No: 9/88 **Ref: EW/C1074** **Category: 1c**

Aircraft Type and Registration:	Aeronca A-65-TAC Champ, G-BIHW	
No & Type of Engines:	1 Continental Motors Corp. A 65 piston engine	
Year of Manufacture:	1939	
Date and Time (UTC):	29 June 1988 at 1040 hrs	
Location:	To the side of Runway 21 at Shoreham Airport	
Type of Flight:	Test Flight	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1	Passengers - N/A
Nature of Damage:	Severe damage to most parts of the aircraft	
Commander's Licence	Private Pilot's Licence	
Commander's Age:	65 years	
Commander's Total Flying Experience:	1000 hours (of which 25 were on type)	
Information Source:	AAIB Field Investigation	

The pilot, who was familiar with the aircraft having flown it on many previous occasions, was asked by the owner to carry out a test flight following a period of some six months on the ground at Shoreham Airport, where the aircraft had been re-covered and painted. For this flight, he decided to fly only in the circuit and intended to complete three circuits, with two "go-arounds" and a landing. After inspecting the aircraft and conducting some engine runs he taxied out to runway 21. The first circuit was flown up to a maximum height of 1000 feet and, as no landing was to be made, the final approach was flown at a speed of 75/80 kts., the fastest that it had flown during the flight. As the aircraft approached the threshold, at a height variously estimated by witnesses of between 50 and 75 feet, the right wing dropped. The pilot reported that he made a correction with full aileron, but with no effect, so he immediately applied full left rudder. The aircraft eventually responded, reluctantly, but a few seconds later the wing dropped again. On this occasion he could not raise the right wing. The aircraft descended, the right wing tip struck the ground and the aircraft cartwheeled across the grass, to the right of the runway, for a distance of approximately 150 feet. The aircraft came to rest inverted, with the engine detached. The pilot suffered head injuries, since he was secured only by a lap strap (there was no upper torso restraint fitted to the aircraft) but was able to make his escape unaided. There was no fire. The surface wind at the time of the accident was reported as 190/08 kts.

The Aeronca A65 Champ is similar in basic design to such aircraft as the Piper Cub, Auster, etc, in that it has a high-mounted wing supported on each side by two struts. These struts on G-BIHW were welded together at their lower end to form a single fitting, which was then attached to the fuselage by a single bolt. The upper end of the front struts were similarly attached to wing-mounted fittings using a single bolt. The rear strut attachments to the wings, however, were slightly more complicated, ref.

Figure 1. As may be seen, each end fitting was made from two parts: an externally threaded rod which attached, by a single bolt, to the spar; and an internally threaded tube into which this rod was screwed and which itself was inserted into a socket at the end of the rear strut. The design was such that this tube was retained by a cross-bolt.

