

AAIB Bulletin No: 11/94

Ref: EW/G94/07/12

Category: 1.3

Aircraft Type and Registration: Cessna 150J, G-BOWC

No & Type of Engines: 1 Continental O-200-A piston engine

Year of Manufacture: 1969

Date & Time (UTC): 10 July 1994 at 1435 hrs

Location: Barton Moss Farm, Manchester

Type of Flight: Private

Persons on Board: Crew - 1 Passengers - 1

Injuries: Crew - None Passengers - None

Nature of Damage: Damaged beyond economic repair

Commander's Licence: Private Pilot's Licence

Commander's Age: 27 years

Commander's Flying Experience: 133 hours (of which 129 were on type)
Last 90 days - N/A
Last 28 days - N/A

Information Source: Aircraft Accident Report Form submitted by the pilot,
telephone enquiries and failed cylinder examination by
the AAIB

The pilot was intending to fly a short distance from Barton Airfield to a farm strip. He had performed the normal power assurance checks prior to takeoff and reported that the initial takeoff and climb performance was good. Having levelled off at 1,200 feet, the aircraft had been cruising for about 5 minutes when the engine started to run very roughly and it appeared to the pilot that they had lost one cylinder. As the engine was still developing partial power he turned back to the airfield, making a 'PAN' call upon which the circuit was cleared for him. However, whilst established on the approach, the engine suddenly stopped with a loud bang accompanied by smoke from the left side of the cowling, which had been pierced by some object from the inside.

The pilot realised that they could not make the aerodrome due to a line of electricity pylons and at 800 feet he declared a 'MAYDAY', turning away from Barton and the pylons but his options were limited since all the fields seemed ploughed and full of crops. Having selected such a field with good landing distance he performed the emergency checks, touching down at about 40 kt in a nose-high

attitude. Unfortunately the crop of potatoes had been furrowed at right angles to the landing direction and, as the nosewheel touched down, the aircraft flipped inverted. The pilot and passenger evacuated rapidly and without injury and reported that the airfield fire services attended within five minutes; there was no fire.

Investigation quickly showed that the front left (No 4) cylinder barrel had failed circumferentially around approximately the second/third cooling fin from the bottom, releasing the major portion of the barrel (see photograph). Subsequent metallurgical examination by the AAIB showed that the failure had been due to metal fatigue initiated by corrosion pits on the outside surface of the cylinder at the base of the cooling fins.

History of the Engine

The airframe and engine log books showed that the aircraft had been imported into the UK from the USA in 1989 with the subject engine, Serial No 230956R, fitted and with 591 engine hours run since 'new or complete overhaul'. The engine log book quoted the date of manufacture as 1979, but the maintenance organisation was unable to clarify whether it had been overhauled between then and 1989 since they said that the hours run had merely been copied across from the American paperwork.

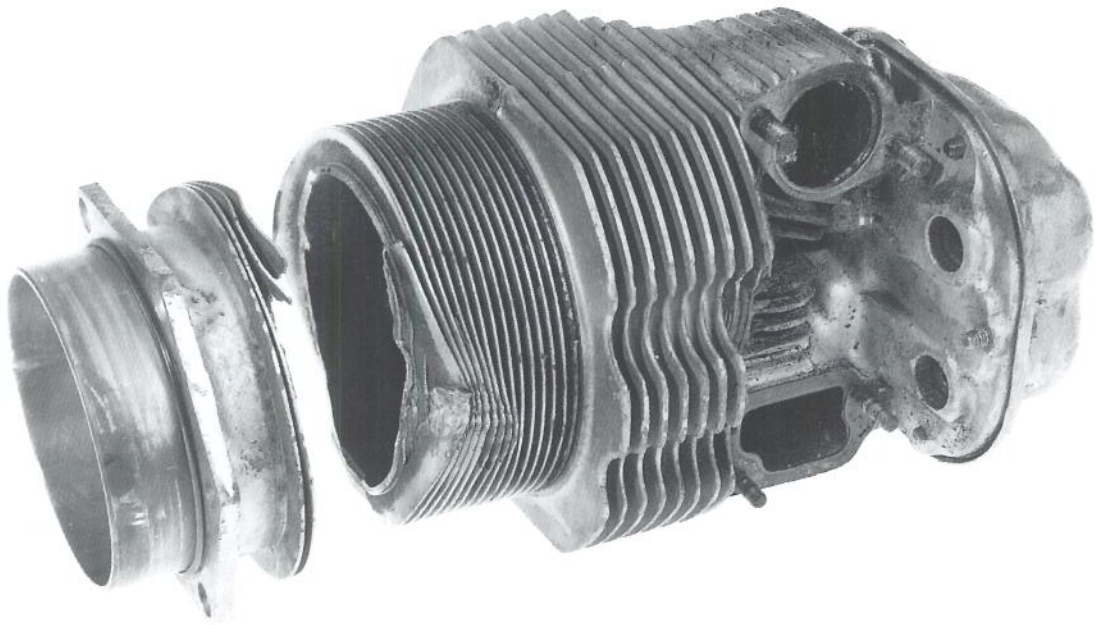
In fact, enquiries with Teledyne Continental Motors were unable to determine the date of manufacture but their last records were of it receiving a factory rebuild in 1979, as indicated by the suffix 'R' after the serial number. All references to previous history are not retained after a factory rebuild, since it is considered that the engine is effectively new and they advise that new cylinders would have been fitted at this time. It was not possible to ascertain whether the unit was subjected to another overhaul between 1979 and 1989 when it was imported into the UK, although the British log book did not record any such work to the date of the accident when the engine had accumulated about 1,200 hours and was probably, effectively 15 years old.

Additional Information

The type of failure suffered by this engine is one of a continuing trend of cylinder cracks and failures. As reported in the AAIB Bulletin 6/94, the CAA's database records a steep rise in the number of reported occurrences under the heading of 'Cylinders and Cylinder Heads' occurring in the last five years. The precise validity of these statistics should be treated with caution, since the rise could result from better reporting over the latter part of the eighteen year period covered. Equally, the statistics show a much greater number of occurrences involved Lycoming engines, but this could reflect a larger number of these engines in-service and the problem of external corrosion at the base of the cooling fins appears to be possible with any air-cooled engine of this type.

Again, as reported in Bulletin 6/94, the accident to a Piper PA-28R-200 was caused by a cylinder of its Lycoming IO-360-CIC engine failing due to corrosion-induced fatigue. In this case the engine was 21 years old but flew very few hours such that it had never reached its recommended TBO (Time Between Overhaul) life of 2,000 hours. This report also noted a Lycoming Service Instruction (No 1009AJ) which stated '...all engines that do not accumulate the recommended operating hours between overhaul in a twelve year period must be overhauled in the twelfth year'. There appears to be no equivalent instruction relating to Continental engines.

A regular flight safety publication issued by Transport Canada Aviation called 'Flight Safety Maintainer' featured the problem of cylinder and head cracking in its issue 3/94. In addition to discussing the relative merits of renewing or overhauling cylinders, it advocated regular checks, including visual, borescope, compressed air and compression checks. The same publication, in its 4/93 issue, gave details of a Continental O-200A engine from a Cessna 150L which force landed following a separated cylinder. Cause of the failure was attributed to fatigue initiated by corrosion pits, the engine having run 3,170 hours since new and 1,371 hours since last overhaul. The calendar age of the engine was not stated. The photograph accompanying the article appears strikingly similar to the photograph which accompanies this bulletin and suggests that the origin of the fatigue occurred in the same location.



G-BOWC failed cylinder