No: 12/90 **Ref: EW/G90/06/18** **Category: 1c**

Aircraft Type and Registration:	Cessna 152, G-BOHB
No & Type of Engines:	1 Lycoming O-235-L2C piston engine
Year of Manufacture:	1977
Date and Time (UTC):	12 June 1990 at 1017 hrs
Location:	Tattenhoe, near Bletchley, Buckinghamshire
Type of flight:	Private (training)
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Left wing heavily damaged, further damage to cowl, aft fuselage and tail. Nose leg collapsed
Commander's Licence:	Commercial Pilot's Licence with Instrument and Instructor ratings
Commander's Age:	32 years
Commander's Total Flying Experience:	1,416 hours (of which 200 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot and metallurgical investigation by Materials and Structures Department, RAE Farnborough

The aircraft was being used on a dual instruction detail when "slight but unusual" engine vibration was felt. The instructor decided to cut the flight short and set course for Cranfield, informing Cranfield ATC of the situation. Over the next four or five minutes the vibration increased until there was a loud bang at which the instructor closed the throttle and completed the engine shutdown drill.

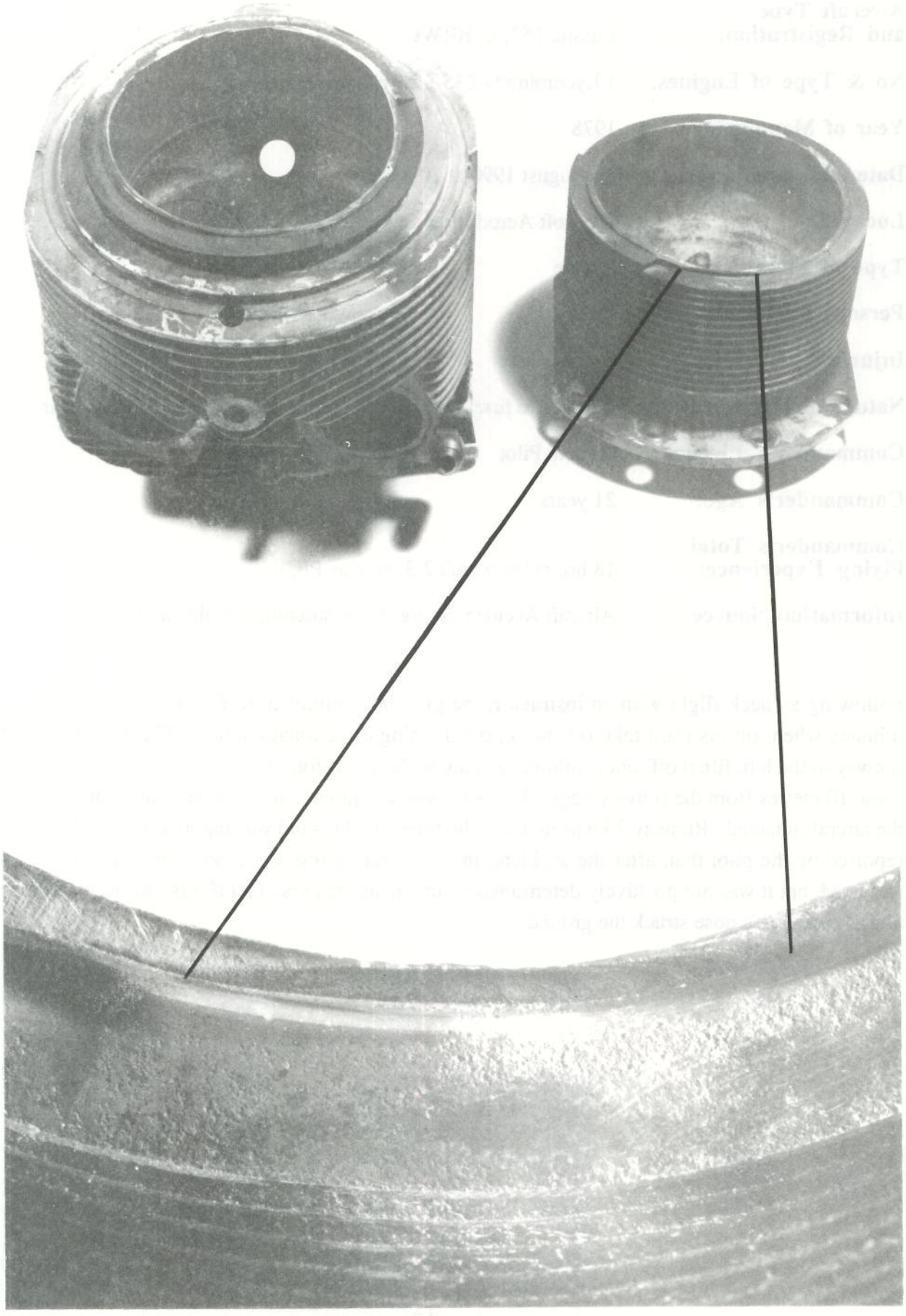
A forced landing was carried out from an altitude of 1500 feet, into wind (5 kt), and the aircraft touched down about half-way into a field which had a pronounced downslope. The aircraft ran to the far corner of the field where it collided with fences, hedges and trees. Although the airframe received substantial damage in these collisions the aircraft remainded upright, the cockpit structure remained intact and the crew emerged uninjured.

It was found that the engine's left hand rear cylinder had detached through a circumferential fracture in its skirt which had developed between two of the cooling fins. The failure was initially examined by a CAA Surveyor who consulted a metallurgist about the nature of the failure but it was subsequently despatched to AAIB for metallurgical examination at RAE Farnborough. Co-incidentally the CAA

became aware of a similar failure in another Lycoming O-235 engine (a series N2A from a Slingsby T67) and that cylinder was also received at Farnborough for examination.

The two cylinders had failed in fatigue and the failures were almost identical in location, initiation and development (cylinder from G-BOHB is shown in the photographs). The cylinder external surfaces had been protected by paint but this had largely disappeared from the barrel surface between the fins and the unprotected surfaces were corroded. Initiation had been from a single origin in an area of the external surface which was corroded and pitted. Staining from hot combustion gases was evident over about one third of the circumference of the fracture (this effect was less marked but slightly more extensive in the case of the other cylinder). This showed how far the crack had progressed before the final rapid rupture. There was no suggestion from the metallurgical examination of any material defect or deficiency.

G-BOHB FAILED ENGINE CYLINDER



AREA OF FATIGUE ORIGIN