

AAIB Bulletin No: 2/95

Ref: EW/G94/08/13

Category: 1.3

Aircraft Type and Registration: Morane Saulnier MS.893E, G-DOOR

No & Type of Engines: 1 Lycoming O-360-A1A piston engine

Year of Manufacture: 1978

Date & Time (UTC): 21 August 1994 at 1020 hrs

Location: Andrewsfield (Saling) Airfield, Essex

Type of Flight: Private

Persons on Board: Crew - 1 Passengers - 3

Injuries: Crew - None Passengers - None

Nature of Damage: Propeller bent, engine shock-loaded and nose landing gear damaged

Commander's Licence: Private Pilot's Licence with Night Rating

Commander's Age: 50 years

Commander's Flying Experience: 400 hours (of which 207 were on type)
Last 90 days - 11 hours
Last 28 days - 3 hours

Information Source: Aircraft Accident Report Form submitted by the pilot and examination of shock absorber strut by the AAIB

Whilst taxiing for takeoff on Runway 27L, the nose landing gear partially collapsed, allowing the propeller to strike the ground.

The fixed landing gears on the Rallye series of aircraft are of the trailing-link type, with oleo-pneumatic shock-absorber struts supporting the weight of the aircraft (see diagram). Failure of the shock-absorber or its attachments would allow the nose landing gear to articulate sufficiently for the propeller to strike the ground.

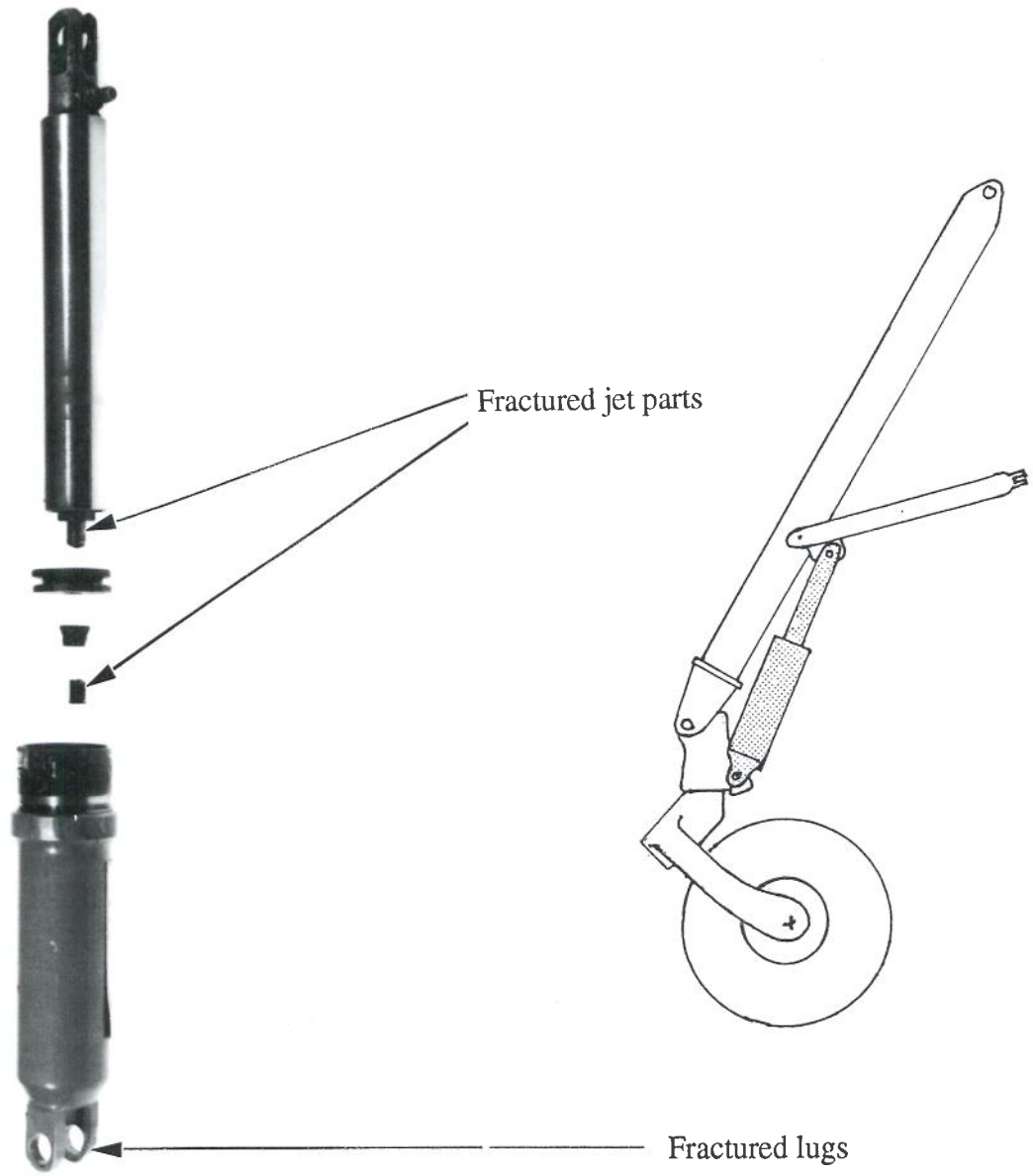
Examination of G-DOOR showed that the shock-absorber cylinder had failed at its attachment forked lugs at the bottom of the assembly (see photograph). The ram had been ejected from the cylinder due to a further failure within the assembly. This latter failure was of a restrictor jet which provides the damping action of the strut but is also threaded to attach the piston and prevents the ram from completely departing the assembly when the strut is fully extended.

Metallurgical examination of the failed shock absorber showed that the cylinder forked fitting had failed in gross overload, whilst the threaded portion of the restrictor jet bore evidence of fatigue damage across about 25% of the fracture surface with the remainder bearing signs of overload. Further fatigue cracks were found in the threads of the latter part.

Additional information

Aerospatiale (SOCATA) Service Bulletin (SB) No 144 dated December 1981 gave details of modified shock absorber jets on both nose and main landing gears to replace the original SOCATA designs across the range of Rallye aircraft. The SB quoted 'some cases' of fatigue failure of the jets as the reason for this change and recommended compliance at the next minor or major inspection. The jet fitted to G-DOOR was of the original type. Its material tensile strength was found to be 564 MPa (36.5 tsi), which appeared to be somewhat lower than the drawing specification. Enquiries with SOCATA revealed that the modification to the jet comprised addition of an undercut in the main body, change of material to a steel of higher strength and substitution of a rolled thread for the previous machined thread.

The SB explained at some length that the effect of such a failure of a jet would be that there was nothing to prevent the ejection of the ram from the cylinder if the shock absorber was not constrained by the geometry of the landing gear itself (see diagram). This highlights the importance of depressurising the strut before removal since if a failure of the jet has occurred, then the ram would be free to eject itself at high speed.



G-DOOR Nose landing gear geometry showing shock-absorber (shaded)