No: 7/88 **Ref: EW/C1025/01** **Category: 2a**

Aircraft Type and Registration:	Aerospatiale AS332L, G-TIGC
No & Type of Engines:	2 Turbomeca Makila 1A
Year of Manufacture:	1982
Date and Time (UTC):	26 June 1987 at 1155 hrs
Location:	59.35N; 00.30W (over North Sea)
Type of Flight:	Airline non-scheduled passenger
Persons on Board:	Crew - 2 Passengers - 9
Injuries:	Crew - None Passengers - None
Nature of Damage:	Failed horizontal stabiliser spar
Commander's Licence:	Airline Transport Pilot's Licence (Helicopters)
Commander's Age:	46 years
Commander's Total Flying Experience:	7038 hours rotary wing (of which 1344 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot

The aircraft was in level flight in IMC over the North Sea when the nose pitched sharply downward. Both pilots immediately applied aft cyclic pitch and regained level flight. However, it was noticed that the pitch attitude was indicating 5° nose down. Subsequently, it was observed that the horizontal stabiliser was not visible from the cockpit. A "Pan" call was transmitted and the aircraft was diverted to Sumburgh. Two passengers were moved from the forward seats to the rear of the aircraft for centre of gravity considerations. The passengers were briefed and checked personally by the Captain for a possible ditching.

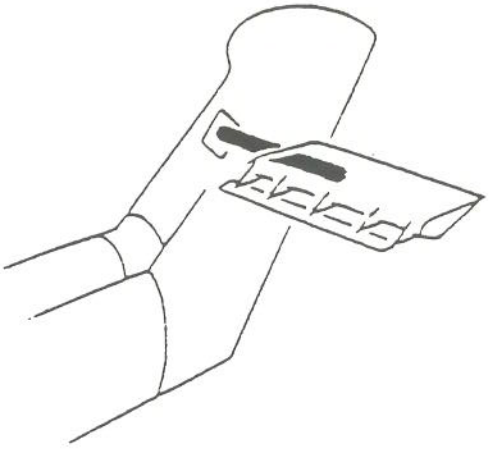
The pilot of a Search and Rescue aircraft that came alongside confirmed that the stabiliser was still attached but handing down vertically. A successful run-on landing was carried out at Sumburgh and the aircraft shut-down.

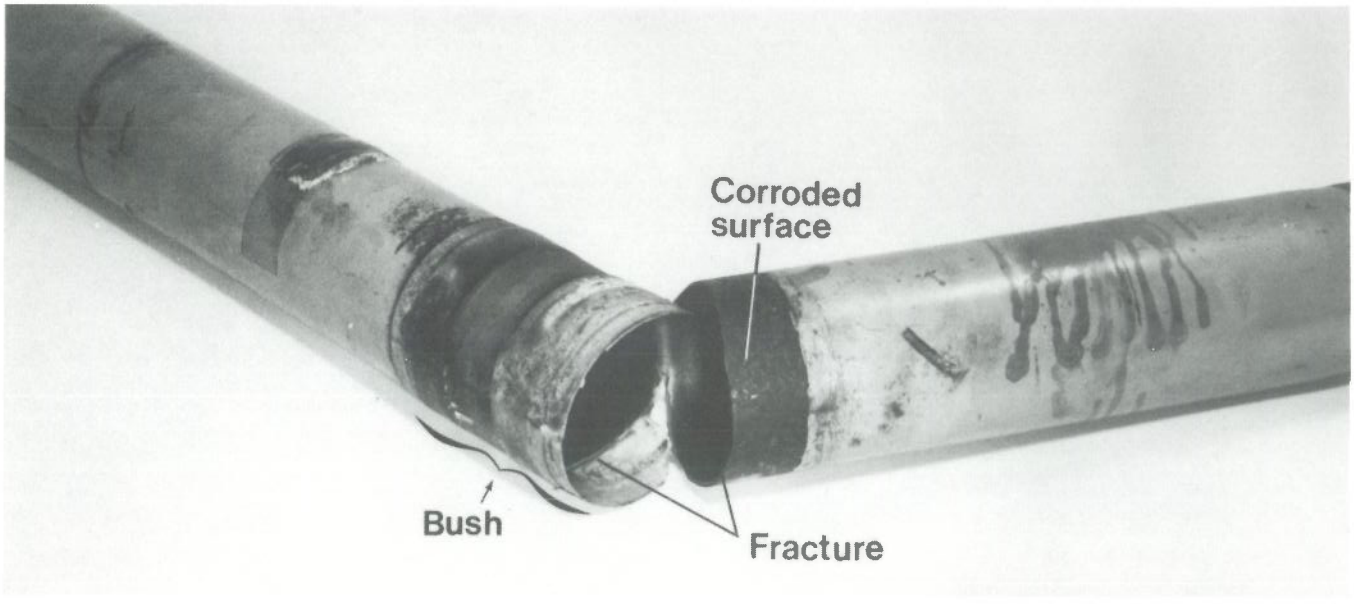
It was apparent that there had been a failure of the 80 mm diameter tubular steel spar within a glass fibre bush that covered that portion of spar bridging the gap between the horizontal and vertical stabiliser (See Figure). The fracture extended transversely around approximately 90% of the circumference. Metallurgical examination revealed a fatigue origin marked by corrosion staining and positioned some 60° aft of top dead centre. The fracture exhibited fatigue characteristics either side of the origin, extending to some 40% of the circumference, the remainder being fast fracture. The surface

of the tube adjacent to the fracture, that had been covered by the bush, was severely corroded over most of its area, and there was no evidence of any adhesive bond remaining between the bush and the spar. It was observed that the fatigue origin was associated with a corrosion pit of approximately 0.2 mm depth.

The bushes tend to wear in service and are thus periodically replaced. A new bush had been fitted to the subject spar. The method of replacement is detailed in the appropriate Maintenance Manual Work Card, with the surface preparation before bonding being the subject of a Standard Practice Card, both issued by the aircraft manufacturer. The Standard Practice Card directed that the passivated surface (on the cadmium plating of the spar) be removed by sanding with abrasive cloth of 180 to 200 grit size. This instruction would inevitably cause loss of the cadmium layer, the presence of which is not specifically mentioned. There was no instruction to subsequently replace the cadmium. Reprotection of the surface beyond the new bush was confined to a touch-up with primer and top-coat.

Following the incident, the manufacturer issued a Service Telex calling for replating (with cadmium) of the affected area prior to bush replacement. However, the operator is currently removing the old bushes by means of a vacu-blast process which also obviates the requirement to use abrasive cloth to prepare the cadmium surface for subsequent bonding.





Fracture of spar within GFRP bush