AAIB Bulletin No: 5/94 **Ref: EW/G94/02/11** **Category: 1.3**

Aircraft Type and Registration:	Luton LA4A Minor, G-ASXJ
No & Type of Engines:	1 Lycoming O-145-A2 piston engine
Year of Manufacture:	1974
Date & Time (UTC):	28 February 1994 at 1740 hrs
Location:	Stapleford Tawney Airfield, Essex
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to engine, propeller, cowlings and landing gear
Commander's Licence:	Private Pilot's Licence with Night Rating
Commander's Age:	37 years
Commander's Flying Experience:	139 hours (one on type) Last 90 days - 8 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot was making a flight from RAF Halton when, after a reportedly normal landing on Runway 22 at Stapleford, the left wing dropped and the aircraft pitched forward onto its nose despite the pilot's efforts to maintain control. After he had shut off the fuel and magnetos and vacated the aircraft he noticed a groove in the grass surface leading up to the left landing gear, with the main wheel assembly lying on the ground at the start of this groove some 10 feet away. On further inspection it was apparent that the wheel stub axle had failed at the junction with its support structure.

A diagram of this area and photographs of the failure are shown in Figures 1 to 4. As may be seen, the axle is a cantilevered tube with its outboard end open to the environment. The failed axle was subjected to a detailed metallurgical examination, the findings of which included the following:-

a) The stub axle assembly had fractured across the diameter of the axle tube just inboard of the inner face of the brake drum attachment plate.

b) The fusion length of the weld on the backing plate and axle tube was almost non-existent and limited to the silver coloured band arrowed 'B' in Figures 2 and 3.

c) Part of a hole was present in the axle tube, which had been painted internally, and is as arrowed 'D' in Figure 3. This hole had broken into the plane of fracture. The nature of this hole indicated that it could have occurred as a result of a weld 'melt-through', possibly due to the use of excessive electric current in a shielded arc welding process.

d) There were two small regions, at positions 'F' in Figure 3, where fracture progression could have progressed from a very low cycle, high stress, tension fatigue mechanism.

e) Hardness test results obtained on the component parts of the subject axle assembly indicated that the sleeves had not been manufactured from material to BS T45 (minimum spec. strength requirement of 45 ton/sq. inch) as required by the drawing, but from a material with a minimum strength of approximately 28 ton/sq.inch.

It was thus concluded that the failure of the axle had resulted from the stress induced in the last landing, but that the static strength of the assembly, as manufactured, had been adversly affected by very poor quality welding.

The aircraft's Permit to Fly had been renewed on 11 January 1994, since when it had flown some 2 hours 15 minutes. This aircraft project had been started in 1974, but it was sold in kit form to an aerial spraying company in 1984 as an exercise for their apprentices to build. After it had been completed, it was sold to a private owner who had flown and maintained it since, the aircraft having flown on average of only eight hours per year. It had accumulated a total time of 81.35 hours. No records could be traced as to where and when this particular axle, or its partner, had originally been manufactured.

