Aviation Safety Investigation Report 199301490

Boeing Co B737-400

23 May 1993

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

The Bureau did not conduct an on scene investigation of this occurrence. The information presented below was obtained from information supplied to the Bureau.

Occurrence Number:	199301490	Occurrence Type:	Incident	
Location:	200km W Melbourn	e		
State:	VIC	Inv Category:	4	
Date:	Sunday 23 May 199	3		
Time:	0918 hours	Time Zone	EST	
Highest Injury Level:	None			
Aircraft Manufacture	r: Boeing Co			
Aircraft Model:	737-476			
Aircraft Registration:	VH-TJJ			Serial Number: 24435
Type of Operation:	Air Transport Do	omestic High Capacity	Passenger	
Damage to Aircraft:	Nil			
<b>Departure Point:</b>	Melbourne Vic			
<b>Departure Time:</b>	0901 EST			
Destination:	Perth WA			

Approved for Release: Sunday, June 19, 1994

Shortly after the aircraft was established in cruise, the crew noticed that the right engine low oil pressure light was illuminated and that the corresponding oil pressure indication was zero. As the engine shutdown procedure was being carried out, a smell of smoke was noticed and the right engine fire extinguisher was activated. The aircraft was returned to Melbourne and landed without further incident.

An analysis of the flight data recorder readout showed the that oil pressure began to fall during the takeoff at Melbourne, and some 13 minutes later had fallen to the low oil pressure warning light setting of 13 lbf/sq in. The pressure continued to fall to zero over the next 3 minutes 20 seconds. The engine ran with zero oil pressure for a further 2 minutes and 40 seconds before the number 3 bearing failed leading to rapidly rising EGT and decaying N1 and N2. The engine was then shut down by the crew.

The crew did not notice the gauge indications during the climb and initial cruise. A check of oil pressure indication during these phases of flight is not required by the aircraft checklist. The engine monitoring instruments are located on the pilots' centre console and are not connected to the aircraft master caution system.

An inspection found that the engine oil tank cap had not been correctly secured and was displaced out of its holder. The non-return valve was also missing from the base of the cap holder. With the oil tank cap not sealing and with the non-return valve not fitted to the cap holder, the engine oil tank was vented to atmosphere, was unable to pressurise, and oil was able to escape from the tank. The lack of oil tank pressurisation also caused a loss of positive inlet pressure to the oil pump resulting in a loss of pump performance which starved the engine bearings of oil, and led to the failure of the number 3 bearing. The smoke smell detected by the crew would have been generated during this failure sequence.

For this incident to occur there had to be two problems. First the oil tank cap had to be unsecured and secondly the non-return valve had to be missing. All engine manufacturers have addressed the problem of unsecured oil tank caps by fitting non return valves to the tanks. This particular installation was the original fitment when the engine was delivered new to the operator and it is therefore likely that the non-return valve was not fitted on manufacture. The engine oil tank cap was not locked into place correctly after the engine oil quantity was checked prior to departure. The reason for this was not determined.

Significant factors

The following factors were considered relevant to the development of the incident.

1. The engine oil tank cap was not properly secured and became dislodged.

2. The engine oil tank filler non-return valve was not installed.

3. The engine low oil pressure warning is not connected to the aircraft master warning system.

4. The reduction in engine oil pressure indication was not noticed by the crew.

Safety Actions.

1. The operator carried out a fleet inspection to check for the installation of the non return valve.

2. The engine manufacturer was notified of the findings.

3 .The operator has revised the preflight check to ensure that the cap is correctly secured.

4. The operator has issued an Engineering Instruction that requires that the presence of the oil tank non-return valve be checked each time engines are inspected in the operators engine facility.

5. Consideration is being given to connecting the engine low oil pressure warning to the aircraft master warning system.