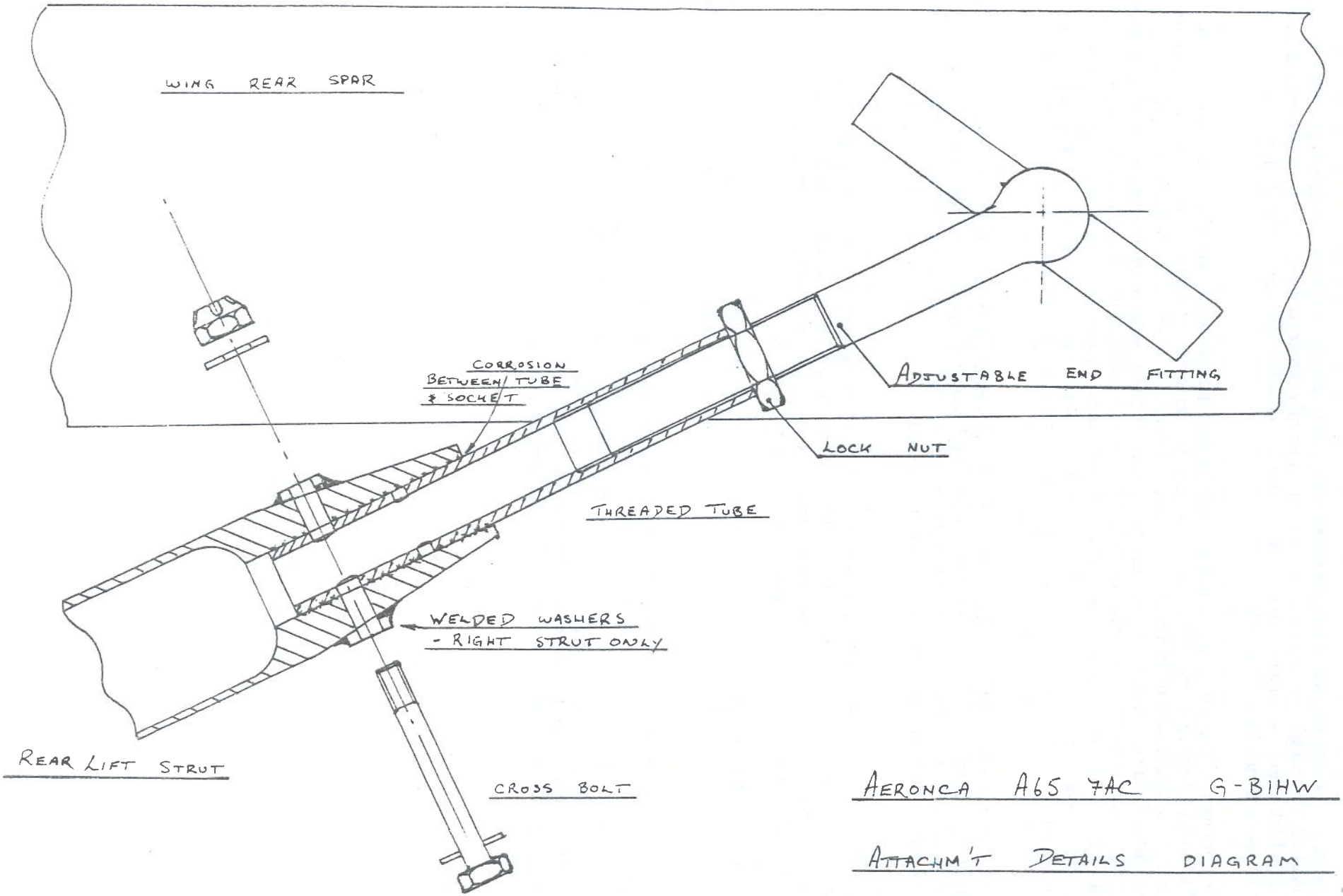
Examination of the wreckage revealed no pre-impact defects or failures within the aircraft, other than that both of these rear strut joints had disconnected due to the tube pulling out of the socket in the strut end. Close examination revealed no evidence of distortion of any of the holes in the tubes or struts and no parts of the cross bolts or their nuts were found in the wreckage trail, despite a specific search. In addition, fresh paint (which matched that of the aircraft) was evident in all of the bolt holes. Figures 2 and 3 show the condition of these joints, with corrosion present over the mating surfaces of both. The corrosion was more severe on the left wing joint. A later inspection of these areas revealed that the joint on the right wing had progessively pulled apart, whilst that on the left wing had initially been forced further into engagement, before pulling apart.

It was thus apparent that neither of these two rear strut attachment bolts had been present in their joints at the time of the accident, and that both joints had been held together through friction, induced by the corrosion. A test carried out, on the substantially intact left wing, demonstrated the expected lack of torsional rigidity with the rear strut joint disconnected.

G-BIHW had spent the previous six months with a maintenance organisation at Shoreham who had completely refurbished the aircraft and restored it to its original US Army Air Corps livery. This had involved repairing numerous faults in the aircraft, including corrosion failures of sections of the airframe, and removal of the wings and struts. There was no record of any rectification work having been carried out on the struts or intention to disassemble the joints.

A photograph taken of this aircraft, just before rectification work was started, was examined. There was sufficient detail to suggest that a bolt was present at that time in the left wing joint, and probably also in the right joint.

When re-assembled, it was not immediately apparent that these two joints required cross bolts to be safe. The tubes were both a relatively tight fit in the sockets, which together with the general amount of welding around the end of the struts, gave the appearance of being an integral part of the struts. It was not uncommon, in other areas of this aircraft and others of a similar type, to find such fittings permanently attached to tubular members by the use of hollow (welded-in) pins. This was the case at the mid-position on each strut, where the stabilising strut attached, and a hole of similar size to the cross bolt holes was present.



AERONCA A65 7AC G-BIHW

ATTACHM'T DETAILS DIAGRAM

WING REAR LIFT STRUT

FIGURE 1

RIGHT JOINT DETAILS

FIGURE 2

LEFT JOINT DETAILS

FIGURE 3