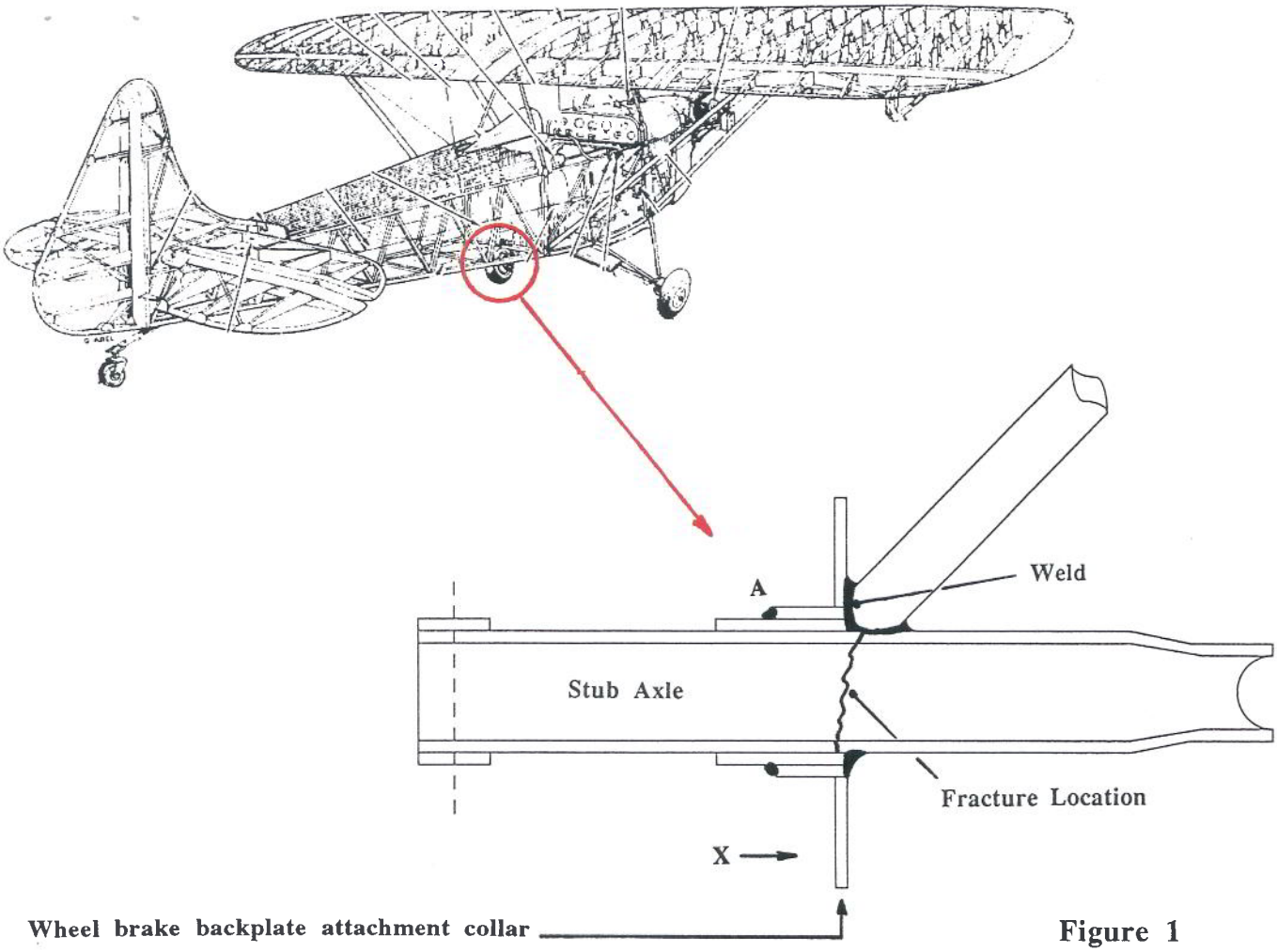

Figure 1

Region where weld detatchment on backplate was negligible
Leg length fusion limited to 'B' - silver coloured band

Figure 2
View on X on inboard face of backplate showing failure

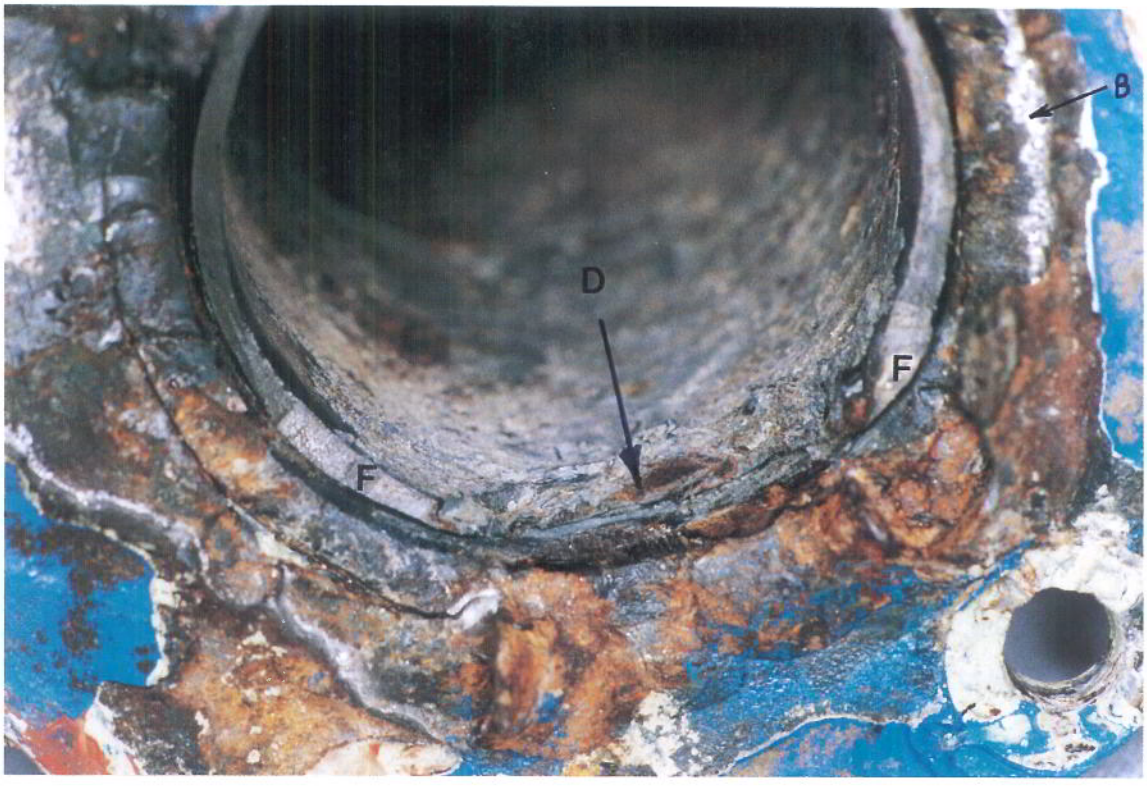

Figure 3

Region where melt-through occurred - 'D'
Fatigue areas - 'F'

Figure 4

Oxide film in weld root