AAIB Bulletin No: 11/95 **Ref: EW/G95/08/15** **Category: 1.3**

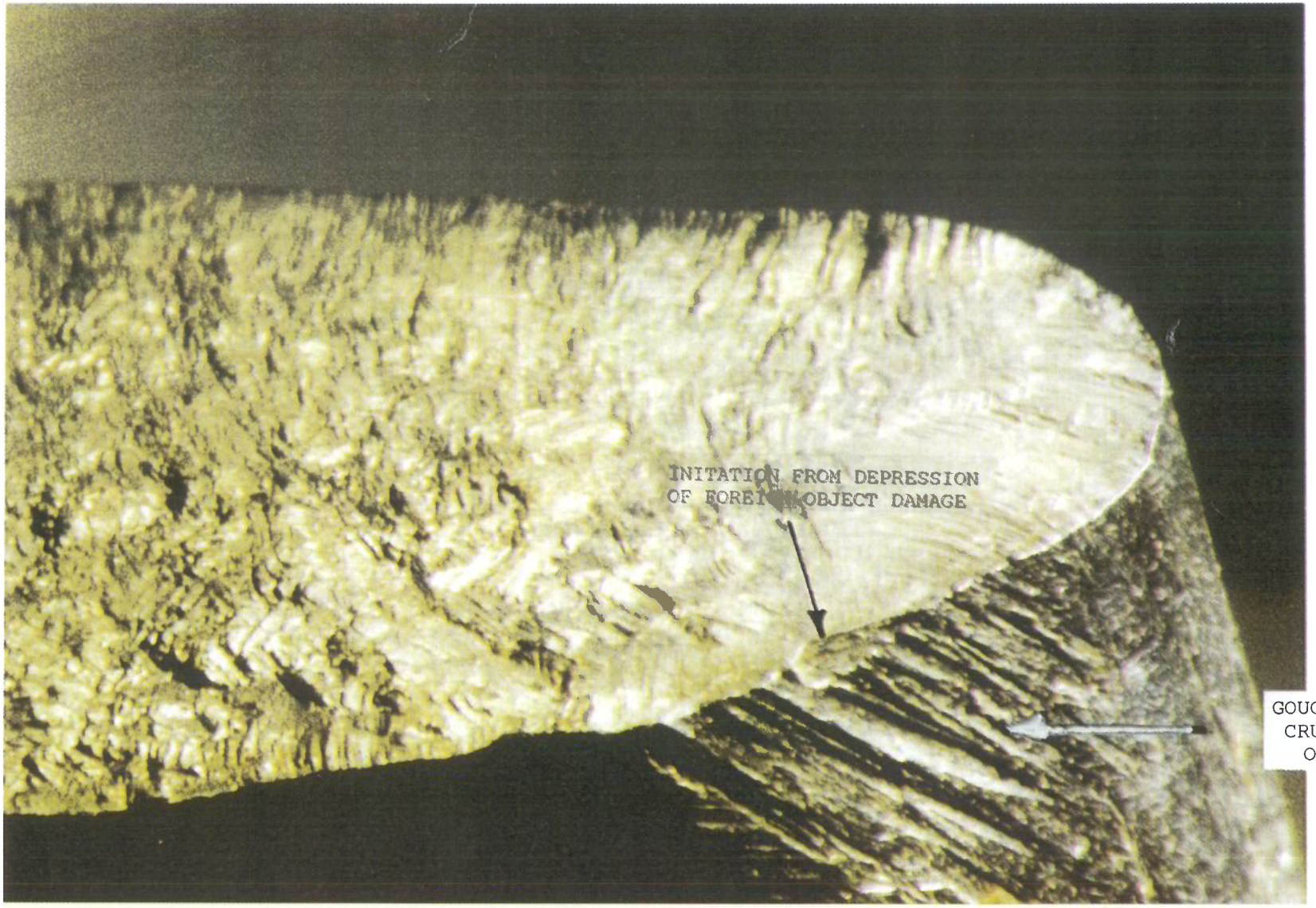
Aircraft Type and Registration:	Piper PA-32R-300 Cherokee Lance G-GOMM
No & Type of Engines:	1 Lycoming IO-540-K1G5D piston engine
Year of Manufacture:	1977
Date & Time (UTC):	15 August 1995 at 1110 hrs
Location:	Eyehurst Farm, Kingswood, Surrey
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Severe damage to right stabiliser; wings, flaps and underside fuselage damaged; 8 inches of propeller blade missing
Commander's Licence:	Basic Commercial Pilot's Licence with IMC, Night and Instructor Ratings
Commander's Age:	38 years
Commander's Flying Experience:	6,484 hours (of which 3,000 were on type) Last 90 days - 100 hours Last 28 days - 48 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and metallurgical examination

Whilst in the cruise at 2,400 feet the pilot heard a loud bang and felt a severe and violent vibration. The pilot attempted to identify the cause of the vibration by alternating the magnetos, selecting another fuel tank and switching on the fuel pump, but the vibration continued. The pilot shut down the engine and carried out a forced landing into a field. During the landing the aircraft collided with wooden fence posts and the right main landing gear collapsed. After evacuating the aircraft the pilot, who was uninjured, noticed that approximately 8 inches of one propeller blade was missing.

Subsequent metallurgical examination of the propeller blade showed that it had failed as a result of fatigue and that the initiation was at a sharp-edged pit immediately adjacent to the blade's leading edge. The pit in the leading edge had been caused by a foreign object striking the blade whilst it was under power. There were witness marks on the blade leading edge which indicated that an unsuccessful attempt had been made to dress out the associated foreign object damage (Photograph No. 1). Microscopic examination of the failure indicated that the fatigue cracking had initiated from micro-cracking in the pit surface. The micro-cracking had occurred at the time that the foreign object

damage took place and the fatigue progression from the micro cracking was almost immediate. The fracture face showed that the initial progression occurred as a result of a series of 'events', each of which contained many load cycles. It was considered that the events were flights. The start of each event was identifiable by an increased rate of damage which, it was considered, had occurred during the 'ground-to-air' part of each flight. It was estimated that the progression up to the rapid failure was over a period of approximately 50 flights. During the examination it was noted that the leading edge paint had been abraded, rather than eroded, from the outer 12 inches of the blades.

The propeller had been examined in accordance with Airworthiness Notice 75 by an approved overhaul agency in February 1995. This inspection had included removal of all paint from the blades, removal of all leading edge damage, re-profiling the leading edges, examination of the blades for signs of corrosion or cracking and repainting, including the leading edges. Examination of the aircraft and propeller log books showed that since the propeller had been fitted following the Airworthiness Notice 75 inspection the aircraft had completed 47 hours over 92 flights. There were no work entries in the log books from the time that the propeller had been fitted up to the accident flight.



PHOTOGRAPH No. 1 Three quarter view on initiation region showing depression from hard particle and associated gouged region where dressing out had been attempted.

Photograph courtesy of HT Consultants