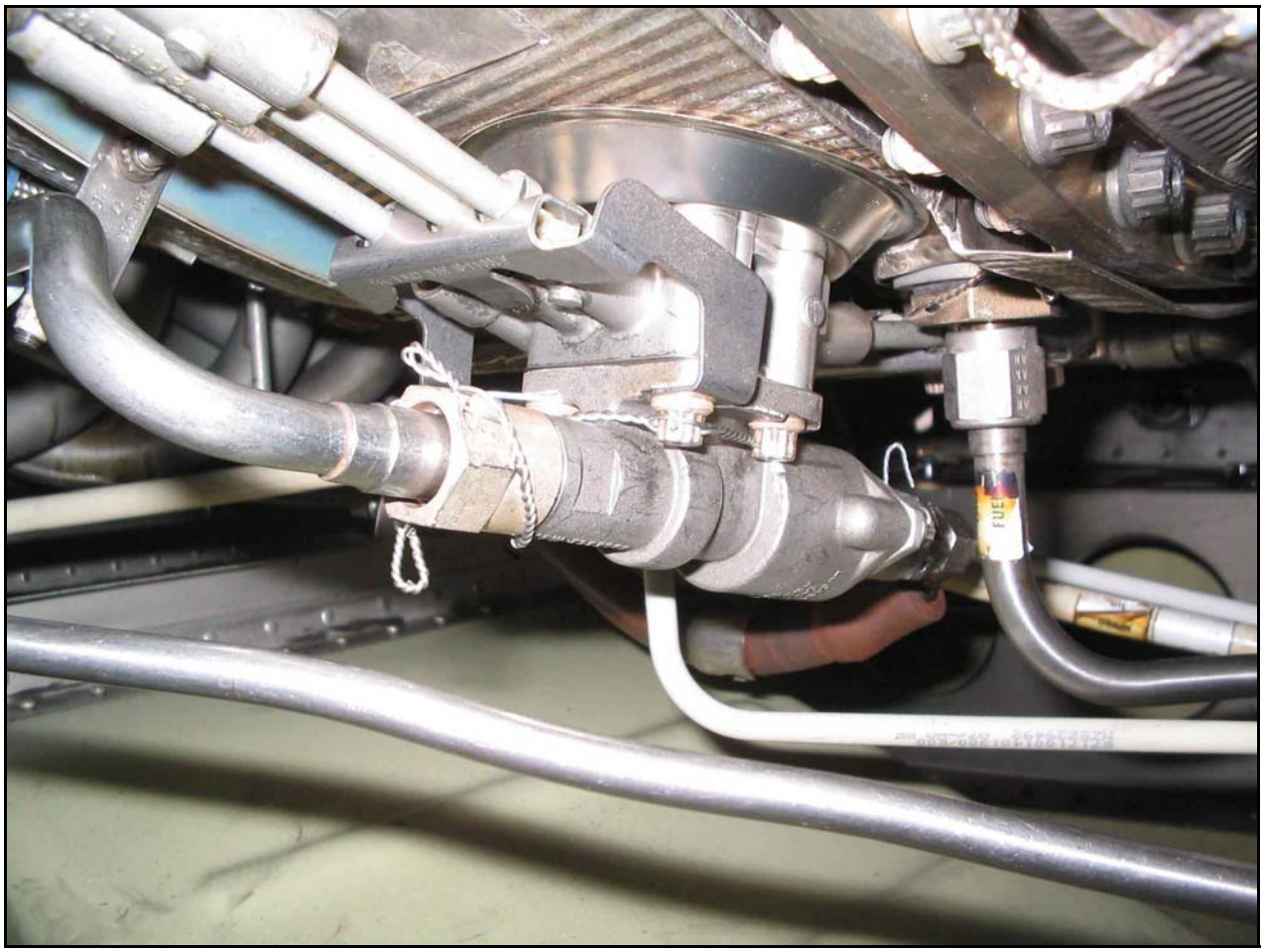
(b) Cause

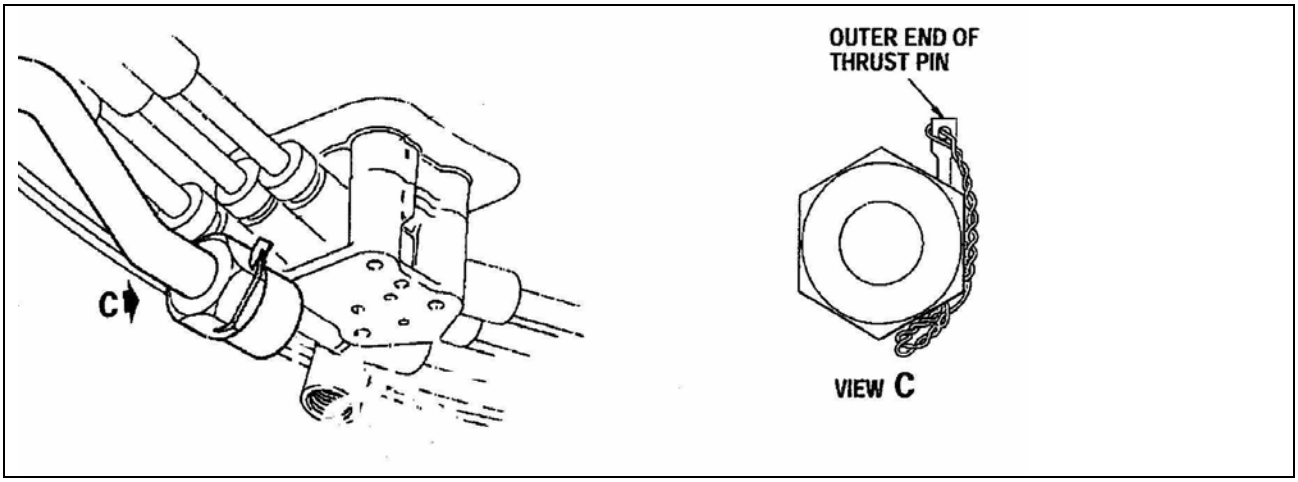
1. A nut on the fuel flow divider was incorrectly wire-locked and allowed the nut to back off, thereby causing the fuel leakage.

4. SAFETY RECOMMENDATIONS

4.1 This report does not sustain any Safety Recommendations.

APPENDIX A





The tube coupling nut is wirelocked to adjacent bolts on the dump valve in such a way that tension in the wire prevents the nut from backing off. The wire locking of the thrust pin to the coupling nut keeps the thrust pin in place.

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